DESCRIPTION

CARBOSTYRIL COMPOUND

TECHNICAL FIELD

The present invention relates to a carbostyril compound.

BACKGROUND OF THE INVENTION

The trefoil factor family (TFF) is a group of highly stable peptides, having a three-leaved clover-like structure formed from six cysteine residues. Three TFF peptides (TFF1, TFF2 and TFF3) have been identified so far in humans. TFFs are present in mucus-related tissues such as the alimentary tract, and are secreted mainly by mucus-secreting cells. The expression of TTF peptides is up-regulated in the vicinity of damaged mucosa and in regenerating glands. It is reported that the main functions of TFF peptides lie in the augmentation of cell migration processes (motogenic effects), protection of cells, and suppression of apoptosis [Nature Reviews, Molecular Cell Biology, Vol. 4: 721-732(2003)].

TFF2 is a peptide of 106 amino acid residues, initially isolated from porcine pancreas. The TFF2 peptide is abundant in the gastric mucous neck cells, the pyloric region of the stomach, the mucosa surrounding ulcers, the regenerative mucosa, the overlying mucus layer, Brunner's glands, and so forth.

It has been confirmed with experiments using rats that TFF2 prevents the development of colitis and gastric ulceration and also accelerates the healing thereof [Gastroenterology 108: 108-116(1995); Gastroenterology 110: 489-497(1996); Alim. Pharmacol. Ther., 14: 1033-1040(2000); Gut, 45: 516-522(1999); Gut, 44: 636-642, 1999; and J. Leukoc. Biol., Vol. 75: 214-223(2004)].

Other experiments show that indomethacin-induced gastric ulcers are exacerbated in TFF2 knockout mice [J. Clin. Invest., Vol. 109: 193-204(2002)].

Eur. J. Clin. Invest., 32: 519-527(2002) discloses the

ability of TFF2 to stabilize mucus.

Am. J. Respir. Cell Mol. Biol., Vol. 29: 458-464(2003) teaches that TFF2 might be involved in regulating the proliferation of damaged airway epithelia.

It can be understood from the above that TFF2 plays key roles in protection against and repair of mucosal injury. With regard to diseases which are likely to be cured with TFF2, improved therapeutic effects are expected by a promotion of endogenous TFF2 production.

Gastroenterology, 126: 796-808(2004) discloses that TFF3 is effective for curing alimentary tract mucositis such as stomatitis induced by the administration of carcinostatics. Science, Vol. 274: 259-262(1996) and Gastroenterology, 119: 691-698(2000) conclude, from the fact that stomach cancer was developed in TFF1 knockout mice, that the TFF1 gene may function as a tumor suppressor gene. Nature Reviews, Molecular Cell Biology, Vol. 4: 721-732(2003) and Int. J. Mol. Med., 12: 3-9(2003) suggest that TFF2 may act in a similar way as TFF1 and TFF3.

As compounds for up-regulating TFF2 expression, ligands for peroxisome proliferator-activated receptor-γ (PPARγ) (e.g., indomethacin, aspirin, prostaglandin J_2 and troglitazone) are known [FEBS Lett., 488: 206-210(2001); Alim. Pharmacol. Ther., 18 (suppl. 1): 119-125(2003); FEBS Lett., 558: 33-38(2004); and Can. Res., 61: 2424-2428(2001)].

Among various proteins, keratinocyte growth factor (KGF) is reported to enhance TFF2 and TFF3 expressions in rat lower gastrointestinal tracts [Am. J. Physiol. Regul. Integr. Comp. Physiol., 284: R564-R573(2003)].

Some studies teach pharmacological actions of the TFF peptides themselves, and suggest the possibility of their application in clinical medicine (WO92/14837, WO02/102403, and WO02/46226).

WO01/002377 and WO02/051419 disclose various compounds having a substituent containing a 2,4-dioxo-thazolidinyl or 4-

oxo-2-thioxo-thiazolidinyl moiety on a heteroaryl skeleton such as a quinoline. These documents also disclose that such compounds exhibit telomerase inhibitory activity.

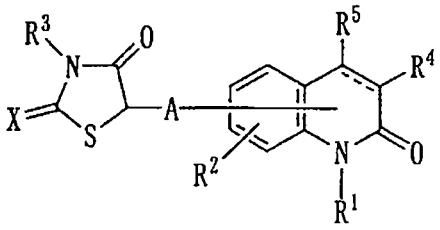
DISCLOSURE OF THE INVENTION

An object of the present invention is to provide a novel compound capable of up-regulating TFF; and to provide a pharmaceutical composition for preventing and/or treating alimentary tract diseases, oral diseases, upper respiratory tract diseases, respiratory tract diseases, eye diseases, cancers, and/or wounds, by up-regulating TFF.

The present inventors carried out extensive research to develop a novel compound capable of up-regulating endogenous TFF, and as a result, they found that carbostyril compounds of the following formula (1) can up-regulate endogenous TFF, particularly TFF2. The present invention has been accomplished based on these findings.

The present invention provides a carbostyril compound, an agent comprising said compound, a use of said compound, a method for treating a disorder, and a process for producing said compound, as described in Items 1 to 35 below.

Item 1. A carbostyril compound represented by General Formula (1)



(1)

or a salt thereof,

wherein A is a direct bond, a lower alkylene group, or a lower alkylidene group;

X is an oxygen atom or a sulfur atom;

the bond between the 3 and 4 positions of the

carbostyril skeleton is a single bond or a double bond;

R^4 and R^5 each represent a hydrogen atom, with the proviso that when the bond between the 3 and 4 positions of the carbostyril skeleton is a double bond, R^4 and R^5 instead may be linked together in the form of a -CH=CH-CH=CH- group;

R^1 is one of the following (1-1) to (1-29):

(1-1) a hydrogen atom,

(1-2) a lower alkyl group,

(1-3) a phenyl lower alkyl group optionally substituted on the phenyl ring with one or more members selected from the group consisting of a phenyl group, lower alkyl groups, lower alkoxy groups, halogen atoms, $-(B)_1NR^6R^7$ groups, a nitro group, a carboxy group, lower alkoxycarbonyl groups, a cyano group, phenyl lower alkoxy groups, a phenoxy group, a piperidinyl lower alkoxycarbonyl groups, amino lower alkoxycarbonyl groups optionally substituted with one or more cycloalkyl groups, 2-imidazolinylcarbonyl groups optionally substituted on the 2-imidazoline ring with one or more lower alkylthio groups, 3-pyrrolinylcarbonyl groups optionally substituted on the 3-pyrroline ring with one or more lower alkyl groups, thiazolidinylcarbonyl groups optionally substituted on the thiazolidine ring with a phenyl group, 3-azabicyclo[3.2.2]nonylcarbonyl groups, piperidinyl lower alkyl groups, anilino lower aklyl groups optionally substituted on the amino group with one or more lower alkyl groups, phenylthio lower alkyl groups, indolinyl lower alkyl groups, and piperidinylcarbonyl groups optionally substituted on the piperidine ring with one or more lower alkyl groups,

(1-4) a cycloalkyl lower alkyl group,

(1-5) a phenoxy lower alkyl group,

(1-6) a naphthyl lower alkyl group,

(1-7) a lower alkoxy lower alkyl group,

(1-8) a carboxy lower alkyl group,

(1-9) a lower alkoxycarbonyl lower alkyl group,

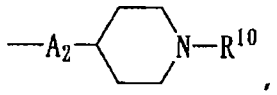
(1-10) a pyridyl lower alkyl group optionally substituted on the

pyridine ring with one or more members selected from the group consisting of halogen atoms; piperidinyl groups; a morpholino group; piperazinyl groups optionally substituted on the piperazine ring with one or more members selected from the group consisting of a phenyl group and lower alkyl group; thienyl groups; a phenyl group; pyridyl groups; piperidinyl lower alkyl groups; phenylthio lower alkyl groups; biphenyl groups; lower alkyl groups optionally substituted with one or more halogen atoms; pyridylamino groups; pyridylcarbonylamino groups; lower alkoxy groups; anilino lower alkyl groups optionally substituted on the amino group with one or more lower alkyl groups; and anilino groups optionally substituted on the amino group with one or more lower alkyl groups,

(1-11) a cyano lower alkyl group,

(1-12) an $-A_1-CONR^8R^9$ group,

(1-13) a group of the following formula



,

(1-14) a phenyl group,

(1-15) a quinolyl lower alkyl group,

(1-16) a lower alkoxy lower alkoxy-substituted lower alkyl group,

(1-17) a hydroxy-substituted lower alkyl group,

(1-18) a thiazolyl lower alkyl group optionally substituted on the thiazole ring with one or more members selected from the group consisting of halogen atoms, a phenyl group, thienyl groups, and pyridyl groups,

(1-19) a lower alkyl group optionally substituted with one or more halogen atoms,

(1-20) a lower alkylsilyloxy lower alkyl group,

(1-21) a phenoxy lower alkyl group optionally substituted on the phenyl ring with one or more members selected from the group consisting of lower alkyl groups optionally substituted with one or more halogen atoms; lower alkoxy groups; halogen atoms; lower

alkenyl groups; cycloalkyl groups; a nitro group; and a phenyl group,

(1-22) a phenylthio lower alkyl group optionally substituted on the phenyl ring with one or more halogen atoms,

(1-23) a piperidinyl lower alkyl groups optionally substituted on the piperidine ring with one or more members selected from the group consisting of phenyl lower alkyl groups and a phenyl group,

(1-24) a piperazinyl lower alkyl group optionally substituted on the piperazine ring with one or more phenyl groups,

(1-25) a 1,2,3,4-tetrahydroisoquinolyl lower alkyl group,

(1-26) a naphthyloxy lower alkyl group,

(1-27) a benzothiazolyloxy lower alkyl group optionally substituted on the benzothiazole ring with one or more alkyl groups,

(1-28) a lower alkyl group substituted with one or more members selected from the group consisting of quinolyloxy groups and isoquinolyloxy groups,

(1-29) a pyridyloxy lower alkyl group optionally substituted on the pyridine ring with one or more lower alkyl groups;

R^2 is one of the following (2-1) to (2-33):

(2-1) a hydrogen atom,

(2-2) a lower alkoxy group,

(2-3) a lower alkyl group,

(2-4) a carboxy lower alkoxy group,

(2-5) a lower alkoxycarbonyl lower alkoxy group,

(2-6) a hydroxy group,

(2-7) a phenyl lower alkoxy group optionally substituted on the phenyl ring with one or more members selected from the group consisting of halogen atoms; lower alkyl groups optionally substituted with one or more halogen atoms; lower alkylthio groups optionally substituted with one or more halogen atoms; lower alkoxy groups; a nitro group; lower alkylsulfonyl groups; lower alkoxycarbonyl groups; phenyl lower alkenyl groups; lower alkanoyloxy groups; and 1,2,3-thiadiazolyl groups,

(2-8) a piperidinyl lower alkoxy group optionally substituted on

the piperidine ring with one or more lower alkyl groups,
(2-9) an amino-substituted lower alkoxy group optionally substituted with one or more lower alkyl groups,
(2-10) a lower alkenyloxy group,
(2-11) a pyridyl lower alkoxy group optionally substituted on the pyridine ring with one or more lower alkyl groups, each lower alkyl substituent optionally being substituted with one or more halogen atoms,
(2-12) a lower alkynyloxy group,
(2-13) a phenyl lower alkynyloxy group,
(2-14) a phenyl lower alkenyloxy group,
(2-15) a furyl lower alkoxy group optionally substituted on the furan ring with one or more lower alkoxycarbonyl groups,
(2-16) a tetrazolyl lower alkoxy group optionally substituted on the tetrazole ring with one member selected from the group consisting of a phenyl group, phenyl lower alkyl groups, and cycloalkyl lower alkyl groups,
(2-17) a 1,2,4-oxadiazolyl lower alkoxy group optionally substituted on the 1,2,4-oxadiazole ring with a phenyl group, the phenyl substituent optionally being substituted on the phenyl ring with one or more lower alkyl groups,
(2-18) an isoxazolyl lower alkoxy group optionally substituted on the isoxazole ring with one or more lower alkyl groups,
(2-19) a 1,3,4-oxadiazolyl lower alkoxy group optionally substituted on the 1,3,4-oxadiazole ring with a phenyl group, the phenyl substituent optionally being substituted on the phenyl ring with one or more lower alkyl groups,
(2-20) a lower alkanoyl lower alkoxy group,
(2-21) a thiazolyl lower alkoxy group optionally substituted on the thiazole ring with one or more members selected from the group consisting of lower alkyl groups and a phenyl group, each phenyl substituent optionally being substituted on the phenyl ring with one or more halogen atoms,
(2-22) a piperidinyloxy group optionally substituted on the piperidine ring with one or more benzoyl groups, each benzoyl

substituent optionally being substituted on the phenyl ring with one or more halogen atoms,

(2-23) a thienyl lower alkoxy group,

(2-24) a phenylthio lower alkoxy group,

(2-25) a carbamoyl-substituted lower alkoxy group optionally substituted with one or more lower alkyl groups,

(2-26) a benzoyl lower alkoxy group,

(2-27) a pyridylcarbonyl lower alkoxy group,

(2-28) an imidazolyl lower alkoxy group optionally substituted on the imidazole ring with one or more phenyl lower alkyl groups,

(2-29) a phenoxy lower alkoxy group,

(2-30) a phenyl lower alkoxy-substituted lower alkoxy group,

(2-31) a 2,3-dihydro-1H-indenyloxy group,

(2-32) an isoindolinyl lower alkoxy group optionally substituted on the isoindoline ring with one or more oxo groups,

(2-33) a phenyl group;

R^3 is one of the following (3-1) to (3-19):

(3-1) a hydrogen atom,

(3-2) a lower alkyl group,

(3-3) a hydroxy-substituted lower alkyl group,

(3-4) a cycloalkyl lower alkyl group,

(3-5) a carboxy lower alkyl group,

(3-6) a lower alkoxycarbonyl lower alkyl group,

(3-7) a phenyl lower alkyl group optionally substituted on the phenyl ring with one or more members selected from the group consisting of halogen atoms; lower alkyl groups optionally substituted with one or more halogen atoms; lower alkoxy groups optionally substituted with one or more halogen atoms; a phenyl group; lower alkoxycarbonyl groups; a phenoxy group; lower alkylthio groups; lower alkylsulfonyl groups; phenyl lower alkoxy groups; and amino groups optionally substituted with one or more lower alkanoyl groups,

(3-8) a naphthyl lower alkyl group,

(3-9) a furyl lower alkyl group optionally substituted on the furan ring with one or more lower alkoxycarbonyl groups,

(3-10) a thiazolyl lower alkyl group optionally substituted on the thiazole ring with one or more members selected from the group consisting of lower alkyl groups and a phenyl group, each phenyl substituent optionally being substituted on the phenyl ring with one or more optionally halogen-substituted lower alkyl groups,

(3-11) a tetrazolyl lower alkyl group optionally substituted on the tetrazole ring with one or more lower alkyl groups,

(3-12) a benzothienyl lower alkyl group optionally substituted on the benzothiophene ring with one or more halogen atoms,

(3-13) a lower alkynyl group,

(3-14) a lower alkenyl group,

(3-15) a phenyl lower alkenyl group,

(3-16) a benzoimidazolyl lower alkyl group,

(3-17) a pyridyl lower alkyl group,

(3-18) an imidazolyl lower alkyl group optionally substituted on the imidazole ring with one or more phenyl lower alkyl groups,

(3-19) a quinolyl lower alkyl group;

B is a carbonyl group or an -NHCO- group;

l is 0 or 1;

R^6 and R^7 each independently represent one of the following (4-1) to (4-79):

(4-1) a hydrogen atom,

(4-2) a lower alkyl group,

(4-3) a lower alkanoyl group,

(4-4) a lower alkylsulfonyl group optionally substituted with one or more halogen atoms,

(4-5) an alkoxycarbonyl group optionally substituted with one or more halogen atoms,

(4-6) a hydroxy-substituted lower alkyl group,

(4-7) a pyridylcarbonyl group optionally substituted on the pyridine ring with one or more members selected from the group consisting of pyrrolyl groups and halogen atoms,

(4-8) a pyridyl group optionally substituted on the pyridine ring with one or more members selected from the group consisting of

lower alkyl groups and lower alkoxy groups,

(4-9) a pyridyl lower alkyl group,

(4-10) a phenyl group optionally substituted on the phenyl ring with one or more members selected from the group consisting of halogen atoms; lower alkyl groups optionally substituted with one or more halogen atoms; a phenoxy group; lower alkoxy groups optionally substituted with one or more halogen atoms; lower alkylthio groups; lower alkylsulfonyl groups; amino groups optionally substituted with one or more members selected from the group consisting of lower alkyl groups and lower alkanoyl groups; pyrrolidinyl groups optionally substituted on the pyrrolidine ring with one or more oxo groups; piperidinyl groups optionally substituted on the piperidine ring with one or more lower alkyl groups; lower alkenyl groups; an aminosulfonyl group; a hydroxy group; carbamoyl groups optionally substituted with one or more lower alkyl groups; phenyl lower alkoxy groups; and a cyano group,

(4-11) a cycloalkyl group optionally substituted on the cycloalkyl ring with one or more lower alkyl groups,

(4-12) a benzoyl group optionally substituted on the phenyl ring with one or more members selected from the group consisting of halogen atoms; a phenoxy group; a phenyl group; lower alkyl groups optionally substituted with one or more halogen atoms; lower alkoxy groups; lower alkanoyl groups; a nitro group; a cyano group; amino groups optionally substituted with one or more members selected from the group consisting of a phenyl group and lower alkyl groups; pyrrolidinyl groups optionally substituted on the pyrrolidine ring with one or more oxo groups; pyrrolyl groups; pyrazolyl groups; 1,2,4-triazolyl groups; and imidazolyl groups,

(4-13) a benzoyl group substituted on the phenyl ring with one or more lower alkylenedioxy groups,

(4-14) a cycloalkylcarbonyl group,

(4-15) a furylcarbonyl group,

(4-16) a naphthylcarbonyl group,

(4-17) a phenoxycarbonyl group optionally substituted on the

phenyl ring with one or more members selected from the group consisting of lower alkoxy groups, lower alkyl groups, halogen atoms, and a nitro group,

(4-18) a phenyl lower alkoxycarbonyl group optionally substituted on the phenyl ring with one or more members selected from the group consisting of halogen atoms and a nitro group,

(4-19) a piperidinyl group optionally substituted on the piperidine ring with one or more members selected from the group consisting of lower alkyl groups; lower alkanoyl groups; benzoyl groups optionally substituted on the phenyl ring with one or more halogen atoms; and phenyl groups optionally substituted on the phenyl ring with one or more halogen atoms,

(4-20) a tetrahydropyranyl lower alkyl group,

(4-21) a cycloalkyl lower alkyl group,

(4-22) a lower alkenyl group,

(4-23) a phenyl lower alkyl group optionally substituted on the alkyl group with one or more lower alkoxycarbonyl groups; and optionally substituted on the phenyl ring with one or more members selected from the group consisting of halogen atoms, lower alkyl groups optionally substituted with one or more halogen atoms, lower alkoxy groups optionally substituted with one or more halogen atoms, and a hydroxy group,

(4-24) a lower alkylenedioxy-substituted phenyl lower alkyl group,

(4-25) a furyl lower alkyl group,

(4-26) a carbamoyl lower alkyl group optionally substituted with one or more members selected from lower alkyl groups and a phenyl group, each phenyl substituent optionally being substituted on the phenyl ring with one or more lower alkyl groups,

(4-27) a lower alkoxy lower alkyl group,

(4-28) an imidazolyl lower alkyl group optionally substituted on the lower alkyl group with one or more members selected from the group consisting of a carbamoyl group and lower alkoxycarbonyl groups,

(4-29) an amino-substituted lower alkyl group optionally substituted with one or more lower alkyl groups,

(4-30) a 2,3,4,5-tetrahydrofuryl group optionally substituted on the 2,3,4,5-tetrahydrofuran ring with one or more oxo groups,

(4-31) a lower alkoxycarbonyl lower alkyl group,

(4-32) a pyrrolidinyl lower alkyl group optionally substituted on the pyrrolidine ring with one or more lower alkyl groups,

(4-33) a phenoxy lower alkanoyl group,

(4-34) a morpholino lower alkyl group,

(4-35) a indolyl group,

(4-36) a thiazolyl group,

(4-37) a 1,2,4-triazolyl group,

(4-38) a pyridyl lower alkanoyl group,

(4-39) a thienylcarbonyl group,

(4-40) a thienyl lower alkanoyl group,

(4-41) a cycloalkyl lower alkanoyl group,

(4-42) an isoxazolylcarbonyl group optionally substituted on the isoxazole ring with one or more lower alkyl groups,

(4-43) a pyrazylcarbonyl group,

(4-44) a piperidinylcarbonyl group optionally substituted on the piperidine ring with one or more members selected from a benzoyl group and lower alkanoyl groups,

(4-45) a chromanylcarbonyl group,

(4-46) an isoindolinyl lower alkanoyl group optionally substituted on the isoindoline ring with one or more oxo groups,

(4-47) a thiazolidinyl lower alkanoyl group optionally substituted on the thiazolidine ring with one or more members selected from an oxo group and a thioxo group,

(4-48) a piperidinyl lower alkanoyl group,

(4-49) a phenyl lower alkenylcarbonyl group optionally substituted on the phenyl ring with one or more halogen atoms,

(4-50) a phenyl lower alkenylcarbonyl group substituted on the phenyl ring with one or more alkylenedioxy groups,

(4-51) a pyridyl lower alkenyl carbonyl group,

(4-52) a pyridylthio lower alkanoyl group,

(4-53) an indolylcarbonyl group,

(4-54) a pyrrolylcarbonyl group,

(4-55) a pyrrolidinylcarbonyl group optionally substituted on the pyrrolidine ring with one or more oxo groups,

(4-56) a benzofurylcarbonyl group,

(4-57) an indolyl lower alkanoyl group,

(4-58) a benzothienylcarbonyl group,

(4-59) a phenyl lower alkanoyl group optionally substituted on the phenyl ring with one or more halogen atoms,

(4-60) a phenylsulfonyl group optionally substituted on the phenyl ring with one or more members selected from the group consisting of lower alkoxycarbonyl groups; a cyano group; a nitro group; amino groups optionally substituted with one or more alkanoyl groups; a hydroxy group; a carboxyl group; lower alkoxycarbonyl lower alkyl groups; halogen atoms; lower alkyl groups optionally substituted with one or more halogen atoms; and lower alkoxy groups optionally substituted with one or more halogen atoms,

(4-61) a thienylsulfonyl group optionally substituted on the thiophene ring with one or more members selected from the group consisting of halogen atoms and lower alkoxycarbonyl groups,

(4-62) a quinolylsulfonyl group,

(4-63) an imidazolylsulfonyl group optionally substituted on the imidazole ring with one or more lower alkyl groups,

(4-64) a phenylsulfonyl group optionally substituted on the phenyl ring with one or more lower alkylenedioxy groups,

(4-65) a lower alkenylsulfonyl group,

(4-66) a cycloalkyl lower alkylsulfonyl group,

(4-67) a 3,4-dihydro-2H-1,4-benzoxazinylsulfonyl group optionally substituted on the 3,4-dihydro-2H-1,4-benzoxazine ring with one or more lower alkyl groups,

(4-68) a pyrazolylsulfonyl group optionally substituted on the pyrazole ring with one or more members selected from halogen atoms and lower alkyl groups,

(4-69) an isoxazolylsulfonyl group optionally substituted on the isoxazole ring with one or more lower alkyl groups,

(4-70) a thiazolylsulfonyl group optionally substituted on the

thiazole ring with one or more members selected from the group consisting of lower alkyl groups and an amino group, each amino substituent optionally being substituted with one or more alkanoyl groups,

(4-71) a phenyl lower alkylsulfonyl group,

(4-72) a phenyl lower alkenylsulfonyl group,

(4-73) a naphthyloxycarbonyl group,

(4-74) a lower alkynyloxycarbonyl group,

(4-75) a lower alkenyloxycarbonyl group,

(4-76) a phenyl lower alkoxy-substituted lower alkoxycarbonyl group,

(4-77) a cycloalkyloxycarbonyl group optionally substituted on the cycloalkyl ring with one or more lower alkyl groups,

(4-78) a tetrazolyl group,

(4-79) an isoxazolyl group optionally substituted on the isoxazole ring with one or more lower alkyl groups; or instead,

R^6 and R^7 may be linked together to form, together with the nitrogen atom to which they are bound, a 1,2,3,4-tetrahydroisoquinolyl group, an isoindolinyl group, or a 5- to 7-membered saturated heterocyclic group, the heterocyclic group optionally containing one or more additional heteroatoms and optionally being substituted with one to three members from the following (5-1) to (5-28):

(5-1) lower alkyl groups,

(5-2) lower alkoxy groups,

(5-3) an oxo group,

(5-4) a hydroxy group,

(5-5) pyridyl lower alkyl groups,

(5-6) phenyl groups optionally substituted on the phenyl ring with one or more members selected from the group consisting of halogen atoms; lower alkoxy groups optionally substituted with one or more halogen atoms; lower alkyl groups optionally substituted with one or more halogen atoms; a cyano group; and a hydroxy group,

(5-7) lower alkylenedioxy-substituted phenyl lower alkyl groups,

(5-8) phenyl lower alkyl groups optionally substituted on the phenyl ring with one or more halogen atoms,

(5-9) pyrimidyl groups,

(5-10) pyrazyl groups,

(5-11) cycloalkyl groups,

(5-12) phenyl lower alkoxy groups optionally substituted on the phenyl ring with one or more halogen atoms,

(5-13) benzoyl groups optionally substituted on the phenyl ring with one or more halogen atoms,

(5-14) benzoyl groups substituted on the phenyl ring with one or more lower alkylenedioxy groups,

(5-15) carbamoyl lower alkyl groups optionally substituted with one or more members selected from the group consisting of a phenyl group and lower alkyl groups,

(5-16) benzoxazolyl groups,

(5-17) lower alkoxycarbonyl groups,

(5-18) a carbamoyl group,

(5-19) phenyl lower alkylidene groups optionally substituted on the phenyl ring with one or more halogen atoms,

(5-20) phenyl lower alkoxycarbonyl groups,

(5-21) pyridyl groups optionally substituted on the pyridine ring with one or more members selected from the group consisting of a cyano group and lower alkyl groups,

(5-22) furyl lower alkyl groups,

(5-23) tetrahydropyranyl groups,

(5-24) imidazolyl lower alkyl groups,

(5-25) naphthyl groups,

(5-26) 2,3-dihydro-1H-indenyl groups,

(5-27) 1,3-dioxolanyl lower alkyl groups,

(5-28) $-(A_3)_mNR^{11}R^{12}$ groups;

A_1 is a lower alkylene group;

R^8 and R^9 each independently represent one of the following (6-1) to (6-25):

(6-1) a hydrogen atom,

(6-2) a lower alkyl group,

(6-3) a phenyl group optionally substituted on the phenyl ring with one or more members selected from the group consisting of lower alkyl groups optionally substituted with one or more halogen atoms; lower alkylthio groups; lower alkoxy groups optionally substituted with one or more halogen atoms; halogen atoms; a phenyl group; lower alkylamino groups; a cyano group; a phenoxy group; cycloalkyl groups; pyrrolidinyl groups optionally substituted with one or more oxo groups; 1,2,3,4-tetrahydroisoquinolylcarbonyl groups; 1,2,3,4-tetrahydroquinolylcarbonyl groups optionally substituted with one or more lower alkyl groups; 1,2,3,4-tetrahydroquinoxalinylcarbonyl groups optionally substituted with one or more lower alkyl groups; thiazolyl groups optionally substituted with one or more phenyl groups; a carbamoyl group; phenyl lower alkoxy groups; lower alkylsulfonylamino groups; anilino groups optionally substituted with one or more halogen atoms; phenyl lower alkyl groups; and hydroxy-substituted lower alkyl groups,

(6-4) a cycloalkyl group,

(6-5) a cycloakyl lower alkyl group,

(6-6) a carbamoyl lower alkyl group,

(6-7) a phenyl lower alkyl group optionally substituted on the phenyl ring with one or more members selected from the group consisting of lower alkyl groups optionally substituted with one or more halogen atoms; lower alkoxy groups optionally substituted with one or more halogen atoms; halogen atoms; and a phenyl group,

(6-8) lower alkyl-substituted amino lower alkyl group,

(6-9) a naphthyl group,

(6-10) a naphthyl lower alkyl group,

(6-11) a tetrahydronaphthyl lower alkyl group,

(6-12) a fluorenyl group,

(6-13) a pyridyl group,

(6-14) a pyridyl lower alkyl group,

(6-15) a pyrimidinyl group,

(6-16) a pyrazinyl lower alkyl group optionally substituted on

the pyrazine ring with one or more lower alkyl groups,
(6-17) a thiazolyl group,
(6-18) a pyrazolyl lower alkyl group optionally substituted on the pyrazole ring with one or more lower alkyl groups,
(6-19) a thienyl lower alkyl group
(6-20) a piperidinyl group optionally substituted on the piperidine ring with one or more members selected from the group consisting of lower alkyl groups; a benzoyl group; and phenyl lower alkyl groups optionally substituted on the phenyl ring with one or more members selected from the group consisting of halogen atoms and lower alkyl groups,
(6-21) an indolyl group,
(6-22) an indazolyl group,
(6-23) a 3,4-dihydrocarbostyril optionally substituted with one or more lower alkyl groups,
(6-24) a quinolyl group optionally substituted with one or more lower alkyl groups,
(6-25) a carbazolyl group optionally substituted with one or more lower alkyl groups; or

R^8 and R^9 may be linked together to form, together with the nitrogen atom to which they are bound, a 5- to 8-membered saturated heterocyclic group optionally containing one or more additional heteroatoms and optionally substituted on the heterocyclic ring with one or more members selected from the group consisting of the following (6-28-1) to (6-28-24):
(6-28-1) lower alkyl groups,
(6-28-2) phenyl lower alkyl groups optionally substituted on the phenyl ring with one or more members selected from halogen atoms and lower alkoxy groups optionally substituted with one or more halogen atoms,
(6-28-3) naphthyl lower alkyl groups,
(6-28-4) phenyl lower alkylcarbamoyl lower alkyl groups,
(6-28-5) phenylcarbamoyl lower alkyl groups,
(6-28-6) phenyl lower alkoxycarbonyl groups,
(6-28-7) phenoxy lower alkyl groups optionally substituted on the

phenyl ring with one or more members selected from the group consisting of halogen atoms and lower alkyl groups optionally substituted with one or more halogen atoms,

(6-28-8) biphenyl groups,

(6-28-9) phenyl groups optionally substituted on the phenyl ring with one or more halogen atoms,

(6-28-10) 2,3-dihydroindenyl groups optionally substituted with one or more halogen atoms,

(6-28-11) benzothiazolyl groups optionally substituted with one or more halogen atoms,

(6-28-12) pyridyl groups optionally substituted with one or more halogen atoms,

(6-28-13) benzothienyl groups,

(6-28-14) benzoisothiazolyl groups,

(6-28-15) thienopyridyl groups,

(6-28-16) a carbamoyl group,

(6-28-17) phenyl lower alkoxy groups optionally substituted on the phenyl ring with one or more halogen atoms,

(6-28-18) phenoxy groups optionally substituted with one or more halogen atoms,

(6-28-19) benzoyl groups optionally substituted on the phenyl ring with one or more members selected from halogen atoms and lower alkoxy groups,

(6-28-20) anilino groups optionally substituted on the phenyl ring with one or more lower alkyl groups, each lower alkyl substituent optionally being substituted with one or more halogen atoms,

(6-28-21) anilino groups substituted on the amino group with one or more lower alkyl groups, and optionally further substituted on the phenyl ring with one or more halogen atoms,

(6-28-22) benzofuryl groups,

(6-28-23) naphthyl groups,

(6-28-24) an oxo group; or

R^8 and R^9 may be linked together to form, together with the nitrogen atom to which they are bound, a 5- or 6-membered

unsaturated heterocyclic group, the unsaturated heterocyclic group optionally being substituted on the heterocyclic ring with one or more members selected from the group consisting of the following (6-29-1) to (6-29-3):

(6-29-1) phenyl groups optionally substituted with one or more halogen atoms,

(6-29-2) 2,3-dihydroindenyl groups,

(6-29-3) benzothienyl groups; or instead,

R^8 and R^9 may be linked together to form, together with the nitrogen atom to which they are bound, a 1,2,3,4-tetrahydroquinolyl group; a 1,2,3,4-tetrahydroisoquinolyl group, a 1,3-dihydroisoindolyl group; an octahydropyrrolo[1,2-*a*]pyrazinyl group optionally substituted on the pyrazine ring with one or more lower alkyl groups; or an 8-azabicyclo[3.2.1]octyl group optionally substituted on the 8-azabicyclo[3.2.1]octyl group with one or more phenoxy groups, each phenoxy substituent optionally being substituted on the phenyl ring with one or more halogen atoms;

A_2 is a lower alkylene group;

R^{10} is one of the following (7-1) to (7-44):

(7-1) a hydrogen atom,

(7-2) a lower alkyl group,

(7-3) an alkoxycarbonyl group optionally substituted with one or more halogen atoms,

(7-4) a benzoyl group optionally substituted on the phenyl ring with one or more members selected from the group consisting of lower alkyl groups optionally substituted with one or more halogen atoms; a phenyl group; halogen atoms; a cyano group; a phenoxy group; lower alkoxycarbonyl groups; pyrazolyl groups; and lower alkoxy groups optionally substituted with one or more halogen atoms,

(7-5) an alkanoyl group,

(7-6) a phenyl lower alkanoyl group optionally substituted on the phenyl ring with one or more members selected from the group consisting of halogen atoms and lower alkyl groups,

(7-7) a cycloalkyl lower alkanoyl group,

(7-8) a phenyl group optionally substituted on the phenyl ring with one or more lower alkyl groups,

(7-9) a phenoxy lower alkanoyl group optionally substituted on the phenyl ring with one or more halogen atoms,

(7-10) a phenyl lower alkenylcarbonyl group,

(7-11) a pyridylcarbonyl group optionally substituted on the pyridine ring with one or more members selected from the group consisting of halogen atoms and lower alkyl groups, each lower alkyl substituent optionally being substituted with one or more halogen atoms,

(7-12) a furylcarbonyl group,

(7-13) a thienylcarbonyl group,

(7-14) a piperidinylcarbonyl group optionally substituted on the piperidine ring with one or more lower alkanoyl groups,

(7-15) a pyrrolidinylcarbonyl group optionally substituted on the pyrrolidine ring with one or more oxo groups,

(7-16) a tetrahydropyranylcarbonyl group,

(7-17) a naphthylcarbonyl group,

(7-18) an indolylcarbonyl group,

(7-19) a benzofurylcarbonyl group,

(7-20) a benzothienylcarbonyl group optionally substituted on the benzothiophene ring with one or more halogen atoms,

(7-21) a furyl lower alkyl group,

(7-22) a pyridyl lower alkyl group optionally substituted on the pyridine ring with one or more members selected from the group consisting of halogen atoms and lower alkyl groups, each lower alkyl substituent optionally being substituted with one or more halogen atoms,

(7-23) a thienyl lower alkyl group optionally substituted on the thiophene ring with one or more halogen atoms,

(7-24) a phenyl lower alkyl group optionally substituted on the phenyl ring with one or more members selected from the group consisting of lower alkoxy groups optionally substituted with one or more halogen atoms; a cyano group; lower alkyl groups

optionally substituted with one or more halogen atoms; amino groups optionally substituted with one or more members selected from the group consisting of lower alkyl groups and lower alkanoyl groups; halogen atoms; lower alkoxycarbonyl groups; lower alkanoyloxy groups; lower alkylsulfonyl groups; lower alkylthio groups; and pyrrolidinyl groups,

(7-25) a thiazolyl lower alkyl group,

(7-26) an imidazolyl lower alkyl group optionally substituted on the imidazole ring with one or more lower alkyl groups,

(7-27) a pyrrolyl lower alkyl group optionally substituted on the pyrrole ring with one or more lower alkyl groups,

(7-28) a cycloalkyl lower alkyl group,

(7-29) a lower alkylthio lower alkyl group,

(7-30) a phenoxycarbonyl group optionally substituted on the phenyl ring with one or more members selected from the group consisting of halogen atoms, lower alkyl groups, and lower alkoxy groups,

(7-31) a phenyl lower alkoxycarbonyl group optionally substituted on the phenyl ring with one or more halogen atoms,

(7-32) a naphthyloxycarbonyl group,

(7-33) a lower alkynyloxycarbonyl group,

(7-34) a cycloalkylcarbonyl group,

(7-35) a quinoxalinylcarbonyl group,

(7-36) a $-CO-NR^{13}R^{14}$ group,

(7-37) a piperidinyl group optionally substituted on the piperidine ring with one or more lower alkyl groups,

(7-38) a cycloalkyl group,

(7-39) a tetrahydropyranyl group,

(7-40) a lower alkoxy lower alkyl group,

(7-41) a tetrahydro-2H-thiopyranyl group,

(7-42) a naphthyl group,

(7-43) a biphenyl group,

(7-44) a lower alkylsilyl lower alkoxycarbonyl group;

A^3 is a lower alkylene group;

m is 0 or 1;

R^{11} and R^{12} each independently represent one of the following (8-1) to (8-5):

(8-1) a hydrogen atom,

(8-2) a lower alkyl group,

(8-3) a lower alkanoyl group,

(8-4) a phenyl lower alkanoyl group,

(8-5) a phenyl group optionally substituted on the phenyl ring with one or more halogen atoms; or instead,

R^{11} and R^{12} may be linked together to form, together with the nitrogen atom to which they are bound, a 5- or 6-membered saturated heterocyclic group which optionally contains one or more additional heteroatoms, the heterocyclic group optionally being substituted with one to three members selected from the group consisting of the following (9-1) and (9-2):

(9-1) lower alkyl groups,

(9-2) a phenyl group; and

R^{13} and R^{14} each independently represent one of the following (10-1) to (10-3):

(10-1) a hydrogen atom,

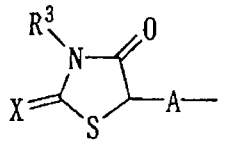
(10-2) a lower alkyl group,

(10-3) a phenyl group, or instead

R^{13} and R^{14} may be linked together to form, together with the nitrogen atom to which they are bound, a 5- or 6-membered saturated heterocyclic group which optionally contains one or more additional heteroatoms.

Item 2. A carbostyril compound or a salt thereof according to Item 1, wherein the bond between the 3 and 4 positions of the carbostyril skeleton is a single bond or a double bond, and R^4 and R^5 each represent a hydrogen atom.

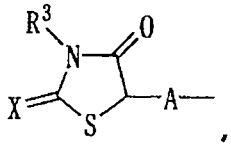
Item 3. A carbostyril compound or a salt thereof according to Item 2, wherein a group of the formula



in which R^3, A and X are as defined in Item 1 above, is bound to

the 3, 4, 5, 6, 7 or 8 position of the carbostyril skeleton.

Item 4. A carbostyril compound or a salt thereof according to Item 3, wherein the bond between the 3 and 4 positions of the carbostyril skeleton is a single bond, and the group of the formula,

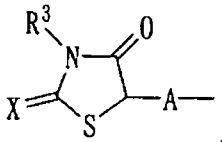


in which R^3, A and X are as defined in Item 1 above, is bound to the 5 or 6 position of the carbostyril skelton.

Item 5. A carbostyril compound or a salt thereof according to Item 3 or 4, wherein A is a lower alkylene group or a lower alkylidene group.

Item 6. A carbostyril compound or a salt thereof according to Item 5, wherein R^1 is one of (1-2), (1-3), (1-4), (1-6), (1-10), (1-12), (1-13), (1-18) and (1-21) as defined in Item 1 above.

Item 7. A carbostyril compound or a salt thereof according to Item 6, wherein the group of the formula



in which R^3, A and X are as defined in Item 1 above, is bound to the 5 position of the carbostyril skelton.

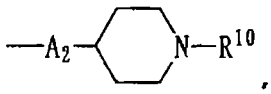
Item 8. A carbostyril compound or a salt thereof according to Item 7, wherein R^1 is a phenyl lower alkyl group optionally substituted on the phenyl ring with one or more members selected from the group consisting of a phenyl ring, halogen atoms, $-(B)_1NR^6R^7$ groups wherein B, 1, R^6 and R^7 are as defined in Item 1, lower alkoxycarbonyl groups, and phenyl lower alkoxy groups.

Item 9. A carbostyril compound or a salt thereof according to Item 8, wherein A is a lower alkylene group, R^2 is a hydrogen atom or a lower alkoxy group, R^3 is a hydrogen atom, and X is an oxygen atom or a sulfur atom.

Item 10. A carbostyril compound or a salt thereof according to Item 7, wherein A is a lower alkylene group, R^1 is a lower alkyl group, R^2 is a hydrogen atom or a lower alkoxy group, R^3 is a hydrogen atom, and X is an oxygen atom or a sulfur atom.

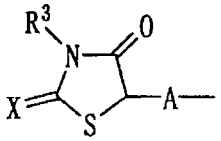
Item 11. A carbostyril compound or a salt thereof according to Item 7, wherein A is a lower alkylene group, R^1 is a naphthyl lower alkyl group, R^2 is a hydrogen atom or a lower alkoxy group, R^3 is a hydrogen atom, and X is an oxygen atom or a sulfur atom.

Item 12. A carbostyril compound or a salt thereof according to Item 7, wherein A is a lower alkylene group, R^1 is a group of the formula



in which R^{10} and A_2 are as defined in Item 1 above, R^2 is a hydrogen atom or a lower alkoxy group, R^3 is a hydrogen atom, and X is an oxygen atom or a sulfur atom.

Item 13. A carbostyril compound or a salt thereof according to Item 3, wherein the bond between the 3 and 4 positions of the carbostyril skeleton is a double bond, and a group of the formula



in which R^3, A and X are as defined in Item 1 above, is bound to the 3, 4 or 5 position of the carbostyril sleketon.

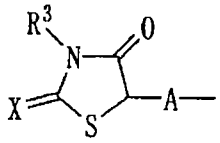
Item 14. A carbostyril compound or a salt thereof according to Item 13, wherein R^1 is one of (1-2) and (1-3) as defined in Item 1.

Item 15. A carbostyril compound or a salt thereof according to Item 14, wherein A is a lower alkylene group or a lower alkylidene group, and R^2 is a hydrogen atom or a lower alkoxy group.

Item 16. A carbostyril compound or a salt thereof

according to Item 1, wherein the bond between the 3 and 4 positions of the carbostyril skeleton is a double bond, and R^4 and R^5 are linked together in the form of a -CH=CH-CH=CH- group.

Item 17. A carbostyril compound or a salt thereof according to Item 16, wherein a group of the formula



in which R^3, A and X are as defined in Item 1 above, is bound to the 7 position of the carbostyril skeleton.

Item 18. A carbostyril compound or a salt thereof according to Item 17, wherein R^1 is one of (1-2) and (1-3) as defined in Item 1 above.

Item 19. A carbostyril compound or a salt thereof according to Item 18, wherein A is a lower alkylene group or a lower alkylidene group, R^2 and R^3 are both hydrogen atoms, and X is an oxygen atom or a sulfur atom.

Item 20. A carbostyril compound or a salt thereof according to Item 1, wherein A is a direct bond.

Item 21. A carbostyril compound or a salt thereof according to Item 1, wherein A is a lower alkylene group.

Item 22. A carbostyril compound or a salt thereof according to Item 1, wherein A is a lower alkylidene group.

Item 23. A carbostyril compound or a salt thereof according to any one of Items 20 to 22, wherein the bond between the 3 and 4 positions of the carbostyril skeleton is a single bond or a double bond, and R^4 and R^5 each represent a hydrogen atom.

Item 24. A carbostyril compound or a salt thereof according to any one of Items 20 to 22, wherein the bond between the 3 and 4 positions of the carbostyril skeleton is a double bond, and R^4 and R^5 are linked together in the form of a -CH=CH-CH=CH- group.

Item 25. A carbostyril compound selected from the group consisting of the following compounds:

5-[1-(biphenyl-4-ylmethyl)-8-methoxy-2-oxo-1,2,3,4-tetrahydroquinolin-5-ylmethyl]thiazolidine-2,4-dione,
5-[1-(4-chlorobenzyl)-8-methoxy-2-oxo-1,2,3,4-tetrahydroquinolin-5-ylmethyl]thiazolidine-2,4-dione,
5-[1-(4-bromobenzyl)-8-methoxy-2-oxo-1,2,3,4-tetrahydroquinolin-5-ylmethyl]thiazolidine-2,4-dione,
5-[1-(2-naphthylmethyl)-8-methoxy-2-oxo-1,2,3,4-tetrahydroquinolin-5-ylmethyl]thiazolidine-2,4-dione,
5-{1-[4-(heptyloxycarbonylamino)benzyl]-8-methoxy-2-oxo-1,2,3,4-tetrahydroquinolin-5-ylmethyl}thiazolidine-2,4-dione,
5-[1-(1-biphenyl-4-ylpiperidin-4-ylmethyl)-2-oxo-1,2,3,4-tetrahydroquinolin-5-ylmethyl]thiazolidine-2,4-dione,
5-{1-[1-(4-methylphenyl)piperidin-4-ylmethyl]-2-oxo-1,2,3,4-tetrahydroquinolin-5-ylmethyl}thiazolidine-2,4-dione,
5-{1-[4-(2-chlorobenzyloxycarbonylamino)benzyl]-8-methoxy-2-oxo-1,2,3,4-tetrahydroquinolin-5-ylmethyl}thiazolidine-2,4-dione,
1-(biphenyl-4-ylmethyl)-8-methoxy-5-(4-oxo-2-thioxothiazolidin-5-ylmethyl)-3,4-dihydro-1H-quinolin-2-one,
8-methoxy-1-methyl-5-(4-oxo-2-thioxothiazolidin-5-ylmethyl)-3,4-dihydro-1H-quinolin-2-one,
8-methoxy-1-(3-methylbutyl)-5-(4-oxo-2-thioxothiazolidin-5-ylmethyl)-3,4-dihydro-1H-quinolin-2-one,
1-propyl-8-methoxy-5-(4-oxo-2-thioxothiazolidin-5-ylmethyl)-3,4-dihydro-1H-quinolin-2-one,
1-isobutyl-8-methoxy-5-(4-oxo-2-thioxothiazolidin-5-ylmethyl)-3,4-dihydro-1H-quinolin-2-one,
8-methoxy-1-phenethyl-5-(4-oxo-2-thioxothiazolidin-5-ylmethyl)-3,4-dihydro-1H-quinolin-2-one, and
1-(4-phenylthiomethyl)benzyl-5-(4-oxo-2-thioxothiazolidin-5-ylmethyl)-3,4-dihydro-1H-quinolin-2-one; or a salt thereof.

Item 26. A pharmaceutical composition comprising as an active ingredient a carbostyril compound or salt thereof according to Item 1.

Item 27. A prophylactic and/or therapeutic agent for a disorder on which TFF up-regulation has a prophylactic and/or

therapeutic effect, comprising as an active ingredient a carbostyril compound or salt thereof according to Item 1.

Item 28. A prophylactic and/or therapeutic agent according to Claim 27, wherein the disorder on which TFF up-regulation has a prophylactic and/or therapeutic effect is an alimentary tract disease, oral disease, upper respiratory tract disease, respiratory tract disease, eye disease, cancer, or wound.

Item 29. A prophylactic and/or therapeutic agent according to Claim 27, wherein the disorder on which TFF up-regulation has a prophylactic and/or therapeutic effect is a drug-induced ulcer, peptic gastric ulcer, ulcerative colitis, Crohn's disease, drug-induced enteritis, ischemic colitis, irritable bowel syndrome, ulcer developed after endoscopic demucosation, acute gastritis, chronic gastritis, reflux esophagitis, esophageal ulcer, Barrett esophagus, gastrointestinal mucositis, hemorrhoidal diseases, stomatitis, Sjögren syndrome, xerostomia, rhinitis, pharyngitis, bronchial asthma, chronic obstructive lung disease, dry eye, or keratoconjunctivitis.

Item 30. A prophylactic and/or therapeutic agent according to Item 27, wherein the TFF is TFF2.

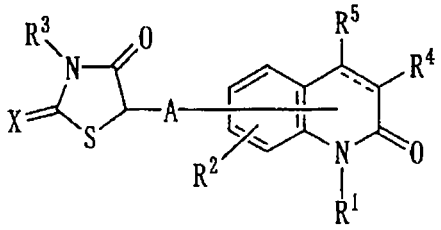
Item 31. A use of a carbostyril compound or salt thereof according to Item 1 for manufacturing a prophylactic and/or therapeutic agent for a disorder on which TFF up-regulation has a prophylactic and/or therapeutic effect.

Item 32. A method for preventing and/or treating a disorder on which TFF up-regulation has a prophylactic and/or therapeutic effect, comprising administering to a patient an effective amount of a carbostyril compound or salt thereof according to Item 1.

Item 33. A prophylactic and/or therapeutic agent for alimentary tract diseases, oral diseases, upper respiratory tract diseases, respiratory tract diseases, eye diseases, cancers, or wounds, the agent comprising a compound that induces the production of TFF.

Item 34. A prophylactic and/or therapeutic agent according to Item 33, wherein the TFF is TFF2.

Item 35. A process for the production of a carbostyril compound (1) of the following formula:

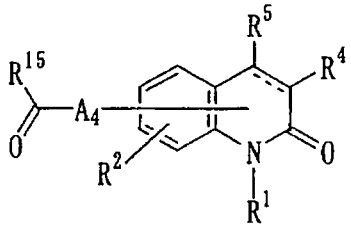


(1)

or a salt thereof, wherein R^1, R^2, R^3, R^4, R^5, A, X, and the bond between the 3 and 4 positions of the carbostyril skeleton are as defined in Item 1,

which comprises

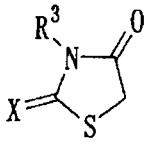
(i) reacting a compound (2) of the formula:



(2)

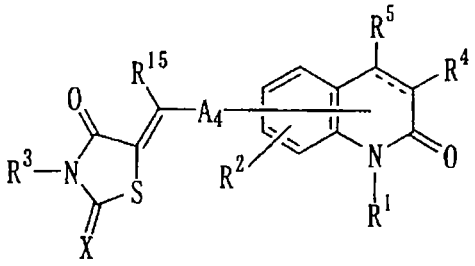
or a salt thereof, wherein R^1, R^2, R^4, R^5, and the bond between the 3 and 4 positions of the carbostyril skeleton are as defined above, and R^{15} is a hydrogen atom or lower alkyl group, and A_4 represents a direct bond or lower alkylene group,

with a compound (3) of the formula:



(3)

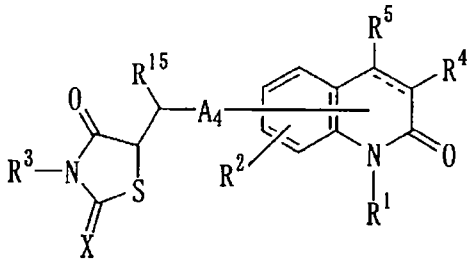
or a salt thereof, wherein R^3 and X are as defined above, to give a compound (1a) of the formula:



(1a)

or a salt thereof, wherein R^1, R^2, R^3, R^4, R^5, R^{15}, A_4 and the bond between the 3 and 4 positions of the carbostyril skeleton are as defined above, and

(ii) reducing the compound (1a) defined above or a salt thereof, to give a compound (1b) of the formula:

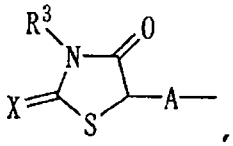


(1b)

or a salt thereof, wherein R^1, R^2, R^3, R^4, R^5, R^{15}, A_4 and the bond between the 3 and 4 positions of the carbostyril skeleton are as defined above.

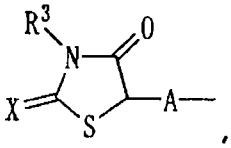
Among carbostyril compounds represented by General Formula (1), compounds wherein the bond between the 3 and 4 positions of the carbostyril skeleton is a single bond and a double bond, and R^4 and R^5 each represent a hydrogen atom are preferable.

Among carbostyril compounds represented by General Formula (1), compounds wherein a group of the formula



in which R^3, A and X are as defined in Item 1 above, is bound to the 3, 4, 5, 6, 7 or 8 position of the carbostyril skeleton are preferable.

Among carbostyril compounds represented by General Formula (1), compounds wherein the bond between the 3 and 4 positions of the carbostyril skeleton is a single bond, and the group of the formula



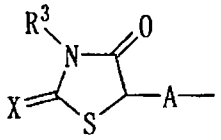
in which R^3, A and X are as defined in Item 1 above, is bound to

the 5 or 6 position of the carbostyril skelton are preferable.

Among carbostyril compounds represented by General Formula (1), compounds wherein A is a lower alkylene group or a lower alkylidene group are preferable.

Among carbostyril compounds represented by General Formula (1), compounds wherein R^1 is one of (1-2), (1-3), (1-4), (1-6), (1-10), (1-12), (1-13), (1-18) and (1-21) as defined in Item 1 above are preferable.

Among these preferable carbostyril compounds, compounds wherein the group of the formula



in which R^3, A and X are as defined in Item 1 above, is bound to the 5 position of the carbostyril skelton are more preferable.

Compounds wherein R^1 is a phenyl lower alkyl group optionally substituted on the phenyl ring with one or more members selected from a phenyl group, halogen atoms, $-(B)_1NR^6R^7$ groups wherein B, 1, R^6 and R^7 are as defined in Item 1 above, lower alkoxycarbonyl groups, and phenyl lower alkoxy groups are also more preferable;

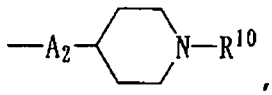
of such carbostyril compounds, those wherein A is a lower alkylene group, R^2 is a hydrogen atom or a lower alkoxy group, R^3 is a hydrogen atom, and X is an oxygen atom or a sulfur atom are particularly preferable.

Among carbostyril compounds represented by General Formula (1), compounds wherein R^1 is a lower alkyl group are preferable, and further, those wherein A is a lower alkylene group, R^2 is a hydrogen atom or a lower alkoxy group, R^3 is a hydrogen atom, and X is an oxygen atom or a sulfur atom are more preferable.

Among carbostyril compounds represented by General Formula (1), compounds wherein R^1 is a naphthyl lower alkyl group are preferable, and further, those wherein A is a lower alkylene group, R^2 is a hydrogen atom or a lower alkoxy group, R^3 is a

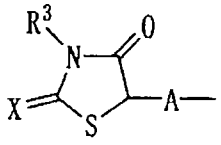
hydrogen atom, and X is an oxygen atom or a sulfur atom are more preferable.

Among carbostyril compounds represented by General Formula (1), compounds wherein R^1 is a group



in which R^{10} and A_2 are as defined in Item 1 above, are preferable, and further, those wherein A is a lower alkylene group, R^2 is a hydrogen atom or a lower alkoxy group, R^3 is a hydrogen atom, and X is an oxygen atom or a sulfur atom are preferable.

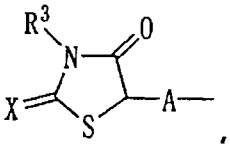
Among carbostyril compounds represented by General Formula (1), compounds wherein the bond between the 3 and 4 positions of the carbostyril skeleton is a double bond, and a group of the formula



in which R^3, A and X are as defined in Item 1 above, is bound to the 3, 4 or 5 position of the carbostyril sleketon are preferable, and further, those wherein R^1 is (1-2) or (1-3) as defined in Item 1 are more preferable; of such carbostyril compounds, compounds wherein A is a lower alkylene group or a lower alkylidene group, and R^2 is a hydrogen atom or a lower alkoxy group are particularly preferable.

Among carbostyril compounds represented by General Formula (1), compounds wherein the bond between the 3 and 4 positions of the carbostyril skeleton is a double bond and R^4 and R^5 are linked together in the form of a -CH=CH-CH=CH- group are preferable;

of such carbostyril compounds, compounds wherein a group of the formula



in which R^3, A and X are as defined in Item 1 above, is bound to the 7 position of the carbostyril skeleton are more preferable; those wherein R^1 is (1-2) or (1-3) as defined in Item 1 above are still more preferable; and those wherein A is a lower alkylene group or a lower alkylidene group, R^2 and R^3 are both hydrogen atoms, and X is an oxygen atom or a sulfur atom are particularly preferable.

Examples of particularly preferable carbostyril compounds of the present invention are as follows:

5-[1-(biphenyl-4-ylmethyl)-8-methoxy-2-oxo-1,2,3,4-tetrahydroquinolin-5-ylmethyl]thiazolidine-2,4-dione,

5-[1-(4-chlorobenzyl)-8-methoxy-2-oxo-1,2,3,4-tetrahydroquinolin-5-ylmethyl]thiazolidine-2,4-dione,

5-[1-(4-bromobenzyl)-8-methoxy-2-oxo-1,2,3,4-tetrahydroquinolin-5-ylmethyl]thiazolidine-2,4-dione,

5-[1-(2-naphthylmethyl)-8-methoxy-2-oxo-1,2,3,4-tetrahydroquinolin-5-ylmethyl]thiazolidine-2,4-dione,

5-{1-[4-(heptyloxycarbonylamino)benzyl]-8-methoxy-2-oxo-1,2,3,4-tetrahydroquinolin-5-ylmethyl}thiazolidine-2,4-dione,

5-[1-(1-biphenyl-4-ylpiperidin-4-ylmethyl)-2-oxo-1,2,3,4-tetrahydroquinolin-5-ylmethyl]thiazolidine-2,4-dione,

5-{1-[1-(4-methylphenyl)piperidin-4-ylmethyl]-2-oxo-1,2,3,4-tetrahydroquinolin-5-ylmethyl}thiazolidine-2,4-dione,

5-{1-[4-(2-chlorobenzyloxycarbonylamino)benzyl]-8-methoxy-2-oxo-1,2,3,4-tetrahydroquinolin-5-ylmethyl}thiazolidine-2,4-dione,

1-(biphenyl-4-ylmethyl)-8-methoxy-5-(4-oxo-2-thioxothiazolidin-5-ylmethyl)-3,4-dihydro-1H-quinolin-2-one,

8-methoxy-1-methyl-5-(4-oxo-2-thioxothiazolidin-5-ylmethyl)-3,4-dihydro-1H-quinolin-2-one,

8-methoxy-1-(3-methylbutyl)-5-(4-oxo-2-thioxothiazolidin-5-ylmethyl)-3,4-dihydro-1H-quinolin-2-one,

1-propyl-8-methoxy-5-(4-oxo-2-thioxothiazolidin-5-ylmethyl)-3,4-dihydro-1H-quinolin-2-one,

1-isobutyl-8-methoxy-5-(4-oxo-2-thioxothiazolidin-5-ylmethyl)-3,4-dihydro-1H-quinolin-2-one,

8-methoxy-1-phenethyl-5-(4-oxo-2-thioxothiazolidin-5-ylmethyl)-3,4-dihydro-1H-quinolin-2-one, and 1-(4-phenylthiomethyl)benzyl-5-(4-oxo-2-thioxothiazolidin-5-ylmethyl)-3,4-dihydro-1H-quinolin-2-one.

Specific examples of groups in the above formula (1) are as follows.

Examples of lower alkylene groups include straight and branched C_{1-6} alkylene groups, such as methylene, ethylene, trimethylene, 2-methyltrimethylene, 2,2-dimethylethylene, 2,2-dimethyltrimethylene, 1-methyltrimethylene, methylmethylene, ethylmethylene, tetramethylene, pentamethylene, and hexamethylene.

Examples of lower alkylidene groups include straight and branched C_{1-6} alkylidene groups, such as methylidene, ethylidene, propylidene, butylidene, pentylidene, and hexylidene.

Examples of lower alkyl groups include straight and branched C_{1-6} alkyl groups, such as methyl, ethyl, *n*-propyl, isopropyl, *n*-butyl, isobutyl, *tert*-butyl, *sec*-butyl, *n*-pentyl, isopentyl, neopentyl, *n*-hexyl, isohexyl, and 3-methylpentyl.

Examples of lower alkoxy groups include straight and branched C_{1-6} alkoxy groups, such as methoxy, ethoxy, *n*-propoxy, isopropoxy, *n*-butoxy, isobutoxy, *tert*-butoxy, *sec*-butoxy, *n*-pentyloxy, isopentyloxy, neopentyloxy, *n*-hexyloxy, isohexyloxy, and 3-methylpentyloxy.

Examples halogen atoms include fluorine, chlorine, bromine, and iodine.

Examples of lower alkoxycarbonyl groups include alkoxycarbonyl groups wherein the alkoxy moiety is a straight or branched C_{1-6} alkoxy group, such as methoxycarbonyl, ethoxycarbonyl, *n*-propoxycarbonyl, isopropoxycarbonyl, *n*-butoxycarbonyl, isobutoxycarbonyl, *tert*-butoxycarbonyl, *sec*-butoxycarbonyl, *n*-pentyloxycarbonyl, neopentyloxycarbonyl, *n*-hexyloxycarbonyl, isohexyloxycarbonyl, and 3-methylpentyloxycarbonyl.

Examples of phenyl lower alkoxy groups include phenylalkoxy groups wherein the alkoxy moiety is a straight or branched C_{1-6} alkoxy group, such as benzyloxy, 2-phenylethoxy, 1-

phenylethoxy, 3-phenylpropoxy, 4-phenylbutoxy, 5-phenylpentyloxy, 6-phenylhexyloxy, 1,1-dimethyl-2-phenylethoxy, and 2-methyl-3-phenylpropoxy.

Examples of piperidinyl lower alkoxycarbonyl groups include piperidinylalkoxycarbonyl groups wherein the alkoxy moiety is a straight or branched C_{1-6} alkoxy group, such as [(1-, 2-, 3-, or 4-)piperidinyl]methoxycarbonyl, 2-[(1-, 2-, 3-, or 4-)piperidinyl]ethoxycarbonyl, 1-[(1-, 2-, 3-, or 4-)piperidinyl]ethoxycarbonyl, 3-[(1-, 2-, 3-, or 4-)piperidinyl]propoxycarbonyl, 4-[(1-, 2-, 3-, or 4-)piperidinyl]butoxycarbonyl, 5-[(1-, 2-, 3-, or 4-)piperidinyl]pentyloxycarbonyl, 6-[(1-, 2-, 3-, or 4-)piperidinyl]hexyloxycarbonyl, 1,1-dimethyl-2-[(1-, 2-, 3-, or 4-)piperidinyl]ethoxycarbonyl, and 2-methyl-3-[(1-, 2-, 3-, or 4-)piperidinyl]propoxy carbonyl.

Examples of cycloalkyl groups include C_{3-8} cycloalkyl groups, such as cyclopropyl, cyclobutyl, cyclopentyl, cyclohexyl, cycloheptyl, and cyclooctyl.

Examples of amino lower alkoxycarbonyl groups optionally substituted with one or more cycloalkyl groups include:

amino-substituted alkoxycarbonyl groups wherein the alkoxy moiety is a straight or branched C_{1-6} alkoxy group, optionally substituted with one or two C_{3-8} cycloalkyl groups;

such as aminomethoxycarbonyl, 2-aminoethoxycarbonyl, cyclopropylaminomethoxycarbonyl, 2-cyclohexylaminoethoxycarbonyl, 1-cyclobutylaminoethoxycarbonyl, 3-cyclopentylaminopropoxycarbonyl, 4-cycloheptylaminobutoxycarbonyl, 5-cyclooctylaminopentyloxycarbonyl, 6-cyclohexylaminohexyloxycarbonyl, 1,1-dimethyl-2-cyclohexylaminoethoxycarbonyl, 2-methyl-3-cyclopropylaminopropoxycarbonyl, and 2-(*N*-cyclopropyl-*N*-cyclohexylamino)ethoxycarbonyl.

Examples of lower alkylthio groups include straight and branched C_{1-6} alkylthio groups such as methylthio, ethylthio, *n*-

propylthio, isopropylthio, *n*-butylthio, *tert*-butylthio, *n*-pentylthio, and *n*-hexylthio.

Examples of 2-imidazolinylcarbonyl groups optionally substituted on the 2-imidazoline ring with one or more alkylthio groups include 2-imidazolinylcarbonyl groups optionally substituted on the 2-imidazoline ring with one to three lower alkylthio groups, such as (1-, 2-, 4-, or 5-)2-imidazolinylcarbonyl, 2-methylthio-(1-, 4-, or 5-)2-imidazolinylcarbonyl, 2-ethylthio-(1-, 4-, or 5-)2-imidazolinylcarbonyl, 4-propylthio-(1-, 2-, or 5-)2-imidazolinylcarbonyl, 5-isopropylthio-(1-, 2-, or 4-)2-imidazolinylcarbonyl, 2-*n*-butylthio-(1-, 4-, or 5-)2-imidazolinylcarbonyl, 2-*n*-pentylthio-(1-, 4-, or 5-)2-imidazolinylcarbonyl, 2-*n*-hexylthio-(1-, 4-, or 5-)2-imidazolinylcarbonyl, 2,4-dimethylthio-(1- or 5-)2-imidazolinylcarbonyl, and 2,4,5-trimethylthio-(1-)2-imidazolinylcarbonyl.

Examples of 3-pyrrolinylcarbonyl groups optionally substituted on the 3-pyrroline ring with one or more lower alkyl groups include 3-pyrrolinylcarbonyl groups optionally substituted on the 3-pyrroline ring with one to three lower alkyl groups, such as (1-, 2-, or 3-)3-pyrrolinylcarbonyl, 2-methyl-(1-, 2-, 3-, 4-, or 5-)3-pyrrolinylcarbonyl, 2-ethyl-(1-, 2-, 3-, 4-, or 5-)3-pyrrolinylcarbonyl, 3-propyl-(1-, 2-, 4-, or 5-)3-pyrrolinylcarbonyl, 4-isopropyl-(1-, 2-, 3-, or 5-)3-pyrrolinylcarbonyl, 5-*n*-butyl-(1-, 2-, 3-, 4-, or 5-)3-pyrrolinylcarbonyl, 2-*n*-pentyl-(1-, 2-, 3-, 4-, or 5-)3-pyrrolinylcarbonyl, 2-*n*-hexyl-(1-, 2-, 3-, 4-, or 5-)3-pyrrolinylcarbonyl, 2,5-dimethyl-(1-, 2-, 3-, 4-, or 5-)3-pyrrolinylcarbonyl, 2,4-dimethyl-(1-, 2-, 3-, or 5-)3-pyrrolinylcarbonyl, 2,3-dimethyl-(1-, 2-, 4-, or 5-)3-pyrrolinylcarbonyl, and 2,4,5-trimethylthio-(1-, 2-, 3-, or 5-)3-pyrrolinylcarbonyl.

Examples of thiazolidinylcarbonyl groups optionally substituted on the thiazolidine ring with a phenyl group includes

(2-, 3-, 4-, or 5-)thiazolidinylcarbonyl, 2-phenyl-(3-, 4-, or 5-)thiazolidinylcarbonyl, 3-phenyl-(2-, 4-, or 5-)thiazolidinylcarbonyl, 4-phenyl-(2-, 3-, or 5-)thiazolidinylcarbonyl, and 5-phenyl-(2-, 3-, or 4-)thiazolidinylcarbonyl.

Examples of piperidinyl lower alkyl groups include piperidinylalkyl groups wherein the alkyl moiety is a straight or branched C_{1-6} alkyl group, such as [(1-, 2-, 3-, or 4-)piperidinyl]methyl, 2-[(1-, 2-, 3-, or 4-)piperidinyl]ethyl, 1-[(1-, 2-, 3-, or 4-)piperidinyl]ethyl, 3-[(1-, 2-, 3-, or 4-)piperidinyl]propyl, 4-[(1-, 2-, 3-, or 4-)piperidinyl]butyl, 5-[(1-, 2-, 3-, or 4-)piperidinyl]pentyl, 6-[(1-, 2-, 3-, or 4-)piperidinyl]hexyl, 1,1-dimethyl-2-[(1-, 2-, 3-, or 4-)piperidinyl]ethyl, and 2-methyl-3-[(1-, 2-, 3-, or 4-)piperidinyl]propyl.

Examples of anilino lower alkyl groups optionally substituted on the amino group with one or more lower alkyl groups include anilinoalkyl groups optionally substituted on the amino group with one or more straight and/or branched C_{1-6} alkyl groups, such as anilinomethyl, *N*-methylanilinomethyl, *N*-ethylanilinomethyl, *N*-*n*-propylanilinomethyl, *N*-isopropylanilinomethyl, *N*-*n*-butylanilinomethyl, *N*-*sec*-butylanilinomethyl, *N*-*tert*-butylanilinomethyl, *N*-*n*-pentylanilinomethyl, *N*-*n*-hexylanilinomethyl, 2-anilinoethyl, 2-(*N*-methylanilino)ethyl, 2-(*N*-ethylanilino)ethyl, 2-(*N*-*n*-propylanilino)ethyl, 2-(*N*-isopropylanilino)ethyl, 2-(*N*-*n*-butylanilino)ethyl, 2-(*N*-*sec*-butylanilino)ethyl, 2-(*N*-*tert*-butylanilino)ethyl, 2-(*N*-*n*-pentylanilino)ethyl, 2-(*N*-*n*-hexylanilino)ethyl, 3-anilinopropyl, 3-(*N*-methylanilino)propyl, 4-(*N*-ethylanilino)butyl, 4-(*N*-*n*-propylanilino)butyl, 5-(*N*-isopropylanilino)pentyl, 5-(*N*-*n*-butylanilino)pentyl, 6-(*N*-*sec*-butylanilino)hexyl, 6-(*N*-*tert*-butylanilino)hexyl, 6-(*N*-*n*-pentylanilino)hexyl, and 6-(*N*-*n*-hexylanilino)hexyl.

Examples of phenylthio lower alkyl groups include phenylthioalkyl groups wherein the alkyl moiety is a straight or

branched C_{1-6} alkyl group, such as phenylthiomethyl, 2-phenylthioethyl, 1-phenylthioethyl, 3-phenylthiopropyl, 4-phenylthiobutyl, 5-phenylthiopentyl, 6-phenylthiohexyl, 1,1-dimethyl-2-phenylthioethyl, and 2-methyl-3-phenylthiopropyl.

Examples of indolinyl lower alkyl groups include indolinylalkyl groups wherein the alkyl moiety is a straight or branched C_{1-6} alkyl group, such as
[(1-, 2-, 3-, 4-, 5-, 6-, or 7-)indolinyl]methyl,
2-[(1-, 2-, 3-, 4-, or 5-)indolinyl]ethyl,
1-[(1-, 2-, 3-, 4-, 5-, 6-, or 7)indolinyl]ethyl,
3-[(1-, 2-, 3-, 4-, 5-, 6-, or 7)indolinyl]propyl,
4-[(1-, 2-, 3-, 4-, 5-, 6-, or 7)indolinyl]butyl,
5-[(1-, 2-, 3-, 4-, 5-, 6-, or 7)indolinyl]pentyl,
6-[(1-, 2-, 3-, 4-, 5-, 6-, or 7)indolinyl]hexyl,
1,1-dimethyl-2-[(1-, 2-, 3-, 4-, 5-, 6-, or 7)indolinyl]ethyl,
and 2-methyl-3-[(1-, 2-, 3-, 4-, 5-, 6-, or 7)indolinyl]propyl.

Examples of piperidinylcarbonyl groups optionally substituted on the piperidine ring with one or more lower alkyl groups include piperidinylcarbonyl groups optionally substituted on the piperidine ring with one to three straight and/or branched C_{1-6} alkyl groups, such as (1-, 2-, 3-, or 4-)piperidinylcarbonyl,
1-methyl-(2-, 3-, or 4-)piperidinylcarbonyl,
1-ethyl-(2-, 3-, or 4-)piperidinylcarbonyl,
1-*n*-propyl-(2-, 3-, or 4-)piperidinylcarbonyl,
1-*n*-butyl-(2-, 3-, or 4-)piperidinylcarbonyl,
1-*n*-pentyl-(2-, 3-, or 4-)piperidinylcarbonyl,
1-*n*-hexyl-(2-, 3-, or 4-)piperidinylcarbonyl,
1,2-dimethyl-(3-, 4-, 5-, or 6-)piperidinylcarbonyl,
1,2,3-trimethyl-(4-, 5-, or 6-)piperidinylcarbonyl,
2-*n*-propyl-(1-, 3-, 4-, 5-, or 6-)piperidinylcarbonyl,
3-ethyl-(1-, 2-, 4-, 5-, or 6-) piperidinylcarbonyl, and
2-methyl-4-isopropyl-(1-, 3-, 5-, or 6-)piperidinylcarbonyl.

Examples of phenyl lower alkyl groups optionally substituted on the phenyl ring with one or more members selected from the group consisting of a phenyl group; lower alkyl groups;

lower alkoxy groups; halogen atoms; $-(B)_1NR^6R^7$ groups; a nitro group; a carboxy group; lower alkoxycarbonyl groups; a cyano group; phenyl lower alkoxy groups; a phenoxy group; piperidinyl lower alkoxycarbonyl groups; amino lower alkoxycarbonyl groups optionally substituted with one or more cycloalkyl groups; 2-imidazolinylcarbonyl groups optionally substituted on the 2-imidazoline ring with one or more lower alkylthio groups; 3-pyrrolinylcarbonyl groups optionally substituted on the pyrroline ring with one or more lower alkyl groups; a thiazolidinylcarbonyl groups optionally substituted on the thiazolidine ring with a phenyl group; 3-azabicyclo[3.2.2] nonylcarbonyl groups; piperidinyl lower alkyl groups; anilino lower alkyl groups optionally substituted on the amino group with one or more lower alkyl groups; phenylthio lower alkyl groups; indolinyl lower alkyl groups; and piperidinylcarbonyl groups optionally substituted on the piperidine ring with one or more lower alkyl groups include:

mono- and di-phenylalkyl groups wherein the alkyl moiety is a straight or branched C_{1-6} aklyl group, optionally substituted on the phenyl ring with one to three members selected from the group consisting of a phenyl group; the above-described straight and branched C_{1-6} alkyl groups; the above-described straight and branched C_{1-6} alkoxy groups; halogen atoms; the below-described $-(B)_1NR^6R^7$ groups; a nitro group; a carboxyl group; the above-described straight and branched C_{1-6} alkoxycarbonyl groups; a cyano group; the above-described phenylalkoxy groups wherein the alkoxy moiety is a straight or branched C_{1-6} alkoxy group; a phenoxy group; the above-described piperidinylalkoxycarbonyl groups wherein the alkoxy moiety is a straight or branched C_{1-6} alkoxy group; the above-described aminoalkoxycarbonyl groups wherein the alkoxy moiety is a straight or branched C_{1-6} alkoxy group, optionally substituted with one or two C_{3-8} cycloalkyl groups; the above-described 2-imidazolinylcarbonyl groups optionally substituted on the 2-imidazoline ring with one to three straight and/or branched C_{1-6} alkylthio groups; the above-

described 3-pyrrolinylcarbonyl groups optionally substituted on the 3-pyrroline ring with one to three straight and/or branched C_{1-6} alkyl groups; thiazolidinylcarbonyl groups optionally substituted on the thiazolidine ring with a phenyl group; 3-azabicyclo[3.2.2]nonylcarbonyl groups; piperidinylalkyl groups wherein the alkyl moiety is a straight or branched C_{1-6} alkyl group; anilinoalkyl groups wherein the alkyl moiety is a straight or branched C_{1-6} alkyl group, optionally substituted on the amino group with one or two straight and/or branched C_{1-6} alkyl groups; phenylthioalkyl groups wherein the alkyl moiety is a straight or branched C_{1-6} alkyl group; indolinylalkyl groups wherein the alkyl moiety is a straight or branched C_{1-6} alkyl group; and the above-described piperidinylcarbonyl groups optionally substituted on the piperidine ring with one to three straight and/or branched C_{1-6} alkyl groups;

such as benzyl, 1-phenethyl, 2-phenethyl, 3-phenylpropyl, 2-phenylpropyl, 4-phenylbutyl, 5-phenylpentyl, 4-phenylpentyl, 6-phenylhexyl, 2-methyl-3-phenylpropyl, 1,1-dimethyl-2-phenylethyl, 1,1-diphenylmethyl, 2,2-diphenylethyl, 3,3-diphenylpropyl, 1,2-diphenylethyl, 4-[*N*-(3-pyridyl) aminocarbonyl]benzyl, 4-[*N*-(2-methoxyphenyl)aminocarbonyl]benzyl, 4-[2-(2-piperidinyl)ethoxycarbonyl]benzyl, 4-[2-(cyclohexylamino) ethoxycarbonyl]benzyl, 4-[4-(3-pyridylmethyl)-1-piperazinylcarbonyl]benzyl, 4-[4-(4-pyridylmethyl)-1-piperazinylcarbonyl]benzyl, 4-[4-(2-pyridylmethyl)-1-piperazinylcarbonyl]benzyl, 4-[4-(2-pyridyl)-1-piperazinylcarbonyl]benzyl, 4-[4-(3-chlorophenyl)-1-piperazinylcarbonyl]benzyl, 4-[4-(2-fluorophenyl)-1-piperazinylcarbonyl]benzyl, 4-[4-(2-pyrimidyl)-1-piperazinylcarbonyl]benzyl, 4-(4-cyclopentyl-1-piperazinylcarbonyl)benzyl, 4-[4-(2-methoxyphenyl)-1-piperazinylcarbonyl]benzyl, 4-[4-(4-fluorophenyl)-1-piperazinylcarbonyl]benzyl, 4-[4-(3,4-methylenedioxybenzyl)-1-piperazinylcarbonyl]benzyl, 4-(*N*-cyclohexyl-*N*-methylaminocarbonyl)benzyl, 4-(*N*,*N*-di-*n*-butylaminocarbonyl)benzyl,

4-[4-(1-piperidinyl)-1-piperidinylcarbonyl]benzyl, 4-(1-homopiperidinylcarbonyl)benzyl, 4-[2-methylthio-1-(2-imidazolinyl)carbonyl]benzyl, 4-{*N*-[2-(2-pyridyl)ethyl]-*N*-methylaminocarbonyl}benzyl, 4-[*N*-(1-methyl-4-piperidinyl)-*N*-methylaminocarbonyl]benzyl, 4-(*N*,*N*-diisobutylaminocarbonyl)benzyl, 4-[*N*-(2-tetrahydropyranyl)methyl-*N*-ethylaminocarbonyl]benzyl, 4-(4-thiomorpholinocarbonyl)benzyl, 4-[2,5-dimethyl-1-(3-pyronyl)carbonyl]benzyl, 4-(3-thiazolidinylcarbonyl)benzyl, 4-(*N*-cyclopropylmethyl-*N*-*n*-propylaminocarbonyl)benzyl, 4-[1-(3-azabicyclo[3.2.2]nonylcarbonyl)benzyl, 4-(*N*-cyclopentyl-*N*-allylaminocarbonyl)benzyl, 4-[4-(4-pyridyl)-1-piperazinylcarbonyl]benzyl, 4-[4-(4-trifluoromethylphenyl)-1-piperazinylcarbonyl]benzyl, 4-[4-(2-phenylethyl)-1-piperazinylcarbonyl]benzyl, 4-[4-(2-pyrazyl)-1-piperazinylcarbonyl]benzyl, 4-(*N*-*n*-butylaminocarbonyl)benzyl, 4-(*N*-cyclopropylaminocarbonyl)benzyl, 4-[*N*-(1-methyl-1-phenylethyl)aminocarbonyl]benzyl, 4-(*N*-benzylaminocarbonyl)benzyl, 4-[*N*-(2-chlorobenzyl)aminocarbonyl]benzyl, 4-[*N*-(3-chlorobenzyl)aminocarbonyl]benzyl, 4-[*N*-(4-chlorobenzyl)aminocarbonyl]benzyl, 4-[*N*-(2-pyridyl)methylaminocarbonyl]benzyl, 4-[*N*-(3-pyridyl)methylaminocarbonyl]benzyl, 4-[(4-pyridyl)methylaminocarbonyl]benzyl, 4-[3,5-dimethyl-1-piperidinylcarbonyl]benzyl, 4-[*N*-(2-furyl)methylaminocarbonyl]benzyl, 4-[4-(2-fluorobenzyloxy)-1-piperidinylcarbonyl]benzyl, 4-{4-[*N*-(2-phenylacetyl)-*N*-methylamino]-1-piperidinylcarbonyl}benzyl, 4-[(4-methoxy-1-piperidinyl)carbonyl]benzyl, 4-{[4-(3,4-dimethyl-1-piperazinyl)-1-piperidinyl]carbonyl}benzyl, 4-{[4-(4-chlorobenzoyl)-1-piperidinyl]carbonyl}benzyl, 4-{[4-(4-chlorobenzyl)-1-piperidinyl]carbonyl}benzyl, 4-[(4-ethylcarbamoylmethyl-1-piperidinyl)carbonyl]benzyl, 4-[(4-cyclohexyl-1-piperidinyl)carbonyl]benzyl, 4-{[4-(4-methoxyphenyl)-1-piperidinyl]carbonyl}benzyl, 4-{[4-(2-benzoxazolyl)-1-piperazinyl]carbonyl}benzyl, 4-[(4-anilinocarbonylmethyl-1-piperazinyl)carbonyl]benzyl, 4-[(4-methyl-2-benzyl-1-piperazinyl)carbonyl]benzyl, 4-[(4-phenyl-3-oxo-1-

piperazinyl)carbonyl]benzyl, 4-[(4-*tert*-butyl-3-oxo-1-piperazinyl)carbonyl]benzyl, 4-[*N*-(1-benzoyl-4-piperidinyl)-*N*-methylaminocarbonyl]benzyl, 4-[*N*-(1-acetyl-4-piperidinyl)-*N*-methylaminocarbonyl]benzyl, 4-{[4-(4-cyanophenyl)-1-piperazinyl]carbonyl}benzyl, 4-[*N*-methylcarbamoylmethyl-*N*-benzylaminocarbonyl]benzyl, 4-[*N*-benzyl-*N*-cyclohexylaminocarbonyl]benzyl, 4-[2-(*N*-methyl-*N*-phenylcarbamoyl)ethyl-*N*-methylaminocarbonyl]benzyl, 4-{[4-(3-phenyl-1-pyrrolidinyl)-1-piperidinyl]carbonyl}benzyl, 4-[(1,2,3,4-tetrahydroisoquinoline-2-yl)carbonyl]benzyl, 4-[(4-benzyl-1-piperidinyl)carbonyl]benzyl, 4-{[4-(3,4-methylenedioxybenzoyl)-1-piperazinyl]carbonyl}benzyl, 4-[*N*-methyl-*N*-(4-methylbenzyl)aminocarbonyl]benzyl, 4-[*N*-methyl-*N*-(3,4-methylenedioxybenzyl)aminocarbonyl]benzyl, 4-[*N*-methyl-*N*-(2-methoxybenzyl)aminocarbonyl]benzyl, 4-[(4-phenyl-1-piperazinyl)carbonyl]benzyl, 4-[(4-phenyl-4-hydroxy-1-piperidinyl)carbonyl]benzyl, 4-(*N*-isopropyl-*N*-benzylaminocarbonyl)benzyl, 4-(*N*-ethyl-*N*-cyclohexylaminocarbonyl)benzyl, 4-[*N*-ethyl-*N*-(4-pyridyl)methylaminocarbonyl]benzyl, 4-(*N*-*n*-propylaminocarbonyl)benzyl, 4-[*N*-ethyl-*N*-(4-ethoxybenzyl)aminocarbonyl]benzyl, 4-(*N*-ethyl-*N*-cyclohexylmethylaminocarbonyl)benzyl, 4-[*N*-(2-ethoxyethyl)aminocarbonyl]benzyl, 4-[*N*-(1,1-dimethyl-2-phenylethyl)aminocarbonyl]benzyl, 4-[{4-[*N*-methyl-*N*-(4-chlorophenyl)amino]-1-piperidinyl}carbonyl]benzyl, 4-[*N*-(1-methyl-1-cyclopentyl)aminocarbonyl]benzyl, 4-[*N*-(1-methyl-1-cyclohexyl)aminocarbonyl]benzyl, 4-{*N*-[2-(3-methoxyphenyl)ethyl]aminocarbonyl}benzyl, 4-[*N*-(4-trifluoromethoxybenzyl)aminocarbonyl]benzyl, 4-{*N*-[2-(4-chlorophenyl)ethyl]aminocarbonyl}benzyl, 4-[*N*-(3,4-methylenedioxybenzyl)aminocarbonyl]benzyl, 4-(*N*-cyclohexylmethylaminocarbonyl)benzyl, 4-[*N*-(4-fluorobenzyl)aminocarbonyl]benzyl, 4-[*N*-(1-phenylethyl)aminocarbonyl]benzyl, 4-[*N*-(3-phenylpropyl)aminocarbonyl]benzyl, 4-{*N*-[3-(1-imidazolyl)propyl]aminocarbonyl}benzyl, 4-[*N*-(2-phenylethyl)aminocarbonyl]benzyl, 4-[2-(*N*,*N*-diisopropylamino)ethylaminocarbonyl]benzyl, 4-{*N*-[1-methoxycarbonyl-2-(4-hydroxyphenyl)ethyl]aminocarbonyl}

benzyl, 4-[*N*-(carbamoylmethyl)aminocarbonyl]benzyl, 4-{*N*-[1-carbamoyl-2-(5-imidazolyl)ethyl]aminocarbonyl}benzyl, 4-{*N*-[1-methoxycarbonyl-2-(5-imidazolyl)ethyl]amino carbonyl}benzyl, 4-[*N*-(2-oxo-2,3,4,5-tetrahydrofuran-3-yl)aminocarbonyl]benzyl, 4-[(2-ethoxycarbonyl-1-piperidinyl)carbonyl]benzyl, 4-(*N*-methoxycarbonylmethyl-*N*-methylaminocarbonyl)benzyl, 4-[(2-carbamoyl-1-pyrrolidinyl)carbonyl]benzyl, 4-{[*N*-(2,6-dimethylbenzyl)-*N*-ethyl]aminocarbonyl}benzyl, 4-{*N*-[(4-methylphenyl)carbamoylmethyl]-*N*-methylaminocarbonyl}benzyl, 4-[*N*-(4-chlorobenzyl)-*N*-ethylaminocarbonyl]benzyl, 4-[*N*-(4-trifluoromethylbenzyl)-*N*-ethylaminocarbonyl]benzyl, 4-[*N*-(3-bromobenzyl)-*N*-ethylaminocarbonyl]benzyl, 4-{[4-(2-chlorobenzyl)-1-piperidinyl]carbonyl}benzyl, 4-{[4-(3-chlorobenzyl)-1-piperidinyl]carbonyl}benzyl, 4-{[4-(2-chlorobenzylidene)-1-piperidinyl]carbonyl}benzyl, 4-[*N*-(2-methoxybenzyl)aminocarbonyl]benzyl, 4-{*N*-[2-(2-fluorophenyl)ethyl]aminocarbonyl}benzyl, 4-{*N*-[2-(3-fluorophenyl)ethyl]aminocarbonyl}benzyl, 4-[(4-benzyloxycarbonyl-1-piperazinyl)carbonyl]benzyl, 4-{[4-(3-cyano-2-pyridyl)-1-piperazinyl]carbonyl}benzyl, 4-[(4-phenyl-1-piperidinyl)carbonyl]benzyl, 4-[{4-[(3-furyl)methyl]-1-piperazinyl}carbonyl]benzyl, 4-{[4-(3-pyridyl)-1-piperazinyl]carbonyl}benzyl, 4-{[4-(4-tetrahydropyranyl)-1-piperazinyl]carbonyl}benzyl, 4-{[4-(2-fluorobenzyl)-1-piperidinyl]carbonyl}benzyl, 4-{[4-(4-morpholino)-1-piperidinyl]carbonyl}benzyl, 4-{4-[2-(1,3-dioxolane-2-yl)ethyl]-1-piperazinyl}carbonyl]benzyl, 4-phenylbenzyl, 2-phenylbenzyl, 3-phenylbenzyl, 4-*tert*-butylbenzyl, 4-aminobenzyl, 4-nitrobenzyl, 4-methoxycarbonylbenzyl, 4-carboxybenzyl, 3-methoxy-4-chlorobenzyl, 4-methoxybenzyl, 2,4,6-trimethoxybenzyl, 3,4-dichlorobenzyl, 4-chlorobenzyl, 4-bromobenzyl, 2,4,6-trifluorobenzyl, 4-fluorobenzyl, 4-cyanobenzyl, 4-piperidinylcarbonylbenzyl, 4-anilinocarbonylbenzyl, 4-(*N*-cyclohexylaminocarbonyl)benzyl, 4-(*N*-benzoylamino)benzyl, 4-(*N*-cyclohexylamino)benzyl, 4-phenylcarbamoylaminobenzyl, 4-methylbenzyl, 3,4-dimethylbenzyl, 3,4,5-trimethylbenzyl, 4-benzyloxybenzyl, 4-ethylcarbamoylaminobenzyl, 4-

ethylaminocarbonylbenzyl, 4-isopropylaminocarbonylbenzyl, 4-[*N*-(2-hydroxyethyl)aminocarbonyl]benzyl, 4-[*N*-(3-pyridyl) aminocarbonyl]benzyl, 4-[*N*-(4-chlorophenyl)aminocarbonyl]benzyl, 4-[*N*-(4-isopropylphenyl)aminocarbonyl]benzyl, 4-[*N*-(4-phenoxyphenyl)aminocarbonyl]benzyl, 4-[*N*-(3-phenoxyphenyl) aminocarbonyl]benzyl, 4-[*N*-(3-phenoxybenzoyl)amino]benzyl, 4-[*N*-(4-phenoxybenzoyl)amino]benzyl, 4-[*N*-(4-chlorobenzoyl)amino] benzyl, 4-[*N*-(2-chlorobenzoyl)amino]benzyl, 4-[*N*-(2,6-dichlorobenzoyl)amino]benzyl, 4-[*N*-(4-methoxyphenyl) aminocarbonyl]benzyl, 4-[*N*-(2-furylcarbonyl)amino]benzyl, 4-[*N*-(4-methoxybenzoyl)amino]benzyl, 4-[*N*-(3-methoxybenzoyl)amino] benzyl, 4-[*N*-(2-methoxybenzoyl)amino]benzyl, 4-phenoxybenzyl, 4-*n*-pentyloxycarbonylaminobenzyl, 4-[*N*-(4-methoxyphenoxycarbonyl) amino]benzyl, 4-[*N*-(4-methylphenoxycarbonyl)amino]benzyl, 4-benzyloxycarbonylaminobenzyl, 4-ethanoylaminobenzyl, 4-(*N*-acetylamino)benzyl, 4-methylsulfonylaminobenzyl, methoxycarbonylaminobenzyl, 4-[*N*-(4-isopropylphenyl) aminocarbonyl]benzyl, 4-[4-{2-[(1-, 2-, or 3-)imidazolyl]ethyl}-1-piperazinylcarbonyl]benzyl, 4-{4-[3-methyl-(2-, 3-, or 4-) pyridyl]-1-piperazinyl carbonyl}benzyl, 4-{4-[4-methyl-(2-, 3-, or 4-)pyridyl]-1-piperazinylcarbonyl}benzyl, 4-[4-{2-[(2-, 3-, or 4-)pyridyl]ethyl}-1-piperazinylcarbonyl]benzyl, 4-{4-4-[(1- or 2-)naphthyl]-(1-, 2-, or 3-)piperazinylcarbonyl} benzyl, 4-[(1-, 2-, 3-, or 4- piperazinylcarbonyl)] benzyl, 4-[2-methyl-(1-, 3-, 4-, 5-, or 6-)piperidinylcarbonyl]benzyl, 4-[3-ethoxycarbonyl-(1-, 2-, 4-, 5-, or 6-)piperidinyl]benzyl, 4-[4-(3-hydroxyphenyl)-(1-, 2-, 4-, 5-, or 6-)piperidinyl]benzyl, 4-[4-hydroxy-4-benzyl-(1-, 2-, or 3-)piperidinylcarbonyl]benzyl, 4-[3-acetylamino-(1-, 2-, 4-, or 5-)pyrrolidinylcarbonyl]benzyl, 4-[*N*-{2-[1-ethyl-(2- or 3-)pyrrolidinyl]ethyl}aminocarbonyl]benzyl, 4-[*N*-{2-[(2- or 3-)pyrrolidinyl]ethyl}aminocarbonyl]benzyl, 4-[*N*-{2-([2-, 3-, or 4-]morpholino)ethyl}aminocarbonyl]benzyl, 4-[*N*-{3-([2-, 3-, or 4-]morpholino)propyl}aminocarbonyl]benzyl, 4-[2,6-dimethyl-(3-, 4-, or 5-)morpholinocarbonyl]benzyl, 4-[4-(4-trifluoromethylanilino)-(1-, 2-, or 3-)piperazinylcarbonyl]benzyl,

4-{2-[(1-, 2-, 3-, or 4-) piperidinylmethyl]-(3-, 4-, 5- or 6-) morpholinocarbonyl}benzyl, 4-(*N*-methyl-*N*-*n*-pentylaminocarbonyl) benzyl, 4-{4-[(1-, 2-, 4-, or 5-)2,3-dihydro-1H-indenyl]-(1-, 2-, or 3-)piperidinylcarbonyl}benzyl, 4-[*N*-(2-methylcyclohexyl)aminocarbonyl]benzyl, 4-isoindolinylcarbonylbenzyl, 4-[2-phenyl-(1-, 3-, 4- or 5-) pyrrolidinylcarbonyl]benzyl, 4-{2-[(1-, 2-, 3-, or 4-morpholinomethyl)-(1-, 3-, 4-, or 5-)pyrrolidinylcarbonyl] benzyl, 4-[2-dimethylaminomethyl-(1-, 3-, 4-, or 5-) pyrrolidinylcarbonyl]benzyl, 4-{*N*-[1-(4-fluorobenzoyl)-(2-, 3-, or 4-)piperidinyl]-*N*-methylaminocarbonyl}benzyl, 4-[2-phenyl-(3-, 4-, or 5-)thiazolidinylcarbonyl]benzyl, 4-[*N*-methyl-(2-methoxyanilino)carbonyl]benzyl, 4-(3-methylthioanilinocarbonyl)benzyl, 4-(2-methylthioanilinocarbonyl)benzyl, 4-(3,4-dichloroanilinocarbonyl)benzyl, 4-(4-trifluoromethoxy-4-anilinocarbonyl)benzyl, 4-anilinocarbonylbenzyl, 4-(4-chloroanilinocarbonyl)benzyl, 4-(4-methoxyanilinocarbonyl)benzyl, 4-(3-methoxyanilinocarbonyl)benzyl, 4-(2-chloroanilinocarbonyl)benzyl, 4-(4-methylanilinocarbonyl)benzyl, 4-(2,4-dimethoxyanilinocarbonyl)benzyl, 4-(4-methoxy-5-chloroanilinocarbonyl)benzyl, 4-(2-methoxy-5-acetylaminoanilinocarbonyl)benzyl, 4-(3,4-dimethoxyanilinocarbonyl)benzyl, 4-[2-(1-methylallyl) anilinocarbonyl]benzyl, 4-(3-trifluoromethoxyanilinocarbonyl) benzyl, 4-(2-methylanilinocarbonyl)benzyl, 4-(2-fluoroanilinocarbonyl)benzyl, 4-(3-fluoroanilinocarbonyl)benzyl, 4-(4-fluoroanilinocarbonyl)benzyl, 4-(3-dimethylaminoanilinocarbonyl)benzyl, 4-(4-ethoxyanilinocarbonyl)benzyl, 4-(3-trifluoromethylanilinocarbonyl)benzyl, 4-(4-trifluoromethylanilinocarbonyl)benzyl, 4-(3-acetylaminoanilinocarbonyl)benzyl, 4-(4-acetylaminoanilinocarbonyl)benzyl, 4-[(2-, 3-, or 4-pyridylaminocarbonyl)benzyl, 4-[*N*-methyl-(3-

methylanilino)carbonyl]benzyl, 4-[3-methoxy-(2-, 4-, 5-, or 6-)pyridylaminocarbonyl]benzyl, 4-(2-phenoxyanilinocarbonyl)benzyl, 4-(3-phenoxyanilinocarbonyl)benzyl, 4-(4-phenoxyanilinocarbonyl)benzyl, 4-(3,5-dichloroanilinocarbonyl)benzyl, 4-(2,3-dimethylanilinocarbonyl)benzyl, 4-(2,4-dimethylanilinocarbonyl)benzyl, 4-(3,5-dimethylanilinocarbonyl)benzyl, 4-(3,5-difluoroanilinocarbonyl)benzyl, 4-[(1-, 2-, 3-, 4-, 5-, 6-, or 7-)indolylaminocarbonyl]benzyl, 4-(3-fluoro-4-methoxyanilinocarbonyl)benzyl, 4-(4-aminosulfonylanilinocarbonyl)benzyl, 4-(4-methyl-3-methoxyanilinocarbonyl)benzyl, 4-(3-chloro-4-methoxyanilinocarbonyl)benzyl, 4-(3-chloro-4-methylanilinocarbonyl)benzyl, 4-(3-methoxy-5-trifluoromethylanilinocarbonyl)benzyl, 4-(3-chloro-4-fluoroanilinocarbonyl)benzyl, 4-[3-methyl-(2-, 4-, 5- or 6-)pyridylaminocarbonyl]benzyl, 4-[(2-, 4- or 5-thiazolylaminocarbonyl)benzyl, 4-(3-chloro-4-hydroxyanilinocarbonyl)benzyl, 4-(2-chloro-5-acetylaminoanilinocarbonyl)benzyl, 4-(4-methylthioanilinocarbonyl)benzyl, 4-(4-isopropylanilinocarbonyl)benzyl, 4-(4-*tert*-butylanilinocarbonyl)benzyl, 4-[(2- or 4-)1,2,4-triazolylaminocarbonyl]benzyl, 4-{4-[2-oxo-(1-, 3-, 4-, or 5-)pyrrolidinyl]anilinocarbonyl}benzyl, 4-(4-methylsulfonylamino)benzyl, 4-(4-methylcarbamoylanilinocarbonyl)benzyl, anilinocarbonylbenzyl, 4-(2-benzyloxyanilinocarbonyl)benzyl, 4-(4-vinylanilinocarbonyl)benzyl, 4-(4-acetylaminoanilinocarbonyl)benzyl, 4-(3-acetylaminoanilinocarbonyl)benzyl, 4-(4-trifluoromethylanilinocarbonyl)benzyl, 4-{3-[(2-, 3-, or 4-)pyridyl]propionylamino}benzyl, 4-(3-phenoxypropionylamino)benzyl, 4-[(2-, 3- or 4-) pyridylcarbonylamino]benzyl, 4-{2-[(2-, 3-, or 4-) pyridyl]acetylamino}benzyl, 4-[(2- or 3-)furylcarbonylamino]benzyl, 4-[(2- or 3-)thienylcarbonylamino]benzyl, 4-{2-[(2- or 3-)thienyl]acetylamino}benzyl, 4-{2-[(1-, 2-, or 3-)pyrrolyl]-(3-, 4-, 5-, or 6-)pyridyl carbonylamino}benzyl, 4-

cyclopentylcarbonylaminobenzyl, 4-cyclohexylcarbonylaminobenzyl, 4-(2-cyclopentylacetylamino)benzyl, 4-(2-cyclohexylcarbonylamino) benzyl, 4-[1-benzoyl-(2-, 3-, or 4-)piperidinylcarbonylamino] benzyl, 4-[1-acetyl-(2-, 3-, or 4-)piperidinylcarbonylamino] benzyl, 4-[(2-, 3-, 4-, 5-, 6-, 7-, or 8-)chromanyl]benzyl, 4-(2-nitrobenzoylamino)benzyl, 4-(3-nitrobenzoylamino)benzyl, 4-(4-nitrobenzoylamino)benzyl, 4-(2-phenylbenzoylamino)benzyl, 4-(2-dimethylaminobenzoylamino)benzyl, 4-(2-anilinobenzoylamino)benzyl, 4-(2,6-dichlorobenzoylamino)benzyl, 4-(2-cyanobenzoylamino)benzyl, 4-(3-phenoxybenzoylamino)benzyl, 4-(2-phenoxybenzoylamino)benzyl, 4-(4-phenoxybenzoylamino)benzyl, 4-[(1- or 2-) naphthylcarbonylamino]benzyl, 4-(2-methyl-3-fluorobenzoylamino) benzyl, 4-(3,4-methylenedioxybenzoylamino)benzyl, 4-{2-[1,3-dioxo-(2-, 4-, or 5-)isoindolinyl]acetylamino}benzyl, 4-{2-[2-thioxo-4-oxothiazolidinyl]acetylamino}benzyl, 4-{3-[(1-, 2-, 3-, or 4-)piperidinyl]propionylamino}benzyl, 4-(4-acetylbenzoylamino)benzyl, 4-(2-trifluoromethylbenzoylamino) benzyl, 4-(3-trifluoromethylbenzoylamino)benzyl, 4-(4-trifluoromethylbenzoylamino)benzyl, 4-[2-(2-chlorophenyl) acetylamino]benzyl, 4-(2-chloro-4-fluorobenzoylamino)benzyl, 4-(2-chlorocinnamoylamino)benzyl, 4-(3,4-methylenedioxycinnamoylamino)benzyl, 4-[3-(2-, 3-, or 4-) pyridylvinylcarbonylamino]benzyl, 4-[2-chloro-(3-, 4-, 5-, or 6-) pyridylcarbonylamino]benzyl, 4-{2-[(2-, 3-, or 4-)pyridylthio] acetylamino}benzyl, 4-[(2-, 3-, 4-, 5-, 6-, or 7-) indolylcarbonylamino]benzyl, 4-[(1-, 2-, or 3-) pyrrolylcarbonylamino]benzyl, 4-[2-oxo-(1-, 3-, 4-, or 5-) pyrrolidinylcarbonylamino]benzyl, 4-[(2-, 3-, 4-, 5-, 6-, or 7-) benzofurylcarbonylamino]benzyl, 4-[2,6-dichloro-(3-, 4-, or 5-) pyridylcarbonylamino]benzyl, 4-{2-[(1-, 2-, 3-, 4-, 5-, 6-, or 7-)indolyl]acetylamino}benzyl, 4-[(2-, 3-, 4-, 5-, 6-, or 7-)benzothienylcarbonylamino]benzyl, 4-{4-[2-oxo-(1-, 3-, 4-, or 5-)pyrrolidinyl]benzoylamino}benzyl, 4-{4-[(1-, 2-, or 3-)pyrrolyl]benzoylamino}benzyl, 4-{4-[(1-, 3-, 4-, or 5-) pyrazolyl]benzoylamino}benzyl, 4-{4-

[(1-, 3-, or 5-)1,2,4-triazolyl]benzoylamino}benzyl, 4-{4-[(1-, 2-, 4-, or 5-)imidazolyl]benzoylamino}benzyl, 4-[4-(3,5-dimethyl-4-isoxazolyl)benzoylamino]benzyl, 4-[(2- or 3-)pyrazylcarbonylamino]benzyl, 4-(2-methoxybenzoylamino)benzyl, 4-(2-methoxy-5-chlorobenzoylamino)benzyl, 4-(4-chlorobenzoylamino)benzyl, 4-(2-phenoxyacetylamino)benzyl, 4-(3-phenylpropionyl)benzyl, 4-[(2-, 3-, or 4-)pyridylcarbonylamino]benzyl, 4-benzoylaminobenzyl, 4-cinnamoylaminobenzyl, 4-(4-methoxyphenylsulfonylamino)benzyl, 4-(3-methoxyphenylsulfonylamino)benzyl, 4-(2-methoxyphenylsulfonylamino)benzyl, 4-(4-chlorophenylsulfonylamino)benzyl, 4-(3-chlorophenylsulfonylamino)benzyl, 4-(2-chlorophenylsulfonylamino)benzyl, 4-(2-methylphenylsulfonylamino)benzyl, 4-(3-methylphenylsulfonylamino)benzyl, 4-(4-methylphenylsulfonylamino)benzyl, 4-(4-fluorophenylsulfonylamino)benzyl, 4-(3-fluorophenylsulfonylamino)benzyl, 4-(2-fluorophenylsulfonylamino)benzyl, 4-(2-methoxy-5-chlorophenylsulfonylamino)benzyl, 4-(2-trifluoromethylphenylsulfonylamino)benzyl, 4-(3-trifluoromethylphenylsulfonylamino)benzyl, 4-(4-trifluoromethylphenylsulfonylamino)benzyl, 4-[(2- or 3-)thienylsulfonylamino]benzyl, 4-(2-chlorophenylsulfonylamino)benzyl, 4-(2-trifluoromethoxyphenylsulfonylamino)benzyl, 4-(3-trifluoromethoxyphenylsulfonylamino)benzyl, 4-(4-trifluoromethoxyphenylsulfonylamino)benzyl, 4-(2-methoxycarbonylphenylsulfonylamino)benzyl, 4-(2-cyanophenylsulfonylamino)benzyl, 4-(3-cyanophenylsulfonylamino)benzyl, 4-(4-cyanophenylsulfonylamino)benzyl, 4-(3,4-dimethoxyphenylsulfonylamino)benzyl, 4-(2,5-dimethoxyphenylsulfonylamino)benzyl,

4-(2-nitrophenylsulfonylamino)benzyl,
4-(3-nitrophenylsulfonylamino)benzyl,
4-(4-nitrophenylsulfonylamino)benzyl,
4-(4-bromophenylsulfonylamino)benzyl,
4-(3-bromophenylsulfonylamino)benzyl,
4-(2-bromophenylsulfonylamino)benzyl,
4-(4-*n*-butylphenylsulfonylamino)benzyl,
4-(2-methoxy-5-chlorophenylsulfonylamino)benzyl,
4-(2,6-dichlorophenylsulfonylamino)benzyl,
4-[(1-, 2-, 3-, 4-, 5-, 6-, 7-, or 8-)quinolylsulfonylamino]benzyl, 4-[1-methyl-(2-, 4-, or 5-)imidazolylsulfonylamino]benzyl,
4-(2,3-dichlorophenylsulfonylamino)benzyl,
4-(2,5-dichlorophenylsulfonylamino)benzyl,
4-(2,4-dichlorophenylsulfonylamino)benzyl,
4-(3-nitro-4-methylphenylsulfonylamino)benzyl,
4-(2-chloro-4-fluorophenylsulfonylamino)benzyl,
4-(2,4-dichloro-5-methylphenylsulfonylamino)benzyl,
4-(2-methyl-5-nitrophenylsulfonylamino)benzyl,
4-(2-chloro-5-nitrophenylsulfonylamino)benzyl,
4-(2-chloro-4-cyanophenylsulfonylamino)benzyl,
4-(2,4,6-trimethylphenylsulfonylamino)benzyl,
4-(4-acetylaminophenylsulfonylamino)benzyl,
4-(3,5-dichloro-2-hydroxyphenylsulfonylamino)benzyl,
4-(4-methoxy-2-nitrophenylsulfonylamino)benzyl,
4-(3,4-dichlorophenylsulfonylamino)benzyl,
4-(4-*tert*-butylphenylsulfonylamino)benzyl,
4-(4-carboxyphenylsulfonylamino)benzyl,
4-(2-bromo-5-chlorophenylsulfonylamino)benzyl,
4-(4-ethylphenylsulfonylamino)benzyl,
4-(2,5-dimethylsulfonylamino)benzyl,
4-(4-*n*-butoxyphenylsulfonylamino)benzyl,
4-(2,5-difluorophenylsulfonylamino)benzyl,
4-(2-chloro-4-acetylaminophenylsulfonylamino)benzyl,
4-(2,4-difluorophenylsulfonylamino)benzyl,
4-(2-methoxy-4-methylphenylsulfonylamino)benzyl,

4-(2-methyl-3-chlorophenylsulfonylamino)benzyl,
4-(2,6-difluorophenylsulfonylamino)benzyl,
4-(3,4-difluorophenylsulfonylamino)benzyl,
4-(2-methyl-5-fluorophenylsulfonylamino)benzyl,
4-(3-methyl-4-chlorophenylsulfonylamino)benzyl,
4-(2-methyl-6-chlorophenylsulfonylamino)benzyl,
4-(4-isopropylphenylsulfonylamino)benzyl,
4-(3,4-dichlorophenylsulfonylamino)benzyl,
4-(2-fluoro-4-bromophenylsulfonylamino)benzyl,
4-(4-methyl-3-chlorophenylsulfonylamino)benzyl,
4-vinylsulfonylaminobenzyl, 4-(3-chloropropylphenylsulfonylamino) benzyl, 4-cyclohexylmethylsulfonylaminobenzyl, 4-[2-chloro-(3-, 4-, or 5-) thienylsulfonylamino]benzyl, 4-(3,5-dichlorophenylsulfonylamino) benzyl, 4-{4-[2-(4-methoxycarbonyl)ethyl]phenylsulfonylamino} benzyl, 4-[4-methyl-(2-, 3-, 4-, 5-, 6-, 7-, or 8-)3,4-dihydro-2H-1,4-dihydro-2H-1,4-benzoxazinylsulfonylamino]benzyl, 4-(2,2,2-trifluoroethylsulfonylamino)benzyl, 4-(2,3,5-trimethyl-4-methoxyphenylsulfonylamino)benzyl, 4-[(1,3-dimethyl-5-chloro-4-pyrazolyl)sulfonylamino]benzyl, 4-[(3,5-dimethyl-4-isoxazolyl) sulfonylamino]benzyl, 4-(3-carboxy-4-hydroxyphenylsulfonylamino) benzyl, 4-{[2,3-dichloro-(4- or 5-)thienyl]sulfonylamino}benzyl, 4-{[2,5-dichloro-(3- or 4-)thienyl]sulfonylamino}benzyl, 4-{[2-bromo-(3-, 4-, or 5-)thienyl]sulfonylamino}benzyl, 4-(4-carboxyphenylsulfonylamino)benzyl, 4-(2-acetylamino-4-methyl-5-thiazolylsulfonylamino)benzyl, 4-{[2-methoxycarbonyl-(3-, 4-, or 5-)thienyl]sulfonylamino}benzyl, 4-benzylsulfonylaminobenzyl, 4-styrylsulfonylaminobenzyl, 4-(2,4,5-trifluorophenylsulfonylamino)benzyl, 4-phenylsulfonylaminobenzyl, 4-phenoxycarbonylaminobenzyl, 4-[(4-chlorophenoxy)carbonylamino] benzyl, 4-[(4-bromophenoxy)carbonylamino]benzyl, 4-benzyloxycarbonylaminobenzyl, 4-methoxycarbonylaminobenzyl, 4-*n*-butoxycarbonylaminobenzyl, 4-[(4-methoxyphenoxy)carbonylamino] benzyl, 4-[(3-methoxyphenoxy)carbonylamino]benzyl, 4-[(2-methoxyphenoxy)carbonylamino]benzyl, 4-[(1- or 2-)

naphthyloxycarbonylamino]benzyl, 4-[(4-fluorophenoxy) carbonylamino]benzyl, 4-[(4-methylphenoxy)carbonylamino]benzyl, 4-[(2-chlorobenzyloxy)carbonylamino]benzyl, 4-[2-propynyloxycarbonylamino]benzyl, 4-[(4-nitrophenoxy) carbonylamino]benzyl, 4-(2-fluoroethoxycarbonylamino)benzyl, 4-(3-butenyloxycarbonylamino)benzyl, 4-(4-chlorobutoxycarbonylamino)benzyl, 4-(2-chloroethoxycarbonylamino) benzyl, 4-[2-(benzyloxy)ethoxycarbonylamino]benzyl, 4-propoxycarbonylaminobenzyl, 4-*n*-butoxycarbonylaminobenzyl, 4-(2-isopropyl-5-methylcyclohexyloxycarbonylamino)benzyl, 4-[(4-nitrobenzyloxy)carbonylamino]benzyl, 4-(2-ethylhexyloxycarbonylamino)benzyl, 4-[*N*-methyl-(4-chloroanilino)carbonyl]benzyl, 4-[(2-chloroanilino)carbonyl] benzyl, 4-[(3-cyanoanilino)carbonyl]benzyl, 4-[(4-cyanoanilino) carbonyl]benzyl, 4-[(2-cyanoanilino)carbonyl]benzyl, 4-[(2-chloro-4-fluoroanilino)carbonyl]benzyl, 4-[(1- or 5-) tetrazolylaminocarbonyl]benzyl, 4-[5-methyl-(3- or 4-) isoxazolylaminocarbonyl]benzyl, 4-{4-[4-methyl-(1-, 2-, 3-, or 4-)piperazinyl]anilinocarbonyl}benzyl, (2-, 3-, or 4-)(1-piperidinylmethyl)benzyl, (2-, 3-, or 4-)(*N*-methylanilinomethyl)benzyl, (2-, 3-, or 4-)(phenylthiomethyl) benzyl, and (2-, 3-, or 4-)(1-indolylmethyl)benzyl.

Examples of cycloalkyl lower alkyl groups include C_{3-8} cycloalkylalkyl groups wherein the alkyl moiety is a straight or branched C_{1-6} alkyl group, such as cyclopropylmethyl, cyclohexylmethyl, 2-cyclopropylethyl, 1-cyclobutylethyl, cyclopentylmethyl, 3-cyclopentylpropyl, 4-cyclohexylbutyl, 5-cycloheptylpentyl, 6-cyclooctylhexyl, 1,1-dimethyl-2-cyclohexylethyl, and 2-methyl-3-cyclopropylpropyl.

Examples of phenoxy lower alkyl groups include phenoxy alkyl groups wherein the alkyl moiety is a straight or branched C_{1-6} alkyl group, such as phenoxymethyl, 2-phenoxyethyl, 1-phenoxyethyl, 3-phenoxypropyl, 4-phenoxybutyl, 1,1-dimethyl-2-phenoxyethyl, 5-phenoxypentyl, 6-phenoxyhexyl, 1-phenoxyisopropyl, and 2-methyl-3-phenoxypropyl.

Examples of naphthyl lower alkyl groups include naphthylalkyl groups wherein the alkyl moiety is a straight or branched C_{1-6} alkyl group, such as (1- or 2-)naphthylmethyl, 2-[(1- or 2-)naphthyl]ethyl, 1-[(1- or 2-)naphthyl]ethyl, 3-[(1- or 2-)naphthyl]propyl, 4-[(1- or 2-)naphthyl]butyl, 5-[(1- or 2-)naphthyl]pentyl, 6-[(1- or 2-)naphthyl]hexyl, 1,1-dimethyl-2-[(1- or 2-)naphthyl]ethyl, and 2-methyl-3-[(1- or 2-)naphthyl]propyl.

Examples of lower alkoxy lower alkyl groups include alkoxyalkyl groups wherein the alkyl moiety is a straight or branched C_{1-6} alkyl group and the alkoxy moiety is a straight or branched C_{1-6} alkoxy group, such as methoxymethyl, 2-methoxyethyl, 1-ethoxyethyl, 2-ethoxyethyl, 3-*n*-butoxypropyl, 4-*n*-propoxybutyl, 1-methyl-3-isobutoxypropyl, 1,1-dimethyl-2-*n*-pentyloxyethyl, 5-*n*-hexyloxypentyl, 6-methoxyhexyl, 1-ethoxyisopropyl, and 2-methyl-3-methoxypropyl.

Examples of carboxy lower alkyl groups include carboxyalkyl groups wherein the alkyl moiety is a straight or branched C_{1-6} alkyl group, such as carboxymethyl, 2-carboxyethyl, 1-carboxyethyl, 3-carboxypropyl, 4-carboxybutyl, 5-carboxypentyl, 6-carboxyhexyl, 1,1-dimethyl-2-carboxyethyl, and 2-methyl-3-carboxypropyl.

Examples of lower alkoxycarbonyl lower alkyl groups include alkoxycarbonylalkyl groups wherein the alkoxy moiety is a straight or branched C_{1-6} alkoxy group and the alkyl moiety is a straight or branched C_{1-6} alkyl group, such as methoxycarbonylmethyl, ethoxycarbonylmethyl, 2-methoxycarbonylethyl, 2-ethoxycarbonylethyl, 1-ethoxycarbonylethyl, 3-methoxycarbonylpropyl, 3-ethoxycarbonylpropyl, 4-ethoxycarbonylbutyl, 5-isopropoxycarbonylpentyl, 6-*n*-propoxycarbonylhexyl, 1,1-dimethyl-2-*n*-butoxycarbonylethyl, 2-methyl-3-*tert*-butoxycarbonylpropyl, 2-*n*-pentyloxycarbonylethyl, and *n*-hexyloxycarbonyl methyl.

Examples of piperazinyl groups optionally substituted on the piperazine ring with one or more members selected from the

group consisting of a phenyl group and lower alkyl groups include:

piperazinyl groups optionally substituted on the piperazine ring with one to three members selected from the group consisting of a phenyl group and straight and branched C_{1-6} alkyl groups;

such as (1- or 2-)piperazinyl, 4-methyl-(1-, 2-, or 3-) piperazinyl, 4-ethyl-(1-, 2-, or 3-)piperazinyl, 4-*n*-propyl-1-, 2-, or 3-)piperazinyl, 4-*tert*-butyl-(1-, 2-, or 3-) piperazinyl, 4-*sec*-butyl-(1-, 2-, or 3-) piperazinyl, 4-*n*-butyl-(1-, 2-, or 3-)piperazinyl, 4-*n*-pentyl-(1-, 2-, or 3-)piperazinyl, 4-*n*-hexyl-(1-, 2-, or 3-)piperazinyl, 3,4-dimethyl-(1-, 2-, 5-, or 6-)piperazinyl, 3,4,5-trimethyl-(1- or 2-) piperazinyl, 4-phenyl-(1-, 2-, or 3-)piperazinyl, 2,4-diphenyl-(1-, 3-, 5-, or 6-)piperazinyl, 2,3,4-triphenyl-(1-, 5-, or 6-) piperazinyl, and 4-phenyl-2-methyl-(1-, 3-, 5-, or 6-)piperazinyl.

Examples of pyridylamino groups include (2-, 3-, or 4-) pyridylamino.

Examples of pyridylcarbonylamino groups include (2-, 3-, or 4-)pyridylcarbonylamino.

Examples of anilino groups optionally substituted on the amino group with one or more lower alkyl groups include anilino groups optionally substituted on the amino group with one or more straight and/or branched C_{1-6} alkyl groups, such as anilino, *N*-methylanilino, *N*-ethylanilino, *N*-*n*-propylanilino, *N*-isopropylanilino, *N*-*n*-butylanilino, *N*-*sec*-butylanilino, *N*-*tert*-butylanilino, *N*-*n*-pentylanilino, and *N*-*n*-hexylanilino.

Examples of pyridyl lower alkyl groups optionally substituted on the pyridine ring with one or more members selected from the group consisting of halogen atoms; piperidinyl groups; a morpholino group; piperazinyl groups optionally substituted on the piperizine ring with one or more members selected from the group consisting of a phenyl group and lower alkyl groups; thienyl groups; a phenyl group; pyridyl groups; piperidinyl lower alkyl groups; phenylthio lower alkyl groups;

biphenyl groups; lower alkyl groups optionally substituted with one or more halogen atoms; pyridylamino groups; pyridylcarbonylamino groups; lower alkoxy groups; anilino lower alkyl groups optionally substituted on the amino group with one or more lower alkyl groups; and anilino groups optionally substituted on the amino group with one or more lower alkyl groups include:

pyridyl alkyl groups wherein the alkyl moiety is a C_{1-6} straight or branched alkyl group, optionally substituted on the pyridine ring with one to three members selected from the group consisting of the above-described halogen atoms; piperidinyl groups; a morpholino group; the above-described piperazinyl groups optionally substituted on the piperazine ring with one to three members selected from the group consisting of a phenyl group and straight and branched C_{1-6} alkyl groups; thienyl groups; a phenyl group; pyridyl groups; piperidinylalkyl groups wherein the alkyl moiety is a straight or branched C_{1-6} alkyl group; phenylthioalkyl groups wherein the alkyl moiety is a straight or branched C_{1-6} alkyl group; biphenyl groups; lower alkyl groups wherein the alkyl moiety is a straight or branched C_{1-6} alkyl group, optionally substituted with one to three halogen atoms; pyridylamino groups; pyridylcarbonylamino groups; straight and branched C_{1-6} alkoxy groups; anilinoalkyl groups wherein the alkyl moiety is a straight or branched C_{1-6} alkyl group, optionally substituted on the amino group with one or two straight and/or branched C_{1-6} alkyl groups; and the above-described anilino groups optionally substituted on the amino group with one or more straight and/or branched C_{1-6} alkyl groups;

such as (2-, 3-, or 4-)pyridylmethyl, 2-[(2-, 3-, or 4-)pyridyl]ethyl, 1-[(2-, 3-, or 4-) pyridyl]ethyl, 3-[(2-, 3-, or 4-)pyridyl]propyl, 4-[(2-, 3-, or 4-)pyridyl]butyl, 1,1-dimethyl-2-[(2-, 3-, or 4-)pyridyl]ethyl, 5-[(2-, 3-, or 4-) pyridyl]pentyl, 6-[(2-, 3-, or 4-)pyridyl]hexyl, 1-[(2-, 3-, or 4-)pyridyl]isopropyl, 2-methyl-3-[(2-, 3-, or 4-) pyridyl]propyl, (2-chloro-3-pyridyl)methyl, [2-chloro-

(3-, 4-, 5-, or 6-)pyridyl]methyl, [2,3-dichloro-(4-, 5-, or 6-) pyridyl]methyl, [2-bromo-(3-, 4-, 5-, or 6-)pyridyl]methyl, [2,4,6-trifluoro-(3-, 5-, or 6-)pyridyl]methyl, [2-(1-piperidinyl)-(3-, 4-, 5-, or 6-)pyridyl]methyl, [2-(4-morpholino)-(3-, 4-, 5-, or 6-)pyridyl]methyl, [2-(4-methyl-1-piperazinyl)-(3-, 4-, 5-, or 6-)pyridyl]methyl, 2-[2-(4-ethyl-1-piperazinyl)-(3-, 4-, 5-, or 6-)pyridyl]ethyl, 3-[2-(4-isopropyl-1-piperazinyl)-(3-, 4-, 5-, or 6-) pyridyl]propyl, 4-[2-(4-*sec*-butyl-1-piperazinyl)-(3-, 4-, 5-, or 6-)pyridyl]butyl, 5-[2-(4-*n*-pentyl-1-piperazinyl)-(3-, 4-, 5-, or 6-)pyridyl]pentyl, 6-[2-(4-*n*-hexyl-1-piperazinyl)-(3-, 4-, 5-, or 6-)pyridyl]hexyl, [2-(4-phenyl-2-methyl-1-piperazinyl)-(3-, 4-, 5-, or 6-)pyridyl]methyl, [2-(4-phenyl-1-piperazinyl)-(3-, 4-, 5-, or 6-)pyridyl]methyl, [2-(3-thienyl)-(3-, 4-, 5-, or 6-)pyridyl]methyl, [2-phenyl-(3-, 4-, 5-, or 6-)pyridyl]methyl, 2-[2,4-diphenyl-(3-, 5-, or 6-)pyridyl]ethyl, 3-[2-(2-pyridyl)-6-(3-thienyl)-(3-, 4-, or 5-)pyridyl]propyl, 4-(3-anilino-(2-, 4-, 5-, or 6-) pyridylbutyl, 5-[2-(4-morpholino)-(3-, 4-, 5-, or 6-)pyridyl] pentyl, 6-[2-(1-piperidinyl)-(3-, 4-, 5-, or 6-)pyridyl]hexyl, [2-(2-pyridyl)-(3-, 4-, 5-, or 6-)pyridyl]methyl, (3-, 4-, 5-, or 6-)(1-piperidinylmethyl)-2-pyridylmethyl, (3-, 4-, 5-, or 6-)phenylthiomethyl-2-pyridylmethyl, (4-, 5-, or 6-)biphenyl-3-pyridylmethyl, (4-, 5-, or 6-) trifluoromethyl-3-pyridylmethyl, (4-, 5-, or 6-)(2-pyridylamino)-3-pyridylmethyl, (4-, 5-, or 6-)[(2- or 3-)pyridylcarbonylamino]-3-pyridylmethyl, 3,5-dimethyl-4-methoxy-2-pyridylmethyl, (3-, 4-, 5-, or 6-)(*N*-methylanilinomethyl)-2-pyridylmethyl, [2-(*N*-methylanilino)-(3-, 4-, 5-, or 6-)pyridyl]methyl, 2-[2-(*N*-ethylanilino)-(3-, 4-, 5-, or 6-)pyridyl]ethyl, 3-[2-(*N*-*n*-propylanilino)-(3-, 4-, 5-, or 6-)pyridyl]propyl, 4-[2-(*N*-*n*-butylanilino)-(3-, 4-, 5-, or 6-)pyridyl]ethyl, 5-[2-(*N*-*n*-pentylanilino)-(3-, 4-, 5-, or 6-)pyridyl]pentyl, and 6-[2-(*N*-*n*-hexylanilino)-(3-, 4-, 5-, or 6-)pyridyl]hexyl.

Examples of cyano lower alkyl groups include cyanoalkyl groups wherein the alkyl moiety is a straight or branched C_{1-6}

alkyl group, such as cyanomethyl, 2-cyanoethyl, 1-cyanoethyl, 3-cyanopropyl, 4-cyanobutyl, 1,1-dimethyl-2-cyanoethyl, 5-cyanopentyl, 6-cyanohexyl, 1-cyanoisopropyl, and 2-methyl-3-cyanopropyl.

Examples of quinolyl lower alkyl groups include quinolylalkyl groups wherein the alkyl moiety is a straight or branched C_{1-6} alkyl group, such as [(2-, 3-, 4-, 5-, 6-, 7-, or 8-)quinolyl]methyl, 2-[(2-, 3-, 4-, 5-, 6-, 7-, or 8-)quinolyl]ethyl, 1-[(2-, 3-, 4-, 5-, 6-, 7-, or 8-)quinolyl]ethyl, 3-[(2-, 3-, 4-, 5-, 6-, 7-, or 8-)quinolyl]propyl, 4-[(2-, 3-, 4-, 5-, 6-, 7-, or 8-)quinolyl]butyl, 1,1-dimethyl-2-[(2-, 3-, 4-, 5-, 6-, 7-, or 8-)quinolyl]ethyl, 5-[(2-, 3-, 4-, 5-, 6-, 7-, or 8-)quinolyl]pentyl, 6-[(2-, 3-, 4-, 5-, 6-, 7-, or 8-)quinolyl]hexyl, 1-[(2-, 3-, 4-, 5-, 6-, 7-, or 8-)quinolyl]isopropyl, and 2-methyl-3-[(2-, 3-, 4-, 5-, 6-, 7-, or -8)quinolyl]propyl.

Examples of lower alkoxy lower alkoxy-substituted lower alkyl groups include alkoxyalkoxy-substituted alkyl groups wherein each of the two alkoxy moieties is a straight or branched C_{1-6} alkoxy group and the alkyl moiety is a straight or branched C_{1-6} alkyl group, such as methoxymethoxymethyl, 2-(methoxymethoxy)ethyl, 1-(ethoxymethoxy)ethyl, 3-(2-*n*-butoxyethoxy)propyl, 4-(3-*n*-propoxypropoxy)butyl, 1,1-dimethyl-2-(4-*n*-pentyloxybutoxy)ethyl, 5-(5-*n*-hexyloxypentyloxy)pentyl, 6-(6-methoxyhexyloxy)hexyl, 1-ethoxymethoxyisopropyl, 2-methyl-3-(2-methoxyethoxy)propyl, and 3,3-dimethyl-3-(methoxymethoxy) propyl.

Examples of hydroxy-substituted lower alkyl groups include straight and branched C_{1-6} alkyl groups substituted with one to three hydroxy groups, such as hydroxymethyl, 2-hydroxyethyl, 1-hydroxyethyl, 3-hydroxypropyl, 2,3-dihydroxypropyl, 4-hydroxybutyl, 3,4-dihydroxybutyl, 1,1-dimethyl-2-hydroxyethyl, 5-hydroxypentyl, 6-hydroxyhexyl, 3,3-dimethyl-3-hydroxypropyl, 2-methyl-3-hydroxypropyl, and 2,3,4-trihydroxybutyl.

Examples of thiazolyl lower alkyl groups optionally substituted on the thiazole ring with one or more members selected from the group consisting of halogen atoms, a phenyl group, thienyl groups, and pyridyl groups include:

thiazolylalkyl groups wherein the alkyl moiety is a straight or branched C_{1-6} alkyl group, optionally substituted on the thiazole ring with one to three members selected from the group consisting of halogen atoms, a phenyl group, thienyl groups, and pyridyl groups;

such as [(2-, 4-, or 5-)thiazolyl]methyl, 2-[(2-, 4-, or 5-)thiazolyl]ethyl, 1-[(2-, 4-, or 5-)thiazolyl]ethyl, 3-[(2-, 4-, or 5-)thiazolyl]propyl, 4-[(2-, 4-, or 5-)thiazolyl]butyl, 5-[(2-, 4-, or 5-)thiazolyl]pentyl, 6-[(2-, 4-, or 5-)thiazolyl]hexyl, 1,1-dimethyl-2-[(2-, 4-, or 5-)thiazolyl]ethyl, [2-methyl-3-[(2-, 4-, or 5-)thiazolyl]propyl, [2-chloro-(4- or 5-)thiazolyl]methyl, 2-[2-chloro-(4- or 5-)thiazolyl]ethyl, 1-[2-fluoro-(4- or 5-)thiazolyl]ethyl, 3-[2-bromo-(4- or 5-)thiazolyl]propyl, 4-[2-iodo-(4- or 5-)thiazolyl]butyl, [2-phenyl-(4- or 5-)thiazolyl]methyl, 2-[2-phenyl-(4- or 5-)thiazolyl]ethyl, 1-[2-phenyl-(4- or 5-)thiazolyl]ethyl, 3-[2-phenyl-(4- or 5-)thiazolyl]propyl, 4-[2-phenyl-(4- or 5-)thiazolyl]butyl, 5-[2-phenyl-(4- or 5-)thiazolyl]pentyl, 6-[2-phenyl-(4- or 5-)thiazolyl]hexyl, 1,1-dimethyl-2-[2-phenyl-(4- or 5-)thiazolyl]ethyl, [2-methyl-3-[2-phenyl-(4- or 5-)thiazolyl]propyl, [2-(2- or 3-)thienyl-(4- or 5-)thiazolyl]methyl, 2-[2-(2- or 3-)thienyl-(4- or 5-)thiazolyl]ethyl, 1-[2-(2- or 3-)thienyl-(4- or 5-)thiazolyl]ethyl, 3-[2-(2- or 3-)thienyl-(4- or 5-)thiazolyl]propyl, 4-[2-(2- or 3-)thienyl-(4- or 5-)thiazolyl]butyl, 5-[2-(2- or 3-)thienyl-(4- or 5-)thiazolyl]pentyl, 6-[2-(2- or 3-)thienyl-(4- or 5-)thiazolyl]hexyl, 1,1-dimethyl-2-[2-(2- or 3-)thienyl-(4- or 5-)thiazolyl]ethyl, [2-methyl-3-[2-(2- or 3-)thienyl-(4- or 5-) thiazolyl]propyl, [2-(2-, 3-, or 4-)pyridyl-(4- or 5-)thiazolyl]methyl, 2-[2-(2-, 3-, or 4-)pyridyl-(4- or 5-)thiazolyl]ethyl, 1-[2-(2-, 3-, or 4-)pyridyl-(4- or 5-)thiazolyl]

ethyl, 3-[2-(2-, 3-, or 4-)pyridyl-(4- or 5-)thiazolyl]propyl, 4-[2-(2-, 3-, or 4-) pyridyl-(4- or 5-)thiazolyl]butyl, 5-[2-(2-, 3-, or 4-)pyridyl-(4- or 5-)thiazolyl]pentyl, 6-[2-(2-, 3-, or 4-)pyridyl-(4- or 5-)thiazolyl]hexyl, 1,1-dimethyl-2-[2-(2-, 3-, or 4-)pyridyl-(4- or 5-)thiazolyl]ethyl, and [2-methyl-3-[2-(2-, 3-, or 4-)pyridyl-(4- or 5-)thiazolyl]propyl.

Examples of lower alkylsilyloxy lower alkyl groups include alkylsilyloxyalkyl groups wherein each of the two alkyl moieties is a straight or branched C_{1-6} alkyl group, such as trimethylsilyloxymethyl, (1- or 2-)(triethylsilyloxy)ethyl, 3-(trimethylsilyloxy)propyl, dimethyl-*tert*-butylsilyloxymethyl, 2-(dimethyl-*tert*-butylsilyloxy)ethyl, 3-(dimethyl-*tert*-butylsilyloxy)propyl, 4-(dimethyl-*tert*-butylsilyloxy)butyl, 5-(dimethyl-*tert*-butylsilyloxy)pentyl, and 6-(dimethyl-*tert*-butylsilyloxy)hexyl.

Examples of phenoxy lower alkyl groups optionally substituted on the phenyl ring with one or more members selected from the group consisting of lower alkyl groups optionally substituted with one or more halogen atoms; lower alkoxy groups; halogen atoms; lower alkenyl groups, cycloalkyl groups, a nitro group; and a phenyl group include:

phenoxy alkyl groups wherein the alkyl moiety is a straight or branched C_{1-6} alkyl group, optionally substituted on the phenyl ring with one to three members selected from the group consisting of straight and branched C_{1-6} alkyl groups optionally substituted with one to three halogen atoms; straight and branched C_{1-6} alkoxy groups; halogen atoms; straight and branched C_{2-6} alkenyl groups; C_{3-8} cycloalkyl groups; a nitro group; and a phenyl group;

such as 3-[(2-, 3-, or 4-)methylphenoxy]propyl, 3-[(2-, 3-, or 4-)propylphenoxy]propyl, 3-[(2-, 3-, or 4-) methoxyphenoxy]propyl, 3-[(2,3- or 3,4-)dichlorophenoxy]propyl, 3-[(2,3- or 3,4-)difluorophenoxy]propyl, 3-[3-fluoro-4-chlorophenoxy]propyl, 3-[(2-, 3-, or 4-)trifluoromethylphenoxy]propyl, 3-[2-methoxy-4-propenylphenoxy]propyl, 3-[2-chloro-4-

methoxyphenoxy]propyl, (2-, 3-, or 4-)cyclopentylphenoxypropyl, 3-[(2-, 3-, or 4-)nitrophenoxy]propyl, 3-[(2,3- or 3,4-) dimethylphenoxy]propyl, and 3-[(2-, 3-, or 4-)phenylphenoxy] propyl.

Examples of phenylthio lower alkyl groups optionally substituted on the phenyl ring with one or more halogen atoms include:

phenylthioalkyl groups wherein the alkyl moiety is a straight or branched C_{1-6} alkyl group, optionally substituted on the phenyl ring with one to three halogen atoms;

such as phenylthiomethyl, 2-phenylthioethyl, 1-phenylthioethyl, 3-phenylthiopropyl, 4-phenylthiobutyl, 5-phenylthiopentyl, 6-phenylthiohexyl, 1,1-dimethyl-2-phenylthioethyl, 2-methyl-3-phenylthiopropyl, (2-, 3-, or 4-) chlorophenylthiomethyl, 2-[(2-, 3-, or 4-)chlorophenylthio]ethyl, 3-[(2-, 3-, or 4-)chlorophenylthio]propyl, 4-[(2-, 3-, or 4-) fluorophenylthio]butyl, 5-[(2-, 3-, or 4-)bromophenylthio]pentyl, and 6-[(2-, 3-, or 4-)iodophenylthio]hexyl.

Examples of piperidinyl lower alkyl groups optionally substituted on the piperidine ring with one or more members selected from the group consisting of a phenyl group and phenyl lower alkyl groups include:

piperidinylalkyl groups wherein the alkyl moiety is a straight or branched C_{1-6} alkyl group, optionally substituted on the piperidine ring with one to three members selected from the group consisting of a phenyl group and phenylalkyl groups wherein the alkyl moiety is a straight or branched C_{1-6} alkyl group;

such as [(1-, 2-, 3-, or 4-)piperidinyl]methyl, 2-[(1-, 2-, 3-, or 4-)piperidinyl]ethyl, 1-[(1-, 2-, 3-, or 4-) piperidinyl]ethyl, 3-[(1-, 2-, 3-, or 4-)piperidinyl]propyl, 4-[(1-, 2-, 3-, or 4-) piperidinyl]butyl, 5-[(1-, 2-, 3-, or 4-) piperidinyl]pentyl, 6-[(1-, 2-, 3-, or 4-)piperidinyl]hexyl, 1,1-dimethyl-2-[(1-, 2-, 3-, or 4-)piperidinyl]ethyl, 2-methyl-3-[(1-, 2-, 3-, or 4-)piperidinyl]propyl, [4-phenyl-1-piperidinyl] methyl, 3-[4-phenyl-1-piperidinyl]propyl, [4-phenylmethyl-1-

piperidinyl]methyl, 3-[4-phenylmethyl-1-piperidinyl]propyl, 2-[4-phenyl-(1-, 2-, or 3-)piperidinyl]ethyl, 3-[4-phenylmethyl-(1-, 2-, or 3-)piperidinyl]propyl, 4-[4-phenylethyl-(1-, 2-, or 3-)piperidinyl]butyl, 5-[4-phenyl-(1-, 2-, or 3-)piperidinyl]pentyl, and 6-[4-phenyl-(1-, 2-, or 3-)piperidinyl]hexyl.

Examples of piperazinyl lower alkyl groups optionally substituted on the piperazine ring with one or more phenyl groups include:

piperazinylalkyl groups wherein the alkyl moiety is a straight or branched C_{1-6} alkyl group, optionally substituted on the piperazine ring with one to three phenyl groups;

such as (1- or 2-)piperazinylmethyl, 2-[(1- or 2-)piperazinyl]ethyl, [4-phenyl-(1-, 2-, or 3-)piperazinyl]methyl, 2-[4-phenyl-(1-, 2-, or 3-)piperazinyl]ethyl, 3-[4-phenyl-(1-, 2-, or 3-)piperazinyl]propyl, 4-[4-phenyl-(1-, 2-, or 3-)piperazinyl]butyl, 5-[4-phenyl-(1-, 2-, or 3-)piperazinyl]pentyl, and 6-[4-phenyl-(1-, 2-, or 3-)piperazinyl]hexyl.

Examples of 1,2,3,4-tetrahydroisoquinolyl lower alkyl groups include 1,2,3,4-tetrahydroisoquinolylalkyl groups wherein the alkyl moiety is a straight or branched C_{1-6} alkyl group, such as (1,2,3,4-tetrahydroisoquinolin-2-yl)methyl, 2-(1,2,3,4-tetrahydroisoquinolin-2-yl)ethyl, 3-(1,2,3,4-tetrahydroisoquinolin-2-yl)propyl, 4-(1,2,3,4-tetrahydroisoquinolin-2-yl)butyl, 5-(1,2,3,4-tetrahydroisoquinolin-2-yl)pentyl, and 6-(1,2,3,4-tetrahydroisoquinolin-2-yl)hexyl.

Examples of naphthyloxy lower alkyl groups include naphthyloxyalkyl groups wherein the alkyl moiety is a straight or branched C_{1-6} alkyl group, such as 1-naphthyloxymethyl, 2-(2-naphthyloxy)ethyl, 3-(1-naphthyloxy)propyl, 3-(2-naphthyloxy)propyl, 4-(1-naphthyloxy)butyl, 5-(2-naphthyloxy)pentyl and 6-(1-naphthyloxy)hexyl.

Examples of benzothiazolyloxy lower alkyl group optionally substituted on the benzothiazole ring with one or more

alkyl groups include:

benzothiazolyloxyalkyl groups wherein the alkyl moiety is a straight or branched C_{1-6} alkyl group, optionally substituted on the benzothiazoline ring with one to three straight and/or branched C_{1-6} alkyl groups;

such as 1-[benzothiazol-(2-,4-,5-,6-or 7-)yloxy]methyl, 2-[benzothiazol-(2-,4-,5-,6-or 7-)yloxy]ethyl, 3-[benzothiazol-(2-,4-,5-,6-or 7-)yloxy]propyl, 3-[benzothiazol-(2-,4-,5-,6-or 7-)yloxy]propyl, 4-[benzothiazol-(2-,4-,5-,6-or 7-)yloxy]butyl, 5-[benzothiazol-(2-,4-,5-,6-or 7-)yloxy]pentyl, 6-[benzothiazol-(2-,4-,5-,6-or 7-)yloxy]hexyl, 2-methylbenzothiazol-5-yloxymethyl, 2-(2-methylbenzothiazol-5-yloxy)ethyl, 3-(2-methylbenzothiazol-5-yloxy)propyl, 4-(2-ethylbenzothiazol-5-yloxy)butyl, 5-(2-ethylbenzothiazol-5-yloxy)pentyl, and 6-(2-ethylbenzothiazol-5-yloxy)hexyl.

Examples of lower alkyl groups substituted with one or more members selected from the group consisting of quinolyloxy groups and isoquinolyloxy groups include:

alkyl groups wherein the alkyl moiety is a straight or branched C_{1-6} alkyl group, substituted with one to three members selected from the group consisting of quinolyloxy groups and isoquinolyloxy groups;

such as (5-quinolyloxy)methyl, 2-(5-quinolyloxy)ethyl, 3-(5-quinolyloxy)propyl, 4-(5-quinolyloxy)butyl, 5-(5-quinolyloxy)pentyl, 6-(5-quinolyloxy)hexyl, (5-isoquinolyloxy)methyl, 2-(5-isoquinolyloxy)ethyl, 3-(5-isoquinolyloxy)propyl, 4-(5-isoquinolyloxy)butyl, 5-(5-isoquinolyloxy)pentyl, and 6-(5-isoquinolyloxy)hexyl.

Examples of pyridyloxy lower alkyl groups optionally substituted on the pyridine ring with one or more lower alkyl groups include:

pyridyloxyalkyl groups wherein the alkyl moiety is a straight or branched C_{1-6} alkyl group, optionally substituted on the pyridine ring with one to three straight and/or branched C_{1-6} alkyl groups;

such as (2-, 3-, or 4-)pyridyloxymethyl, 2-[(2-, 3-, or 4-)pyridyloxy]ethyl, 1-[(2-, 3-, or 4-)pyridyloxy]ethyl, 3-[(2-, 3-, or 4-)pyridyloxy]propyl, 4-[(2-, 3-, or 4-)pyridyloxy]butyl, 1,1-dimethyl-2-[(2-, 3-, or 4-)pyridyloxy]ethyl, 5-[(2-, 3-, or 4-)pyridyloxy]pentyl, 6-[(2-, 3-, or 4-)pyridyloxy]hexyl, [6-methyl-(2-, 3-, 4-, or 5-)pyridyloxy]methyl, 2-[6-ethyl-(2-, 3-, 4-, or 5-)pyridyloxy]ethyl, 3-[6-methyl-(2-, 3-, 4-, or 5-)pyridyloxy]propyl, 4-[6-methyl-(2-, 3-, 4-, or 5-)pyridyloxy]butyl, 5-[6-methyl-(2-, 3-, 4-, or 5-)pyridyloxy]pentyl, and 6-[6-methyl-(2-, 3-, 4-, or 5-)pyridyloxy]hexyl.

Examples of carboxy lower alkoxy groups include carboxyalkoxy groups wherein the alkoxy moiety is a straight or branched C_{1-6} alkoxy group, such as carboxymethoxy, 2-carboxyethoxy, 1-carboxyethoxy, 3-carboxypropoxy, 4-carboxybutoxy, 5-carboxypentyloxy, 6-carboxyhexyloxy, 1,1-dimethyl-2-carboxyethoxy, and 2-methyl-3-carboxypropoxy.

Examples of lower alkoxycarbonyl lower alkoxy groups include alkoxycarbonylalkoxy groups wherein each of the two alkoxy moieties is a straight or branched C_{1-6} alkoxy group, such as methoxycarbonylmethoxy, ethoxycarbonylmethoxy, 2-methoxycarbonylethoxy, 2-ethoxycarbonylethoxy, 1-ethoxycarbonylethoxy, 3-methoxycarbonylpropoxy, 3-ethoxycarbonylpropoxy, 4-ethoxycarbonylbutoxy, 5-isopropoxycarbonylpentyloxy, 6-*n*-propoxycarbonylhexyloxy, 1,1-dimethyl-2-*n*-butoxycarbonylethoxy, 2-methyl-3-*tert*-butoxycarbonylpropoxy, 2-*n*-pentyloxycarbonylethoxy, and *n*-hexyloxycarbonylmethoxy.

Examples of lower alkyl groups optionally substituted with one or more halogen atoms include straight and branched C_{1-6} alkyl groups optionally substituted with one to three halogen atoms, such as, in addition to the above-described lower alkyl groups, trifluoromethyl, trichloromethyl, chloromethyl, bromomethyl, fluoromethyl, iodomethyl, difluoromethyl, dibromomethyl, 2-chloroethyl, 2,2,2-trifluoroethyl, 2,2,2-

trichloroethyl, 3-chloropropyl, 2,3-dichloropropyl, 4,4,4-trichlorobutyl, 4-fluorobutyl, 4,4,4-trifluorobutyl, 5-chloropentyl, 3-chloro-2-methylpropyl, 5-bromohexyl, and 5,6-dibromhexyl.

Examples of lower alkylthio groups optionally substituted with one or more halogen atoms include straight and branched C_{1-6} alkylthio groups optionally substituted with one to three halogen atoms, such as, in addition to the above-described lower alkylthio groups, trifluoromethylthio, trichloromethylthio, chloromethylthio, bromomethylthio, fluoromethylthio, iodomethylthio, difluoromethylthio, dibromomethylthio, 2-chloroethylthio, 2,2,2-trifluoroethylthio, 2,2,2-trichloroethylthio, 3-chloropropylthio, 2,3-dichloropropylthio, 4,4,4-trichlorobutylthio, 4-fluorobutylthio, 4,4,4-trifluorobutylthio, 5-chloropentylthio, 3-chloro-2-methylpropylthio, 5-bromohexylthio, and 5,6-dibromohexylthio.

Examples of lower alkylsulfonyl groups include straight and branched C_{1-6} alkyl sulfonyl groups optionally substituted with one to three halogen atoms, such as methylsulfonyl, ethylsulfonyl, *n*-propylsulfonyl, isopropylsulfonyl, *n*-butylsulfonyl, isobutylsulfonyl, *tert*-butylsulfonyl, *sec*-butylsulfonyl, *n*-pentylsulfonyl, isopentylsulfonyl, neopentylsulfonyl, *n*-hexylsulfonyl, isohexylsulfonyl, and 3-methylpentylsulfonyl.

Examples of phenyl lower alkenyl groups include phenylalkenyl groups containing one to three double bonds wherein the alkenyl moiety is a straight or branched C_{2-6} alkenyl group, such as styryl, 3-phenyl-2-propenyl (trivial name: cinnamyl), 4-phenyl-2-butenyl, 4-phenyl-3-butenyl, 5-phenyl-4-pentenyl, 5-phenyl-3-pentenyl, 6-phenyl-5-hexenyl, 6-phenyl-4-hexenyl, 6-phenyl-3-hexenyl, 4-phenyl-1,3-butadienyl, and 6-phenyl-1,3,5-hexatrienyl.

Examples of lower alkanoyloxy groups include straight and branched C_{2-6} alkanoyloxy groups such as acetyloxy, propionyloxy, butyryloxy, isobutyryloxy, pentanoyloxy, *tert*-butylcarbonyloxy, and hexanoyloxy.

Examples of phenyl lower alkoxy groups optionally substituted on the phenyl ring with one or more members selected from the group consisting of halogen atoms; lower alkyl groups optionally substituted with one or more halogen atoms; lower alkylthio groups optionally substituted with one or more halogen atoms; lower alkoxy groups; a nitro group; lower alkylsulfonyl groups; lower alkoxycarbonyl groups; phenyl lower alkenyl groups; lower alkanoyloxy groups; and 1,2,3-thiadiazolyl groups include:

phenylalkoxy groups wherein the alkoxy moiety is a straight or branched C_{1-6} alkoxy group, optionally substituted on the phenyl ring with one to three members selected from the group consisting of the above-described halogen atoms; the above-described straight and branched C_{1-6} alkyl groups optionally substituted with one to three halogen atoms; the above-described straight and branched C_{1-6} alkylthio groups optionally substituted with one to three halogen atoms; the above-described straight and branched C_{1-6} alkoxy groups; a nitro group; the above-described straight and branched C_{1-6} alkylsulfonyl groups; the above-described straight and branched C_{1-6} alkoxycarbonyl groups; the above-described phenylalkenyl groups containing one to three double bonds wherein the alkenyl moiety is a straight or branched C_{2-6} alkenyl group; the above-described straight and branched C_{1-6} alkanoyloxy groups; and 1,2,3-thiadiazolyl groups;

such as benzyloxy, 2-phenylethoxy, 1-phenylethoxy, 3-phenylpropoxy, 4-phenylbutoxy, 5-phenylpentyloxy, 6-phenylhexyloxy, 1,1-dimethyl-2-phenylethoxy, 2-methyl-3-phenylpropoxy, 4-chlorobenzyloxy, 2-chlorobenzyloxy, 3-chlorobenzyloxy, 3-fluorobenzyloxy, 4-fluorobenzyloxy, 2,4-dibromobenzyloxy, 2,4,6-trifluorobenzyloxy, 3-trifluoromethylbenzyloxy, 4-trifluoromethylbenzyloxy, 4-methylbenzyloxy, 3-methylbenzyloxy, 2,4-dimethylbenzyloxy, 2,4,6-trimethylbenzyloxy, 4-methoxycarbonylbenzyloxy, 3-methoxybenzyloxy, 2-methoxybenzyloxy, 3-methoxycarbonylbenzyloxy, 2,3-dimethoxybenzyloxy, 2,4,5-trimethoxybenzyloxy, 3-nitrobenzyloxy, 2-(2,3-dinitrophenyl)ethoxy, 3-(2,4,6-

trinitrophenyl)ethoxy, 2-nitro-4-methylbenzyloxy, 4-methylsulfonylbenzyloxy, 4-(4-ethylsulfonylphenyl)butoxy, 5-(4-propylsulfonylphenyl)pentyloxy, 4-acetyloxybenzyloxy, 6-(4-propionyloxyphenyl)hexyloxy, 4-styrylbenzyloxy, 4-(1,2,3-thiadiazol-4-yl)benzyloxy, 4-trifluoromethylthiobenzyloxy, 3-methylthiobenzyloxy, 2,4-dimethylthiobenzyloxy, and 2,4,6-trimethylthiobenzyloxy.

Examples of piperidinyl lower alkoxy groups optionally substituted on the piperidine ring with one or more lower alkyl groups include:

piperidinylalkoxy groups wherein the alkoxy moiety is a straight or branched C_{1-6} alkoxy group, optionally substituted on the piperidine ring with one to three straight and/or branched C_{1-6} alkyl groups;

such as [(1-, 2-, 3-, or 4-) piperidinyl]methoxy, 2-[(1-, 2-, 3-, or 4-)piperidinyl]ethoxy, 1-[(1-, 2-, 3-, or 4-) piperidinyl]ethoxy, 3-[(1-, 2-, 3-, or 4-)piperidinyl]propoxy, 4-[(1-, 2-, 3-, or 4-)piperidinyl]butoxy, 5-[(1-, 2-, 3-, or 4-) piperidinyl]pentyloxy, 6-[(1-, 2-, 3-, or 4-)piperidinyl]hexyloxy, 1,1-dimethyl-2-[(1-, 2-, 3-, or 4-)piperidinyl]ethoxy, 2-methyl-3-[(1-, 2-, 3-, or 4-)piperidinyl]propoxy, [1-methyl-(2-, 3-, or 4-)piperidinyl]methoxy, 2-[1-ethyl-(2-, 3-, or 4-) piperidinyl]ethoxy, 3-[1-*n*-propyl-(2-, 3-, or 4-)piperidinyl] propoxy, 4-[1-*n*-butyl-(2-, 3-, or 4-piperidinyl)butoxy, 5-[1-*n*-pentyl-(2-, 3-, or 4-)piperidinyl]pentyloxy, 6-[1-*n*-hexyl-(2-, 3-, or 4-)piperidinyl]hexyloxy, [1,2-dimethyl-(3-, 4-, 5-, or 6-) piperidinyl]methoxy, [1,2,3-trimethyl-(4-, 5-, or 6-)piperidinyl] methoxy, 2-[2-*n*-propyl-(3-, 4-, 5-, or 6-)piperidinyl]ethoxy, 2-[3-ethyl-(2-, 4-, 5-, or 6-)piperidinyl]ethoxy, and [2-methyl-4-isopropyl-(3-, 5-, or 6-piperidinyl)methoxy.

Examples of amino-substituted lower alkoxy groups optionally substituted on each amino group with one or more lower alkyl groups include amino-substituted straight and branched C_{1-6} alkoxy groups optionally substituted on the amino group with one or two straight and/or branched C_{1-6} alkyl groups, such as

aminomethoxy, 2-aminomethoxy, 1-aminoethoxy, 3-aminopropoxy, 4-aminobutoxy, 5-aminopentyloxy, 6-aminohexyloxy, 1,1-dimethyl-2-aminoethoxy, 2-methyl-3-aminopropoxy, methylaminomethoxy, 1-ethylaminoethoxy, 2-*n*-propylaminoethoxy, 3-isopropylaminopropoxy, 4-*n*-butylaminobutoxy, 5-*n*-pentylaminopentyloxy, 6-*n*-hexylaminohexyloxy, dimethylaminomethoxy, 3-dimethylaminopropoxy, 2-diisopropylaminoethoxy, (*N*-ethyl-*N*-*n*-propylamino)methoxy, and 2-(*N*-methyl-*N*-*n*-hexylamino)ethoxy.

Examples of lower alkenyloxy groups include straight and branched C_{2-6} alkenyloxy groups containig one to three double bonds, such as vinyloxy, 1-propenyloxy, 1-methyl-1-propenyloxy, 2-methyl-1-propenyloxy, 2-propenyloxy, 2-butenyloxy, 1-butenyloxy, 3-butenyloxy, 2-pentenyloxy, 1-pentenyloxy, 3-pentenyloxy, 4-pentenyloxy, 1,3-butadienyloxy, 1,3-pentadienyloxy, 2-penten-4-yloxy, 2-hexenyloxy, 1-hexenyloxy, 5-hexenyloxy, 3-hexenyloxy, 4-hexenyloxy, 3,3-dimethyl-1-propenyloxy, 2-ethyl-1-propenyloxy, 1,3,5-hexatrienyloxy, 1,3-hexadienyloxy, and 1,4-hexadienyloxy.

Examples of pyridyl lower alkoxy groups optionally substituted on the pyridine ring with one or more lower alkyl groups, each lower alkyl substituent optionally being substituted with one or more halogen atoms include:

pyridylalkoxy groups wherein the alkoxy moiety is a straight or branched C_{1-6} alkoxy group, optionally substituted on the pyridine ring with one to three above-described straight and/or branched C_{1-6} alkyl groups, each alkyl substituent optionally being substituted with one to three halogen atoms;

such as [(2-, 3-, or 4-)pyridyl]methoxy, 2-[(2-, 3-, or 4-)pyridyl]ethoxy, 1-[(2-, 3-, or 4-) pyridyl]ethoxy, 3-[(2-, 3-, or 4-)pyridyl]propoxy, 4-[(2-, 3-, or 4-)pyridyl]butoxy, 5-[(2-, 3-, or 4-) pyridyl]pentyloxy, 6-[(2-, 3-, or 4-)pyridyl]hexyloxy, 1,1-dimethyl-2-[(2-, 3-, or 4-)pyridyl]ethoxy, 2-methyl-3-[(2-, 3-, or 4-)pyridyl]propoxy, [2-trifluoromethyl-(3-, 4-, 5-, or 6-)pyridyl]methoxy, [2-methyl-(3-, 4-, 5-, or 6-)pyridyl]methoxy, [2,4-dimethyl-(3-, 5-, or 6-)pyridyl]methoxy, [2,4,6-trimethyl-(3- or 5-)pyridyl]methoxy), [2-trifluoromethyl-

4-methyl-(3-, 5-, or 6-)pyridyl]methoxy, 2-[3-ethyl-(2-, 4-, 5-, or 6-) pyridyl]ethoxy, 3-[4-*n*-propyl-(2- or 3-)pyridyl]propoxy, 4-[3-*n*-butyl-(2-, 4-, 5-, or 6-) pyridyl]butyl, 5-[3-trifluoromethyl-(2-, 4-, 5-, or 6-)pyridyl] pentyloxy, 6-[2-*n*-pentyl-(3-, 4-, 5-, or 6-)pyridyl]hexyloxy, and [2-*n*-hexyl-(3-, 4-, 5-, or 6-)pyridyl]methoxy.

Examples of lower alkynyloxy groups include straight and branched C_{2-6} alkynyloxy groups, such as ethynyloxy, 2-propynyloxy, 2-butynyloxy, 3-butynyloxy, 1-methyl-2-propynyloxy, 2-pentynyloxy, and 2-hexynyloxy.

Examples of phenyl lower alkynyloxy groups include phenylalkynyloxy groups wherein the alkynyloxy moiety is a straight or branched C_{2-6} alkynyloxy group, such as 2-phenylethynyloxy, 3-phenyl-2-propynyloxy, 4-phenyl-2-butynyloxy, 4-phenyl-3-butynyloxy, 3-phenyl-1-methyl-2-propynyloxy, 5-phenyl-2-pentynyloxy, and 6-phenyl-2-hexynyloxy.

Examples of phenyl lower alkenyloxy groups include phenylalkenyloxy groups containing one to three double bonds wherein the alkenyloxy moiety is a straight or branched C_{2-6} alkenyloxy group, such as styryloxy, 3-phenyl-1-propenyloxy, 3-phenyl-1-methyl-1-propenyloxy, 3-phenyl-2-methyl-1-propenyloxy, 3-phenyl-2-propenyloxy, 4-phenyl-2-butenyloxy, 4-phenyl-1-butenyloxy, 4-phenyl-3-butenyloxy, 4-phenyl-2-pentenyloxy, 5-phenyl-1-pentenyloxy, 5-phenyl-3-pentenyloxy, 5-phenyl-4-pentenyloxy, 4-phenyl-1,3-butadienyloxy, 5-phenyl-1,3-pentadienyloxy, 5-phenyl-2-penten-4-yloxy, 6-phenyl-2-hexenyloxy, 6-phenyl-1-hexenyloxy, 6-phenyl-5-hexenyloxy, 6-phenyl-3-hexenyloxy, 6-phenyl-4-hexenyloxy, 3-phenyl-3,3-dimethyl-1-propenyloxy, 3-phenyl-2-ethyl-1-propenyloxy, 6-phenyl-1,3,5-hexatrienyloxy, 6-phenyl-1,3-hexadienyloxy, and 6-phenyl-1,4-hexadienyloxy.

Examples of furyl lower alkoxy groups optionally substituted on the furan ring with one or more lower alkoxycarbonyl groups include:

furylalkoxy groups wherein the alkoxy moiety is a

straight or branched C_{1-6} alkoxy group, optionally substituted on the furan ring with one to three above-described alkoxycarbonyl groups wherein the alkoxy moiety is a straight or branched C_{1-6} alkoxy group;

such as [(2- or 3-)furyl]methoxy, 2-[(2- or 3-)furyl] ethoxy, 1-[(2- or 3-)furyl]ethoxy, 3-[(2- or 3-)furyl]propoxy, 4-[(2- or 3-)furyl]butoxy, 5-[(2- or 3-)furyl]pentyloxy, 6-[(2- or 3-)furyl]hexyloxy, 1,1-dimethyl-2-[(2- or 3-)furyl]ethoxy, 2-methyl-3-[(2- or 3-)furyl]propoxy, [2-ethoxycarbonyl-(3-, 4-, or 5-)furyl]methoxy, [2-methoxycarbonyl-(3-, 4-, or 5-) furyl]methoxy, [3-*n*-propoxycarbonyl-(2-, 4-, or 5-)furyl]methoxy, [2-*n*-butoxycarbonyl-(3-, 4-, or 5-)furyl]methoxy, [3-*n*-pentyloxycarbonyl-(2-, 4-, or 5-)furyl]methoxy, [2-*n*-hexyloxycarbonyl-(3-, 4-, or 5-)furyl]methoxy, [2,3-diethoxycarbonyl-(4- or 5-)furyl]methoxy, 2,3,4-trimethoxycarbonyl-5-furyl)methoxy, 2-[3-*n*-propoxycarbonyl-(2-, 4-, or 5-)furyl]ethoxy, 3-[2-*n*-butoxycarbonyl-(3-, 4-, or 5-)furyl]propoxy, 4-[3-*n*-pentyloxycarbonyl-(2-, 4-, or 5-)furyl]butoxy, 5-[2-*n*-hexyloxycarbonyl-(3-, 4-, or 5-)furyl]pentyloxy, and 6-[2-*n*-hexyloxycarbonyl-(3-, 4-, or 5-)furyl]hexyloxy.

Examples of tetrazolyl lower alkoxy groups optionally substituted on the tetrazole ring with one member selected from the group consisting of a phenyl group, phenyl lower alkyl groups, and cycloalkyl lower alkyl groups include:

tetrazolylalkoxy groups wherein the alkoxy moiety is a straight or branched C_{1-6} alkoxy group, optionally substituted on the tetrazole ring with one member selected from the group consisting of a phenyl group, the above-described phenylalkyl groups wherein the alkyl moiety is a straight or branched C_{1-6} alky group, and the above-descried C_{3-8} cycloalkyl alkylgroups wherein the alkyl moiety is a straight or branched C_{1-6} alkyl group;

such as [(1- or 5-)tetrazolyl]methoxy, 2-[(1- or 5-) tetrazolyl]ethoxy, 1-[(1- or 5-)tetrazolyl]ethoxy, 3-[(1- or 5-)tetrazolyl]propoxy, 4-[(1- or 5-)tetrazolyl] butoxy,

5-[(1- or 5-)tetrazolyl]pentyloxy, 6-[(1- or 5-) tetrazolyl]hexyloxy, 1,1-dimethyl-2-[(1- or 5-)tetrazolyl] ethoxy, 2-methyl-3-[(1- or 5-) tetrazolyl]propoxy, (1-benzyl-5-tetrazolyl)methoxy, (1-phenyl-5-tetrazolyl)methoxy, (1-cyclohexylmethyl-5-tetrazolyl)methoxy, [5-(2-phenylethyl)-1-tetrazolyl]methoxy, [1-(1-phenylethyl)-5-tetrazolyl]methoxy, [1-(3-phenylpropyl)-5-tetrazolyl]methoxy, [5-(4-phenylbutyl)-1-tetrazolyl]methoxy, [1-(5-phenylpentyl)-5-tetrazolyl]methoxy, [1-(6-phenylhexyl)-5-tetrazolyl]methoxy, [5-(2-cyclohexylethyl)-1-tetrazolyl]methoxy, [1-(1-cyclopropylethyl)-5-tetrazolyl]methoxy, [1-(3-cyclobutylpropyl)-5-tetrazolyl]methoxy, [5-(4-cyclopentylbutyl)-1-tetrazolyl]methoxy, [1-(5-cycloheptylpentyl)-5-tetrazolyl]methoxy, [1-(6-cyclooctylhexyl)-5-tetrazolyl]methoxy, 2-(1-phenyl-5-tetrazolyl)ethoxy, 3-(1-cyclohexylmethyl-5-tetrazolyl)propoxy, 4-[5-(2-phenylethyl)-1-tetrazolyl]butoxy, 5-(1-benzyl-5-tetrazolyl)pentyloxy, 6-(1-phenyl-5-tetrazolyl)hexyloxy, and 1-(1-cyclohexylmethyl-5-tetrazolyl)ethoxy.

Examples of phenyl groups optionally substituted on the phenyl ring with one or more lower alkyl groups include phenyl groups optionally substituted on the phenyl ring with one to three straight and/or branched C_{1-6} alkyl groups, such as phenyl, 2-methylphenyl, 3-methylphenyl, 4-methylphenyl, 2-ethylphenyl, 3-ethylphenyl, 4-ethylphenyl, 4-isopropylphenyl, 3-*n*-butylphenyl, 4-*n*-pentylphenyl, 4-*n*-hexylphenyl, 3,4-dimethylphenyl, 3,4-diethylphenyl, 2,4-dimethylphenyl, 2,5-dimethylphenyl, 2,6-dimethylphenyl, and 3,4,5-trimethylphenyl.

Examples of 1,2,4-oxadiazolyl lower alkoxy groups optionally substituted on the 1,2,4-oxadiazole ring with a phenyl group, the phenyl substituent optionally being substituted on the phenyl ring with one or more lower alkyl groups, include:

1,2,4-oxadiazolylalkoxy groups wherein the alkoxy moiety is a straight or branched C_{1-6} alkoxy group, optionally substituted on the 1,2,4-oxadiazole ring with one of the above-described phenyl groups optionally substituted on the phenyl ring

with one to three straight and/or branched C_{1-6} alkyl groups;

such as [(3- or 5-)1,2,4-oxadiazolyl]methoxy, 2-[(3- or 5-)1,2,4-oxadiazolyl]ethoxy, 1-[(3- or 5-) 1,2,4-oxadiazolyl]ethoxy, 3-[(3- or 5-)1,2,4-oxadiazolyl] propoxy, 4-[(3- or 5-)1,2,4-oxadiazolyl]butoxy, 5-[(3- or 5-) 1,2,4-oxadiazolyl]pentyloxy, 6-[(3- or 5-)1,2,4-oxadiazolyl] hexyloxy, 1,1-dimethyl-2-[(3- or 5-)1,2,4-oxadiazolyl]ethoxy, 2-methyl-3-[(3- or 5-)1,2,4-oxadiazolyl]propoxy, [3-(4-*tert*-butylphenyl)-5-1,2,4-oxadiazolyl]methoxy, [3-(3-methylphenyl)-5-1,2,4-oxadiazolyl]methoxy, [5-(2-ethylphenyl)-3-1,2,4-oxadiazolyl] methoxy, [3-(4-*n*-propylphenyl)-5-1,2,4-oxadiazolyl]methoxy, [5-(3-*n*-pentylphenyl)-3-1,2,4-oxadiazolyl]methoxy, [3-(2-*n*-hexylphenyl)-5-1,2,4-oxadiazolyl]methoxy, [3-(2,4-dimethylphenyl)-5-1,2,4-oxadiazolyl]methoxy, [3-(2,3,5-trimethylphenyl)-5-1,2,4-oxadiazolyl]methoxy, 2-[3-(4-*tert*-butylphenyl)-5-1,2,4-oxadiazolyl]ethoxy, 1-[3-(3-methylphenyl)-5-1,2,4-oxadiazolyl]ethoxy, 3-[5-(2-ethylphenyl)-3-1,2,4-oxadiazolyl]propoxy, 4-[3-(4-*n*-propylphenyl)-5-1,2,4-oxadiazolyl] butoxy, 5-[5-(3-*n*-pentylphenyl)-3-1,2,4-oxadiazolyl]pentyloxy, 6-[3-(2-*n*-hexylphenyl)-5-1,2,4-oxadiazolyl]hexyloxy, 2-[3-(2,4-dimethylphenyl)-5-1,2,4-oxadiazolyl]ethoxy and 1-[3-(2,3,5-trimethylphenyl)-5-1,2,4-oxadiazolyl]ethoxy.

Examples of isoxazolyl lower alkoxy groups optionally substituted on the isoxazole ring with one or more lower alkyl groups include:

isoxazolylalkoxy groups wherein the alkoxy moiety is a straight or branched C_{1-6} alkoxy group, optionally substituted on the isoxazole ring with one or two above-described straight and/or branched C_{1-6} alkyl groups;

such as [(3-, 4-, or 5-)isoxazolyl]methoxy, 2-[(3-, 4-, or 5-)isoxazolyl]ethoxy, 1-[(3-, 4-, or 5-) isoxazolyl]ethoxy, 3-[(3-, 4-, or 5-)isoxazolyl]propoxy, 4-[(3-, 4-, or 5-)isoxazolyl]butoxy, 5-[(3-, 4-, or 5-)isoxazolyl] pentyloxy, 6-[(3-, 4-, or 5-)isoxazolyl]hexyloxy, 1,1-dimethyl-2-[(3-, 4-, or 5-)isoxazolyl]ethoxy, 2-methyl-3-[(3-, 4-, or 5-)

isoxazolyl]propoxy, (3,5-dimethyl-4-isoxazolyl)methoxy, [3-methyl-(4- or 5-) isoxazolyl]methoxy, [3-ethyl-(4- or 5-) isoxazolyl]methoxy, [4-*n*-propyl-(3- or 5-)isoxazolyl]methoxy, [5-*n*-butyl-(3- or 4-)isoxazolyl]methoxy, [3-*n*-pentyl-(4- or 5-) isoxazolyl]methoxy, [4-*n*-hexyl-(3- or 5-)isoxazolyl]methoxy, 2-[3-methyl-(4- or 5-)isoxazolyl]ethoxy, 1-[3-ethyl-(4- or 5-) isoxazolyl]ethoxy, 3-[4-*n*-propyl-(3- or 5-) isoxazolyl]propoxy, 4-[5-*n*-butyl-(3- or 4-)isoxazolyl]butoxy, 5-[3-*n*-pentyl-(4- or 5-)isoxazolyl]pentyloxy, and 6-[4-*n*-hexyl-(3- or 5-) isoxazolyl]hexyloxy.

Examples of 1,3,4-oxadiazolyl lower alkoxy groups optionally substituted on the 1,3,4-oxadiazole ring with a phenyl group, the phenyl substituent optionally being substituted on the phenyl ring with one or more lower alkyl groups include:

1,3,4-oxadiazolylalkoxy groups wherein the alkoxy moiety is a straight or branched C_{1-6} alkoxy group, optionally substituted on the 1,3,4-oxadiazole ring with one of the above-described phenyl groups optionally substituted on the phenyl ring with one to three straight and/or branched C_{1-6} alkyl groups;

such as [(2- or 5-)1,3,4-oxadiazolyl]methoxy, 2-[(2- or 5-)1,3,4-oxadiazolyl]ethoxy, 1-[(2- or 5-)1,3,4-oxadiazolyl]ethoxy, 3-[(2- or 5-)1,3,4-oxadiazolyl]propoxy, 4-[(2- or 5-)1,3,4-oxadiazolyl]butoxy, 5-[(2- or 5-)1,3,4-oxadiazolyl]pentyloxy, 6-[(2- or 5-)1,3,4-oxadiazolyl]hexyloxy, 1,1-dimethyl-2-[(2- or 5-)1,3,4-oxadiazolyl]ethoxy, 2-methyl-3-[(2- or 5-)1,3,4-oxadiazolyl]propoxy, [2-(4-*tert*-butylphenyl)-5-1,3,4-oxadiazolyl]methoxy, [2-(4-methylphenyl)-5-1,3,4-oxadiazolyl]methoxy, [5-(2-ethylphenyl)-2-1,3,4-oxadiazolyl] methoxy, [2-(4-*n*-propylphenyl)-5-1,3,4-oxadiazolyl]methoxy, [5-(3-*n*-pentylphenyl)-2-1,3,4-oxadiazolyl]methoxy, [2-(2-*n*-hexylphenyl)-5-1,3,4-oxadiazolyl]methoxy, [2-(2,4-dimethylphenyl)-5-1,3,4-oxadiazolyl]methoxy, [2-(2,3,5-trimethylphenyl)-5-1,3,4-oxadiazolyl]methoxy, 2-[2-(4-*tert*-butylphenyl)-5-1,3,4-oxadiazolyl]ethoxy, 1-[2-(3-methylphenyl)-5-1,3,4-oxadiazolyl]ethoxy, 3-[5-(2-ethylphenyl)-2-1,3,4-

oxadiazolyl]propoxy, 4-[2-(4-*n*-propylphenyl)-5-1,3,4-oxadiazolyl] butoxy, 5-[5-(3-*n*-pentylphenyl)-2-1,3,4-oxadiazolyl]pentyloxy, 6-[2-(2-*n*-hexylphenyl)-5-1,3,4-oxadiazolyl]hexyloxy, 2-[2-(2,4-dimethylphenyl)-5-1,3,4-oxadiazolyl]ethoxy, and 1-[2-(2,3,5-trimethylphenyl)-5-1,3,4-oxadiazolyl]ethoxy.

Examples of lower alkanoyl lower alkoxy groups include alkanoylalkoxy groups wherein the alkanoyl moiety is a straight or branched C_{2-6} alkanoyl group and the alkoxy moiety is a straight or branched C_{1-6} alkoxy group, such as acetylmethoxy, propionylmethoxy, 2-acetylethoxy, 2-propionylethoxy, 1-acetylethoxy, 3-acetylpropoxy, 3-propionylpropoxy, 4-acetylbutoxy, 5-butyrylpentyloxy, 6-pentanoylhexyloxy, 1,1-dimethyl-2-hexanoylethoxy, 2-methyl-3-acetylpropoxy, 2-pentanoylethoxy, and hexanoylmethoxy.

Examples of phenyl groups optionally substituted on the phenyl ring with one or more halogen atoms include phenyl groups optionally substituted on the phenyl ring with one to three halogen atoms, such as phenyl, 4-fluorophenyl, 2,5-difluorophenyl, 2,4-difluorophenyl, 3,4-difluorophenyl, 3,5-difluorophenyl, 2,6-difluorophenyl, 2-chlorophenyl, 3-chlorophenyl, 4-chlorophenyl, 2,3-dichlorophenyl, 2,4-dichlorophenyl, 2,5-dichlorophenyl, 3,4-dichlorophenyl, 2,6-dichlorophenyl, 3-fluorophenyl, 2-fluorophenyl, 3-bromophenyl, 4-iodophenyl, 2-bromophenyl, 4-bromophenyl, 3,5-dichlorophenyl, 2,4,6-trifluorophenyl, 3,4-difluorophenyl, 2-iodophenyl, 3-iodophenyl, 4-iodophenyl, 2,3-dibromophenyl, 2,4-diiodophenyl, and 2,4,6-trichlorophenyl.

Examples of thiazolyl lower alkoxy groups optionally substituted on the thiazole ring with one or more members selected from the group consisting of lower alkyl groups and a phenyl group, each phenyl substituent optionally being substituted on the phenyl ring with one or more halogen atoms, include:

thiazolylalkoxy groups wherein the alkoxy moiety is a straight or branched C_{1-6} alkoxy group, optionally substituted on the thiazole ring with one or two members selected from the group

consisting of the above-described straight and branched C_{1-6} alkyl groups and phenyl groups optionally substituted on the phenyl ring with one to three halogen atoms;

such as [(2-, 4-, or 5-)thiazolyl]methoxy, 2-[(2-, 4-, or 5-)thiazolyl]ethoxy, 1-[(2-, 4-, or 5-)thiazolyl]ethoxy, 3-[(2-, 4-, or 5-)thiazolyl]propoxy, 4-[(2-, 4-, or 5-)thiazolyl]butoxy, 5-[(2-, 4-, or 5-) thiazolyl]pentyloxy, 6-[(2-, 4-, or 5-)thiazolyl]hexyloxy, 1,1-dimethyl-2-[(2-, 4-, or 5-)thiazolyl]ethoxy, 2-methyl-3-[(2-, 4-, or 5-)thiazolyl]propoxy, [2-phenyl-(4- or 5-)thiazolyl]methoxy, [2-(4-chlorophenyl)-4-methyl-5-thiazolyl]methoxy, [2-(3-bromophenyl)-(4- or 5-)thiazolyl]methoxy, [2-(2-fluorophenyl)-(4- or 5-)thiazolyl]methoxy, [2-(3,4-dichlorophenyl)-(4- or 5-)thiazolyl]methoxy, [2-(2,4,6-trifluorophenyl)-(4- or 5-)thiazolyl]methoxy, [2-methyl-(4- or 5-)thiazolyl]methoxy, 2-[2-ethyl-(4- or 5-)thiazolyl]methoxy, 2-[4-phenyl-(2- or 5-)thiazolyl]ethoxy, 3-[5-*n*-propyl-(2- or 4-)thiazolyl]propoxy, 4-[4-*n*-butyl-(2- or 5-)thiazolyl]butoxy, 5-[2-*n*-pentyl-(4- or 5-)thiazolyl]pentyloxy, 6-[5-*n*-hexyl-(2- or 4-)thiazolyl]hexyloxy, [2,4-dimethyl-5-thiazolyl]methoxy, and [2,4-diphenyl-5-thiazolyl]methoxy.

Examples of benzoyl groups optionally substituted on the phenyl ring with one or more halogen atoms include benzoyl groups optionally substituted on the phenyl ring with one to three halogen atoms, such as benzoyl, 4-fluorobenzoyl, 2,5-difluorobenzoyl, 2,4-difluorobenzoyl, 3,4-difluorobenzoyl, 3,5-difluorobenzoyl, 2,6-difluorobenzoyl, 2-chlorobenzoyl, 3-chlorobenzoyl, 4-chlorobenzoyl, 2,3-dichlorobenzoyl, 2,4-dichlorobenzoyl, 2,5-dichlorobenzoyl, 3,4-dichlorobenzoyl, 2,6-dichlorobenzoyl, 3-fluorobenzoyl, 2-fluorobenzoyl, 3-bromobenzoyl, 4-iodobenzoyl, 2-bromobenzoyl, 4-bromobenzoyl, 3,5-dichlorobenzoyl, 2,4,6-trifluorobenzoyl, 2-iodobenzoyl, 3-iodobenzoyl, 4-iodobenzoyl, 2,3-dibromobenzoyl, 2,4-diiodobenzoyl, and 2,4,6-trichlorobenzoyl.

Examples of piperidinyloxy groups optionally

substituted on the piperidine ring with one or more benzoyl groups, each benzoyl substituent optionally being substituted on the phenyl ring with one or more halogen atoms, include:

piperidinyloxy groups optionally substituted on the piperidine ring with one to three above-described benzoyl groups, each benzoyl substituent optionally being substituted on the phenyl ring with one to three halogen atoms;

such as (1-, 2-, 3-, or 4-)piperidinyloxy, 1-(4-chlorobenzoyl)-(2-, 3-, or 4-piperidinyloxy, 1-(3-bromobenzoyl)-(2-, 3-, or 4-)piperidinyloxy, 1-benzoyl-(2-, 3-, or 4-) piperidinyloxy, 1-(2-fluorobenzoyl)-(2-, 3-, or 4-)piperidinyloxy, 1-(2,4-dichlorobenzoyl)-(2-, 3-, or 4-)piperidinyloxy, 1-(2,4,6-trifluorobenzoyl)-(2-, 3-, or 4-)piperidinyloxy, 2-(3-chlorobenzoyl)-(1-, 3-, or 4-)piperidinyloxy, 3-(2-chlorobenzoyl)-(1-, 2-, or 4-)piperidinyloxy, 4-(2,3-dibromobenzoyl)-(1-, 2-, or 3-)piperidinyloxy, 1,2-dibenzoyl-(3- or 4-)piperidinyloxy, and 1,2,4-tribenzoyl-3-piperidinyloxy.

Examples of thienyl lower alkoxy groups include thienylalkoxy groups wherein the alkoxy moiety is a straight or branched C_{1-6} alkoxy group, such as [(2- or 3-)thienyl]methoxy, 2-[(2- or 3-)thienyl]ethoxy, 1-[(2- or 3-)thienyl]ethoxy, 3-[(2- or 3-)thienyl]propoxy, 4-[(2- or 3-)thienyl]butoxy, 5-[(2- or 3-) thienyl]pentyloxy, 6-[(2- or 3-)thienyl]hexyloxy, 1,1-dimethyl-2-[(2- or 3-)thienyl]ethoxy, and 2-methyl-3-[(2- or 3-)thienyl]propoxy.

Examples of phenylthio lower alkoxy groups include phenylthioalkoxy groups wherein the alkoxy moiety is a straight or branched C_{1-6} alkoxy group, such as phenylthiomethoxy, 2-phenylthioethoxy, 1-phenylthioethoxy, 3-phenylthiopropoxy, 4-phenylthiobutoxy, 5-phenylthiopentyloxy, 6-phenylthiohexyloxy, 1,1-dimethyl-2-phenylthioethoxy, and 2-methyl-3-phenylthiopropoxy.

Examples of carbamoyl-substituted lower alkoxy groups optionally substituted with one or more lower alkyl groups include:

carbamoyl-substituted straight and branched C_{1-6} alkoxy

groups optionally substituted on the carbamoyl group with one or two straight and/or branched C_{1-6} alkyl groups;

such as carbamoylmethoxy, 2-carbamoylethoxy, 1-carbamoylethoxy, 3-carbamoylpropoxy, 4-carbamoylbutoxy, 5-carbamoylpentyloxy, 6-carbamoylhexyloxy, 1,1-dimethyl-2-carbamoylethoxy, 2-methyl-3-carbamoylpropoxy, methylcarbamoylmethoxy, 1-ethylcarbamoylethoxy, 2-*n*-propylcarbamoylethoxy, 3-isopropylcarbamoylpropoxy, 4-*n*-butylcarbamoylbutoxy, 5-*n*-pentylcarbamoylpentyloxy, 6-*n*-hexylcarbamoylhexyloxy, dimethylcarbamoylmethoxy, 3-dimethylcarbamoylpropoxy, 2-diisopropylcarbamoylethoxy, (*N*-ethyl-*N*-*n*-propylcarbamoyl)methoxy, and 2-(*N*-methyl-*N*-*n*-hexylcarbamoyl)ethoxy.

Examples of benzoyl lower alkoxy groups include benzoylalkoxy groups wherein the alkoxy moiety is a straight or branched C_{1-6} alkoxy group, such as benzoylmethoxy, 2-benzoylethoxy, 1-benzoylethoxy, 3-benzoylpropoxy, 4-benzoylbutoxy, 5-benzoylpentyloxy, 6-benzoylhexyloxy, 1,1-dimethyl-2-benzoylethoxy, and 2-methyl-3-benzoylpropoxy.

Examples of pyridylcarbonyl lower alkoxy groups include pyridylcarbonylalkoxy groups wherein the alkoxy moiety is a straight or branched C_{1-6} alkoxy group, such as [(2-, 3-, or 4-)pyridylcarbonyl]methoxy, 2-[(2-, 3-, or 4-)pyridylcarbonyl]ethoxy, 1-[(2-, 3-, or 4-)pyridylcarbonyl]ethoxy, 3-[(2-, 3-, or 4-)pyridylcarbonyl]propoxy, 4-[(2-, 3-, or 4-)pyridylcarbonyl]butoxy, 5-[(2-, 3-, or 4-)pyridylcarbonyl]pentyloxy, 6-[(2-, 3-, or 4-)pyridylcarbonyl]hexyloxy, 1,1-dimethyl-2-[(2-, 3-, or 4-)pyridylcarbonyl]ethoxy, and 2-methyl-3-[(2-, 3-, or 4-)pyridylcarbonyl] propoxy.

Examples of imidazolyl lower alkoxy groups optionally substituted on the imidazole ring with one or more phenyl lower alkyl groups include:

imidazolylalkoxy groups wherein the alkoxy moiety is a straight or branched C_{1-6} alkoxy group, optionally substituted on the imidazole ring with one to three phenylalkyl groups wherein

the alkyl moiety is a straight or branched C_{1-6} alkyl group;

such as [(1-, 2-, 4-, or 5-)imidazolyl]methoxy, 2-[(1-, 2-, 4-, or 5-)imidazolyl]ethoxy, 1-[(1-, 2-, 4-, or 5-) imidazolyl]ethoxy, 3-[(1-, 2-, 4-, or 5-)imidazolyl]propoxy, 4-[(1-, 2-, 4-, or 5-)imidazolyl]butoxy, 5-[(1-, 2-, 4-, or 5-) imidazolyl]pentyloxy, 6-[(1-, 2-, 4-, or 5-)imidazolyl] hexyloxy, 1,1-dimethyl-2-[(1-, 2-, 4-, or 5-)imidazolyl] ethoxy, 2-methyl-3-[(1-, 2-, 4-, or 5-)imidazolyl]propoxy, [1-benzyl-(2-, 4-, or 5-)imidazolyl]methoxy, [1-(2-phenylethyl)-(2-, 4-, or 5-)imidazolyl]methoxy, 2-[2-(3-phenylpropyl)-(1-, 4-, or 5-)imidazolyl]ethoxy, 3-[4-(4-phenylbutyl)-(1-, 2-, or 5-)imidazolyl]propoxy, 5-[4-(5-phenylpentyl)-(1-, 2-, or 4-)imidazolyl]pentyloxy, 6-[1-(6-phenylhexyloxy)-(2-, 4-, or 5-)imidazolyl]hexyloxy, [1,2-dibenzyl-(4- or 5-) imidazolyl]methoxy, and [1,2,4-tribenzyl-5-imidazolyl]methoxy.

Examples of phenoxy lower alkoxy groups include phenoxyalkoxy groups wherein the alkoxy moiety is a straight or branched C_{1-6} alkoxy group, such as phenoxymethoxy, 2-phenoxyethoxy, 1-phenoxyethoxy, 3-phenoxypropoxy, 4-phenoxybutoxy, 5-phenoxypentyloxy, 6-phenoxyhexyloxy, 1,1-dimethyl-2-phenoxyethoxy, and 2-methyl-3-phenoxypropoxy.

Examples of phenyl lower alkoxy-substituted lower alkoxy groups include phenylalkoxy-substituted alkoxy groups wherein each of the two alkoxy moieties is a straight or branched C_{1-6} alkoxy group, such as phenylmethoxymethoxy, 2-(phenylmethoxy)ethoxy, 1-(phenylmethoxy)ethoxy, 3-(phenylmethoxy) propoxy, 4-(phenylmethoxy)butoxy, 5-(phenylmethoxy)pentyloxy, 6-(phenylmethoxy)hexyloxy, 1,1-dimethyl-2-(phenylmethoxy)ethoxy, 2-methyl-3-(phenylmethoxy) propoxy, 1-(2-phenylethoxy)ethoxy, 2-(1-phenylethoxy)ethoxy, 3-(3-phenylpropoxy)propoxy, 4-(4-phenylbutoxy)butoxy, 5-(5-phenylpentyloxy)pentyloxy, 6-(6-phenylhexyloxy)hexyloxy, (1,1-dimethyl-2-phenylethoxy)methoxy, and 3-(2-methyl-3-phenylpropoxy)propoxy.

Examples of isoindolinyl lower alkoxy groups optionally substituted on the isoindoline ring with one or more oxo groups

include:

isoindolinylalkoxy groups wherein the alkoxy moiety is a straight or branched C_{1-6} alkoxy group, optionally substituted on the isoindoline ring with one or two oxo groups;

such as [(1-, 2-, 4-, or 5-)isoindolinyl]methoxy, 2-[(1-, 2-, 4-, or 5-)isoindolinyl]ethoxy, 1-[(1-, 2-, 4-, or 5-)isoindolinyl]ethoxy, 3-[(1-, 2-, 4-, or 5-)isoindolinyl]propoxy, 4-[(1-, 2-, 4-, or 5-) isoindolinyl]butoxy, 5-[(1-, 2-, 4-, or 5-)isoindolinyl]pentyloxy, 6-[(1-, 2-, 4-, or 5-)isoindolinyl]hexyloxy, 1,1-dimethyl-2-[(1-, 2-, 4-, or 5-)isoindolinyl]ethoxy, 2-methyl-3-[(1-, 2-, 4-, or 5-)isoindolinyl]propoxy, 3-[1,3-dioxo-(2-, 4-, or 5-) isoindolinyl]propoxy, [1-oxo-(2-, 3-, 4-, 5-, 6-, or 7-)isoindolinyl]methoxy, 2-[1,3-dioxo-(1-, 4-, or 5-)isoindolinyl]ethoxy, 4-[1-oxo-(2-, 3-, 4-, 5-, 6-, or 7-)isoindolinyl]butoxy, 5-[1,3-dioxo-(1-, 4-, or 5-)isoindolinyl]pentyloxy, and 6-[1-oxo-(2-, 3-, 4-, 5-, 6-, or 7-)isoindolinyl]hexyloxy.

Examples of lower alkoxy groups optionally substituted with one or more halogen atoms include straight and branched C_{1-6} alkoxy groups optionally substituted with one to three halogen atoms, such as, in addition to the above-described lower alkoxy groups, trifluoromethoxy, trichloromethoxy, chloromethoxy, bromomethoxy, fluoromethoxy, iodomethoxy, difluoromethoxy, dibromomethoxy, 2-chloroethoxy, 2,2,2-trifluoroethoxy, 2,2,2-trichloroethoxy, 3-chloropropoxy, 2,3-dichloropropoxy, 4,4,4-trichlorobutoxy, 4-fluorobutoxy, 5-chloropentyloxy, 3-chloro-2-methylpropoxy, 5-bromohexyloxy, and 5,6-dibromohexyloxy.

Examples of lower alkanoyl groups include straight and branched C_{1-6} alkanoyl groups, such as formyl, acetyl, propionyl, butyryl, isobutyryl, pentanoyl, *tert*-butylcarbonyl, and hexanoyl.

Examples of amino groups optionally substituted with one or more lower alkanoyl groups include amino groups optionally substituted with one or two straight and/or branched C_{1-6} alkanoyl groups, such as amino, formylamino, acetylamino, propionylamino,

butyrylamino, isobutyrylamino, pentanoylamino, *tert*-butylcarbonylamino, hexanoylamino, *N*,*N*-diacetylamino, and *N*-acetyl-*N*-propionylamino.

Examples of phenyl lower alkyl groups optionally substituted on the phenyl ring with one or more members selected from the group consisting of halogen atoms; lower alkyl groups optionally substituted with one or more halogen atoms; lower alkoxy groups optionally substituted with one or more halogen atoms; a phenyl group; lower alkoxycarbonyl groups; a phenoxy group; lower alkylthio groups; lower alkylsulfonyl groups; phenyl lower alkoxy groups; and amino groups optionally substituted with one or more lower alkanoyl groups include:

mono- and di-phenylalkyl groups wherein the alkyl moiety is a straight or branched C_{1-6} alkyl group, optionally substituted on the phenyl ring with one to three members selected from the group consisting of the above-described halogen atoms; the above-described straight and branched C_{1-6} alkyl groups optionally substituted with one to three halogen atoms; the above-described straight and branched C_{1-6} alkoxy groups optionally substituted with one to three halogen atoms; a phenyl group; the above-described alkoxycarbonyl groups wherein the alkoxy moiety is a straight or branched C_{1-6} alkoxy group; a phenoxy group, the above-described straight and branched C_{1-6} alkylthio groups; the above-described straight and branched C_{1-6} alkylsulfonyl groups; the above-described phenylalkoxy groups wherein the alkoxy moiety is a straight or branched C_{1-6} alkoxy group; and the above-described amino groups optionally substituted with one or two straight and/or branched C_{1-6} alkanoyl groups;

such as benzyl, 1-phenethyl, 2-phenethyl, 3-phenylpropyl, 2-phenylpropyl, 4-phenylbutyl, 5-phenylpentyl, 4-phenylpentyl, 6-phenylhexyl, 2-methyl-3-phenylpropyl, 1,1-dimethyl-2-phenylethyl, 1,1-diphenylmethyl, 2,2-diphenylethyl, 3,3-diphenylpropyl, 1,2-diphenylethyl, 4-chlorobenzyl, 2-chlorobenzyl, 3-chlorobenzyl, 3-fluorobenzyl, 4-fluorobenzyl, 2,3-dichlorobenzyl, 2,4,6-trifluorobenzyl, 3-

trifluoromethylbenzyl, 4-trifluoromethylbenzyl, 2-methylbenzyl, 3-methylbenzyl, 4-methylbenzyl, 4-*tert*-butylbenzyl, 2,4-dimethylbenzyl, 2,4,6-trimethylbenzyl, 2-phenylbenzyl, 4-phenylbenzyl, 2,4-diphenylbenzyl, 2,4,6-triphenylbenzyl, 2-trifluoromethoxybenzyl, 3-trifluoromethoxybenzyl, 4-trifluoromethoxybenzyl, 2-methoxybenzyl, 3-methoxybenzyl, 4-methoxybenzyl, 3,4-dimethoxybenzyl, 3,4,5-trimethoxybenzyl, 4-methoxycarbonylbenzyl, 3-ethoxycarbonylbenzyl, 2-*n*-propoxycarbonylbenzyl, 2,4-dimethoxycarbonylbenzyl, 2,4,6-trimethoxycarbonylbenzyl, 4-*tert*-butoxycarbonylbenzyl, 3-phenoxybenzyl, 2-phenoxybenzyl, 4-phenoxybenzyl, 3,4-diphenoxybenzyl, 3,4,5-triphenoxybenzyl, 4-methylthiobenzyl, 3-methylthiobenzyl, 2-methylthiobenzyl, 2,4-dimethylthiobenzyl, 2,4,6-trimethylthiobenzyl, 4-methylsulfonylbenzyl, 3-methylsulfonylbenzyl, 2-methylsulfonylbenzyl, 3,4-dimethylsulfonylbenzyl, 3,4,5-trimethylsulfonylbenzyl, 4-benzyloxybenzyl, 3-benzyloxybenzyl, 2-benzyloxybenzyl, 2,4-dibenzyloxybenzyl, 2,4,6-tribenzyloxybenzyl, 4-methoxy-3-chlorobenzyl, 4-(*N*-acetylamino)benzyl, 3-aminobenzyl, 2-aminobenzyl, 4-aminobenzyl, 2,3-diaminobenzyl, 3,4,5-triaminobenzyl, and 4-methyl-3-fluorobenzyl.

Examples of naphthyl lower alkyl groups include naphthylalkyl groups wherein the alkyl moiety is a straight or branched C_{1-6} alkyl group, such as [(1- or 2-)naphthyl]methyl, 1-[(1- or 2-)naphthyl]ethyl, 2-[(1- or 2-)naphthyl]ethyl, 3-[(1- or 2-)naphthyl]propyl, 2-[(1- or 2-)naphthyl]propyl, 4-[(1- or 2-)naphthyl]butyl, 5-[(1- or 2-)naphthyl]pentyl, 4-[(1- or 2-)naphthyl]pentyl, 6-[(1- or 2-)naphthyl]hexyl, 2-methyl-3-[(1- or 2-)naphthyl]propyl, and 1,1-dimethyl-2-[(1- or 2-)naphthyl]ethyl.

Examples of furyl lower alkyl groups optionally substituted on the furan ring with one or more lower alkoxycarbonyl groups include:

furylalkyl groups wherein the alkyl moiety is a straight or branched C_{1-6} alkyl group, optionally substituted on

the furan ring with one to three alkoxycarbonyl groups wherein the alkoxy moiety is a straight or branched C_{1-6} alkoxy group;

such as [(2- or 3-)furyl]methyl, 2-[(2- or 3-)furyl] ethyl, 1-[(2- or 3-)furyl]ethyl, 3-[(2- or 3-)furyl]propyl, 4-[(2- or 3-)furyl]butyl, 5-[(2- or 3-)furyl]pentyl, 6-[(2- or 3-)furyl]hexyl, 1,1-dimethyl-2-[(2- or 3-)furyl] ethyl, 2-methyl-3-[(2- or 3-)furyl]propyl, [5-ethoxycarbonyl-(2-, 3-, or 4-)furyl] methyl, [5-methoxycarbonyl-(2-, 3-, or 4-)furyl]methyl, [2-*n*-propoxycarbonyl-(3-, 4-, or 5-)furyl]methyl, [3-*tert*-butoxycarbonyl-(2-, 4-, or 5-)furyl]methyl, [4-*n*-pentyloxycarbonyl-(2-, 3-, or 5-)furyl]methyl, [2-*n*-hexyloxycarbonyl-(3-, 4-, or 5-)furyl]methyl, [2,5-diethoxycarbonyl-(3- or 4-)furyl]methyl, and [2,4,5-triethoxycarbonyl-3-furyl]methyl.

Examples of phenyl groups optionally substituted on the phenyl ring with one or more lower alkyl groups, each lower alkyl substituent optionally being substituted with one or more halogen atoms, include:

phenyl groups optionally substituted on the phenyl ring with one to three straight and/or branched C_{1-6} alkyl groups, each alkyl substituent optionally being substituted with one to three above-described halogen atoms;

such as phenyl, 2-methylphenyl, 3-methylphenyl, 4-methylphenyl, 2-ethylphenyl, 3-ethylphenyl, 4-ethylphenyl, 4-isopropylphenyl, 3-*n*-butylphenyl, 4-*n*-pentylphenyl, 4-*n*-hexylphenyl, 3,4-dimethylphenyl, 3,4-diethylphenyl, 2,4-dimethylphenyl, 2,5-dimethylphenyl, 2,6-dimethylphenyl, 3,4,5-trimethylphenyl, 2-trifluoromethylphenyl, 3-trifluoromethylphenyl, 4-trifluoromethylphenyl, 3,5-difluoromethylphenyl, 2,4,6-tri(trifluoromethyl)phenyl, and 2-methyl-4-trifluoromethylphenyl.

Examples of thiazolyl lower alkyl groups optionally substituted on the thiazole ring with one or more members selected from the group consisting of lower alkyl groups and a phenyl group, each phenyl substituent optionally being substituted with one or more optionally halogen-substituted lower

alkyl groups, include thiazolylalkyl groups wherein the alkyl moiety is a straight or branched C_{1-6} alkyl group. Such thiazoylalkyl groups include those optionally substituted on the thiazole ring with one or two members selected from the above-described straight and branched C_{1-6} alkyl groups and the above-described phenyl groups optionally substituted on the phenyl ring with one to three straight and/or branched C_{1-6} alkyl groups, each alkyl substituent on the phenyl substituent optionally further being substituted with one to three halogen atoms. More specific examples of the thiazolyl lower alkyl groups are [(2-, 4-, or 5-) thiazolyl]methyl, 2-[(2-, 4-, or 5-) thiazolyl]ethyl, 1-[(2-, 4-, or 5-)thiazolyl]ethyl, 3-[(2-, 4-, or 5-)thiazolyl] propyl, 4-[(2-, 4-, or 5-)thiazolyl]butyl, 5-[(2-, 4-, or 5-) thiazolyl]pentyl, 6-[(2-, 4-, or 5-)thiazolyl]hexyl, 1,1-dimethyl-2-[(2-, 4-, or 5-)thiazolyl]ethyl, [2-methyl-(4- or 5-) thiazolyl]methyl, [2-(4-trifluoromethylphenyl)-[(4- or 5-) thiazolyl]methyl, 2-[4-ethyl-(2- or 5-)thiazolyl]ethyl, 1-[5-(3-methylphenyl)-(2- or 4-)thiazolyl]ethyl, 3-[5-isopropyl-(2- or 4-)thiazolyl]propyl, 4-[2-(2,4-dimethylphenyl)-(4- or 5-) thiazolyl]butyl, 5-[2-*n*-butyl-(4- or 5-)thiazolyl]pentyl, 6-[4-(2,4,6-trimethylphenyl)-(2- or 5-)thiazolyl]hexyl, (2,4-dimethyl-5-thiazolyl)methyl, [2-(4-trifluoromethylphenyl)-4-phenyl-5-thiazolyl]methyl, and (2-phenyl-4-thiazolyl)methyl.

Examples of tetrazolyl lower alkyl groups optionally substituted on the tetrazole ring with one or more lower alkyl groups include:

tetrazolylalkyl groups wherein the alkyl moiety is a straight or branched C_{1-6} alkyl group, optionally substituted on the tetrazole ring with one or more straight and/or branched C_{1-6} alkyl groups,

such as [(1- or 5-)tetrazolyl]methyl, 2-[(1- or 5-) tetrazolyl]ethyl, 1-[(1- or 5-)tetrazolyl]ethyl, 3-[(1- or 5-) tetrazolyl]propyl, 4-[(1- or 5-)tetrazolyl]butyl, 5-[(1- or 5-) tetrazolyl]pentyl, 6-[(1- or 5-)tetrazolyl]butyl, 5-(1-methyl-5-tetrazolyl)pentyl, 6-(1-methyl-5-tetrazolyl)hexyl, (5-methyl-1-

tetrazolyl)methyl, 2-(5-ethyl-1-tetrazolyl)hexyl, 1,1-dimethyl-2-[(1- or 5-) tetrazolyl]ethyl, 2-methyl-3-[(1- or 5-)tetrazolyl] propyl, (1-methyl-5-tetrazolyl)methyl, (1-ethyl-5-tetrazolyl) methyl, 2-(1-*n*-propyl-5-tetrazolyl)ethyl, 1-(1-*n*-butyl-5-tetrazolyl)ethyl, 3-(1-*n*-pentyl-5-tetrazolyl)propyl, 4-(1-*n*-hexyl-4-tetrazolyl)butyl, 3-(5-isopropyl-1-tetrazolyl)propyl, 4-(5-*sec*-butyl-1-tetrazolyl)butyl, 5-(5-isopentyl-1-tetrazolyl) pentyl, and 6-(5-*n*-hexyl-1-tetrazolyl)hexyl.

Examples of benzothienyl lower alkyl groups optionally substituted on the benzothiophene ring with one or more halogen atoms include:

benzothienylalkyl groups wherein the alkyl moiety is a straight and branched C_{1-6} alkyl group, optionally substituted on the benzothiophene ring with one to three halogen atoms;

such as [(2-, 3-, 4-, 5-, 6-, or 7-)benzothienyl] methyl, 2-[(2-, 3-, 4-, 5-, 6-, or 7-)benzothienyl]ethyl, 1-[(2-, 3-, 4-, 5-, 6-, or 7-)benzothienyl]ethyl, 3-[(2-, 3-, 4-, 5-, 6-, or 7-)benzothienyl]propyl, 4-[(2-, 3-, 4-, 5-, 6-, or 7-)benzothienyl]butyl, 5-[(2-, 3-, 4-, 5-, 6-, or 7-)benzothienyl]pentyl, 6-[(2-, 3-, 4-, 5-, 6-, or 7-)benzothienyl]hexyl, 1,1-dimethyl-2-[(2-, 3-, 4-, 5-, 6-, or 7-)benzothienyl]ethyl, 2-methyl-3-[(2-, 3-, 4-, 5-, 6-, or 7-)benzothienyl]propyl, [5-chloro-(2-, 3-, 4-, 6-, or 7-)benzothienyl]methyl, [4-bromo-(2-, 3-, 5-, 6-, or 7-)benzothienyl]methyl, [6-fluoro-(2-, 3-, 4-, 5-, or 7-)benzothienyl]methyl, [7-iodo-(2-, 3-, 4-, 5-, or 6-)benzothienyl]methyl, [2-chloro-(3-, 4-, 5-, 6-, or 7-)benzothienyl]methyl, [4,5-dichloro-(2-, 3-, 6-, or 7-)benzothienyl]methyl, [2,4,5-chloro-(3-, 6- or 7-)benzothienyl]methyl, 2-[6-fluoro-(2-, 3-, 4-, 5-, or 7-)benzothienyl]ethyl, 1-[7-iodo-(2-, 3-, 4-, 5-, or 6-)benzothienyl]ethyl, 3-[2-chloro-(3-, 4-, 5-, 6-, or 7-)benzothienyl]propyl, 4-[4,5-dichloro-(2-, 3-, 6-, or 7-)benzothienyl]butyl, 5-[2,4,5-trichloro-(3-, 6- or 7-)benzothienyl]pentyl, and

6-[5-chloro-(2-, 3-, 4-, 6-, or 7-)benzothienyl]hexyl.

Examples of lower alkynyl groups include C_{2-6} straight and branched alkynyl groups, such as ethynyl, 2-propynyl, 2-butynyl, 3-butynyl, 1-methyl-2-propynyl, 2-pentynyl, and 2-hexynyl.

Examples of lower alkenyl groups include straight and branched C_{2-6} alkenyl groups containing one to three double bonds, such as vinyl, 1-propenyl, 1-methyl-1-propenyl, 2-methyl-1-propenyl, 2-propenyl, 2-butenyl, 1-butenyl, 3-butenyl, 2-penthenyl, 1-penthenyl, 3-penthenyl, 4-penthenyl, 1,3-butadienyl, 1,3-pentadienyl, 2-penten-4-yl, 2-hexenyl, 1-hexenyl, 5-hexenyl, 3-hexenyl, 4-hexenyl, 3,3-dimethyl-1-propenyl, 2-ethyl-1-propenyl, 1,3,5-hexatrienyl, 1,3-hexadienyl, and 1,4-hexadienyl.

Examples of benzoimidazolyl lower alkyl groups include benzoimidazolylalkyl groups wherein the alkyl moiety is a straight or branched C_{1-6} alkyl group, such as [(1-, 2-, 4-, or 5-)benzoimidazolyl]methyl, 2-[(1-, 2-, 4-, or 5-)benzoimidazolyl]ethyl, 1-[(1-, 2-, 4-, or 5-)benzoimidazolyl]ethyl, 3-[(1-, 2-, 4-, or 5-)benzoimidazolyl]propyl, 4-[(1-, 2-, 4-, or 5-)benzoimidazolyl]butyl, 5-[(1-, 2-, 4-, or 5-)benzoimidazolyl]pentyl, 6-[(1-, 2-, 4-, or 5-)benzoimidazolyl]hexyl, 1,1-dimethyl-2-[(1-, 2-, 4-, or 5-)benzoimidazolyl]ethyl, and 2-methyl-3-[(1-, 2-, 4-, or 5-)benzoimidazolyl]propyl.

Examples of pyridyl lower alkyl groups include pyridylalkyl groups wherein the alkyl moiety is a straight or branched C_{1-6} alkyl group, such as [(2-, 3-, or 4-)pyridyl]methyl, 2-[(2-, 3-, or 4-)pyridyl]ethyl, 1-[(2-, 3-, or 4-)pyridyl]ethyl, 3-[(2-, 3-, or 4-)pyridyl]propyl, 4-[(2-, 3-, or 4-)pyridyl]butyl, 1,1-dimethyl-2-[(2-, 3-, or 4-)pyridyl]ethyl, 5-[(2-, 3-, or 4-)pyridyl]pentyl, 6-[(2-, 3-, or 4-)pyridyl]hexyl, 1-[(2-, 3-, or 4-)pyridyl]isopropyl, and 2-methyl-3-[(2-, 3-, or 4-)pyridyl]propyl.

Examples of imidazolyl lower alkyl groups optionally substituted on the imidazole ring with one or more phenyl lower alkyl groups include:

imidazolylalkyl groups wherein the alkyl moiety is a straight or branched C_{1-6} alkyl group, optionally substituted on the imidazole ring with one to three above-described phenylalkyl groups wherein the alkyl moiety is a straight or branched C_{1-6} alkyl group;

such as [(1-, 2-, 4-, or 5-)imidazolyl]methyl, 2-[(1-, 2-, 4-, or 5-)imidazolyl]ethyl, 1-[(1-, 2-, 4-, or 5-)imidazolyl]ethyl, 3-[(1-, 2-, 4-, or 5-)imidazolyl]propyl, 4-[(1-, 2-, 4-, or 5-)imidazolyl]butyl, 1,1-dimethyl-2-[(1-, 2-, 4-, or 5-)imidazolyl]ethyl, 5-[(1-, 2-, 4-, or 5-)imidazolyl]pentyl, 6-[(1-, 2-, 4-, or 5-)imidazolyl]hexyl, 1-[(1-, 2-, 4-, or 5-)imidazolyl]isopropyl, 2-methyl-3-[(1-, 2-, 4-, or 5-)imidazolyl]propyl, [1-benzyl-(2-, 4-, or 5-)imidazolyl]methyl, [1-(2-phenylethyl)-(2-, 4-, or 5-)imidazolyl]methyl, [1-(1-phenylethyl)-(2-, 4-, or 5-)imidazolyl]methyl, [1-(3-phenylpropyl)-(2-, 4-, or 5-)imidazolyl]methyl, [1-(4-phenylbutyl)-(2-, 4-, or 5-)imidazolyl]methyl, [1-(5-phenylpentyl)-(2-, 4-, or 5-)imidazolyl]methyl, [1-(6-phenylhexyl)-(2-, 4-, or 5-)imidazolyl]methyl, 2-[2-benzyl-(1-, 4-, or 5-)imidazolyl]ethyl, 1-[4-(4-phenylethyl)-(1- or 2-)imidazolyl]ethyl, 3-[2-(2-phenylethyl)-(1-, 4-, or 5-)imidazolyl]methyl, 4-[1-(3-phenylpropyl)-(2-, 4-, or 5-)imidazolyl]butyl, 5-[1-(4-phenylbutyl)-(2-, 4-, or 5-)imidazolyl]pentyl, 6-[1-(5-phenylpentyl)-(2-, 4-, or 5-)imidazolyl]hexyl, [1,2-dibenzyl-(4- or 5-)imidazolyl]methyl, and (1,2,4-tribenzyl-5-imidazolyl)methyl.

Examples of lower alkylsulfonyl groups optionally substituted with one or more halogen atoms include straight and branched C_{1-6} alkylsulfonyl groups optionally substituted with one to three halogen atoms, such as, in addition to the above-described lower alkylsulfonyl groups, trifluoromethylsulfonyl, trichloromethylsulfonyl, chloromethylsulfonyl, bromomethylsulfonyl, fluoromethylsulfonyl, iodomethylsulfonyl, difluoromethylsulfonyl, dibromomethylsulfonyl, 2-

chloroethylsulfonyl, 2,2,2-trifluoroethylsulfonyl, 2,2,2-trichloroethylsulfonyl, 3-chloropropylsulfonyl, 2,3-dichloropropylsulfonyl, 4,4,4-trichlorobutylsulfonyl, 4-fluorobutylsulfonyl, 5-chloropentylsulfonyl, 3-chloro-2-methylpropylsulfonyl, 5-bromohexylsulfonyl, and 5,6-dibromohexylsulfonyl.

Examples of alkoxycarbonyl groups optionally substituted with one or more halogen atoms include:

alkoxycarbonyl groups wherein the alkoxy moiety is a straight or branched C_{1-10} alkoxy group, optionally substituted with one to three halogen atoms;

such as, in addition to the above-described lower alkoxycarbonyl groups, *n*-heptyloxycarbonyl, *n*-octyloxycarbonyl, *n*-nonyloxycarbonyl, *n*-decyloxycarbonyl, 2-ethylhexyloxycarbonyl, trifluoromethoxycarbonyl, trichloromethoxycarbonyl, chloromethoxycarbonyl, bromomethoxycarbonyl, fluoromethoxycarbonyl, iodomethoxycarbonyl, difluoromethoxycarbonyl, dibromomethoxycarbonyl, 2-chloroethoxycarbonyl, 2-fluoroethoxycarbonyl, 2,2,2-trifluoroethoxycarbonyl, 2,2,2-trichloroethoxycarbonyl, 3-chloropropoxycarbonyl, 2,3-dichloropropoxycarbonyl, 4,4,4-trichlorobutoxycarbonyl, 4-fluorobutoxycarbonyl, 4-chlorobutoxycarbonyl, 5-chloropentyloxycarbonyl, 3-chloro-2-methylpropoxycarbonyl, 5-bromohexyloxycarbonyl, 5,6-dibromohexyloxycarbonyl, 7,7,6-trichloroheptyloxycarbonyl, 8-bromooctyloxycarbonyl, 9,9,9-trifluorononyloxycarbonyl, and 10,10,10-trichlorodecyloxycarbonyl.

Examples of pyridylcarbonyl groups optionally substituted on the pyridine ring with one or more members selected from the group consisting of pyrrolyl groups and halogen atoms include:

pyridylcarbonyl groups optionally substituted on the pyridine ring with one to three members selected from the group consisting of pyrrolyl groups and halogen atoms;

such as (2-, 3-, or 4-)pyridylcarbonyl, 2-chloro-

(3-, 4-, 5-, or 6-)pyridylcarbonyl, 2,6-dichloro-(3-, 4-, or 5-) pyridylcarbonyl, 2-(1-pyrrolyl)-(3-, 4-, 5-, or 6-) pyridylcarbonyl, 2-bromo-(3-, 4-, 5-, or 6-)pyridylcarbonyl, 2,6-difluoro-(3-, 4-, or 5-)pyridylcarbonyl, 4-(1-pyrrolyl)-(2- or 3-)pyridylcarbonyl, 3-chloro-(2-, 4-, 5-, or 6-) pyridylcarbonyl, 2,5-dibromo-(3-, 4-, or 6-)pyridylcarbonyl, 2-(1-pyrrolyl)-4-chloro-(3-, 5-, or 6-)pyridylcarbonyl, 2,4,6-trifluoro-(3- or 5-)pyridylcarbonyl, and 2,4-di(1-pyrrolyl)-(3-, 5-, or 6-)pyridylcarbonyl.

Examples of pyridyl groups optionally substituted on the pyridine ring with one or more members selected from the group consisting of lower alkyl groups and lower alkoxy groups include:

pyridyl groups optionally substituted on the pyridine ring with one to three members selected from the group consisting of the above-described straight and branched C_{1-6} alkyl groups and the above-described straight and branched C_{1-6} alkoxy groups;

such as (2-, 3-, or 4-)pyridyl, 2-methyl-(3-, 4-, 5-, or 6-)pyridyl, 3-methyl-(2-, 4-, 5-, or 6-)pyridyl, 2-methoxy-(3-, 4-, 5-, or 6-)pyridyl, 4-ethyl-(2- or 3-)pyridyl, 3-*n*-propyl-(2-, 4-, 5-, or 6-)pyridyl, 2-*tert*-butyl-(3-, 4-, 5-, or 6-)pyridyl, 2-*n*-pentyl-(3-, 4-, 5-, or 6-)pyridyl, 3-*n*-hexyl-(2-, 4-, 5-, or 6-)pyridyl, 2,4-dimethyl-(3-, 5-, or 6-)pyridyl, 2,4,6-trimethyl-(3- or 5-)pyridyl, 3-ethoxy-(2-, 4-, 5-, or 6-)pyridyl, 2-isopropoxy-(3-, 4-, 5-, or 6-)pyridyl, 2-*n*-butoxy-(3-, 4-, 5-, or 6-)pyridyl, 4-*n*-pentyloxy-(2- or 3-)pyridyl, 2-*n*-hexyloxy-(3-, 4-, 5-, or 6-) pyridyl, 2,3-dimethoxy-(4-, 5-, or 6-)pyridyl, 3-methyl-(2-, 4-, 5-, or 6-)pyridyl, 3,4,5-trimethoxy-(2- or 6-)pyridyl, and 2-methyl-3-methoxy-(4-, 5-, or 6-)pyridyl.

Examples of amino groups optionally substituted with one or more members selected from the group consisting of lower alkyl groups and lower alkanoyl groups:

include amino groups optionally substituted with one or two members selected from the group consisting of straight and

branched C_{1-6} alkyl groups and straight and branched C_{1-6} alkanoyl groups;

such as amino, methylamino, ethylamino, *n*-propylamino, isopropylamino, *n*-butylamino, *tert*-butylamino, *n*-pentylamino, *n*-hexylamino, dimethylamino, diethylamino, di-*n*-propylamino, di-*n*-butylamino, di-*n*-pentylamino, di-*n*-hexylamino, *N*-methyl-*N*-ethylamino, *N*-ethyl-*N*-*n*-propylamino, *N*-methyl-*N*-*n*-butylamino, *N*-methyl-*N*-*n*-hexylamino, formylamino, acetylamino, propionylamino, butyrylamino, isobutyrylamino, pentanoylamino, *tert*-butylcarbonylamino, hexanoylamino, *N,N*-diacetylamino, *N*-acetyl-*N*-propionylamino, *N*-methyl-*N*-acetylamino, and *N*-ethyl-*N*-propionylamino.

Examples of pyrrolidinyl groups optionally substituted on the pyrrolidine ring with one or more oxo groups include pyrrolidinyl groups optionally substituted with one or two oxo groups, such as (1-, 2-, or 3-)pyrrolidinyl, 2-oxo-(1-, 3-, 4-, or 5-)pyrrolidinyl, and 2,5-dioxo-(1- or 3-)pyrrolidinyl.

Examples of piperidinyl groups optionally substituted on the piperidine ring with one or more lower alkyl groups include piperidinyl groups optionally substituted on the piperidine ring with one to three straight and/or branched C_{1-6} alkyl groups, such as (1-, 2-, 3-, or 4-)piperidinyl, 1-methyl-(2-, 3-, or 4-)piperidinyl, 1-ethyl-(2-, 3-, or 4-)piperidinyl, 1-*n*-propyl-(2-, 3-, or 4-)piperidinyl, 1-isopropyl-(2-, 3-, or 4-)piperidinyl, 1-*n*-butyl-(2-, 3-, or 4-)piperidinyl, 1-*n*-pentyl-(2-, 3-, or 4-)piperidinyl, 1-*n*-hexyl-(2-, 3-, or 4-)piperidinyl, 1,2-dimethyl-(3-, 4-, 5-, or 6-)piperidinyl, 1,2,3-trimethyl-(4-, 5-, or 6-)piperidinyl, 2-*n*-propyl-(1-, 3-, 4-, 5- or 6-)piperidinyl, 3-ethyl-(1-, 2-, 4-, 5-, or 6-)piperidinyl, and 2-methyl-4-isopropyl-(1-, 3-, 5-, or 6-)piperidinyl.

Examples of carbamoyl groups optionally substituted with one or more lower alkyl groups include carbamoyl groups optionally substituted with one or two straight and/or branched C_{1-6} alkyl groups, such as carbamoyl, methylcarbamoyl,

ethylcarbamoyl, *n*-propylcarbamoyl, isopropylcarbamoyl, *n*-butylcarbamoyl, *tert*-butylcarbamoyl, *n*-pentylcarbamoyl, *n*-hexylcarbamoyl, dimethylcarbamoyl, diethylcarbamoyl, di-*n*-propyl carbamoyl, di-*n*-butylcarbamoyl, di-*n*-pentylcarbamoyl, di-*n*-hexylcarbamoyl, *N*-methyl-*N*-ethylcarbamoyl, *N*-ethyl-*N*-*n*-propylcarbamoyl, *N*-methyl-*N*-*n*-butylcarbamoyl, and *N*-methyl-*N*-*n*-hexylcarbamoyl.

Examples of phenyl groups optionally substituted with on the phenyl ring one or more members selected from the group consisting of halogen atoms; lower alkyl groups optionally substituted with one or more halogen atoms; a phenoxy group; lower alkoxy groups optionally substituted with one or more halogen atoms; lower alkylthio groups; lower alkylsulfonyl groups; amino groups optionally substituted with one or more members selected from the group consisting of lower alkyl groups and lower alkanoyl groups; pyrrolidinyl groups optionally substituted on the pyrrolidine ring with one or more oxo groups; piperidinyl groups optionally substituted on the piperidine ring with one or more lower alkyl groups; lower alkenyl groups; an aminosulfonyl group; a hydroxy group; carbamoyl groups optionally substituted with one or more lower alkyl groups; phenyl lower alkoxy groups; and a cyano group include:

phenyl groups optionally substituted on the phenyl ring with one to three members selected from the group consisting of the above-described halogen atoms; the above-described straight and branched C_{1-6} alkyl groups optionally substituted with one to three halogen atoms; a phenoxy group; the above-described straight and branched C_{1-6} alkoxy groups optionally substituted with one to three halogen atoms; the above-described straight and branched C_{1-6} alkylthio groups; the above-described straight and branched C_{1-6} alkylsulfonyl groups; the above-described amino groups optionally substituted with one or two members selected from the group consisting of straight and branched C_{1-6} alkyl groups and straight and branched C_{1-6} alkanoyl groups; the above-described pyrrolidinyl groups optionally substituted on the

pyrrolidine ring with one or two oxo groups; the above-described piperidinyl groups optionally substituted on the piperidine ring with one to three straight and/or branched C_{1-6} alkyl groups; the above-described straight and branched C_{2-6} alkenyl groups containing one to three double bonds; an aminosulfonyl group; a hydroxy group; the above-described carbamoyl groups optionally substituted with one or two straight and/or branched C_{1-6} alkyl groups; the above-described phenylalkoxy groups wherein the alkoxy moiety is a straight or branched C_{1-6} alkoxy group; and a cyano group;

such as phenyl, 4-phenoxyphenyl, 3-phenoxyphenyl, 2-phenoxyphenyl, 4-isopropylphenyl, 3-isopropylphenyl, 2-isopropylphenyl, 4-*tert*-butylphenyl, 4-methylphenyl, 3-methylphenyl, 2-methylphenyl, 2,3-dimethylphenyl, 2,4-dimethylphenyl, 3,5-dimethylphenyl, 2,4,6-trimethylphenyl, 4-methyl-3-methoxyphenyl, 4-trifluoromethylphenyl, 3-trifluoromethylphenyl, 2-trifluoromethylphenyl, 4-methyl-3-chlorophenyl, 4-chlorophenyl, 3-chlorophenyl, 2-chlorophenyl, 2-fluorophenyl, 3-fluorophenyl, 4-fluorophenyl, 3-bromophenyl, 3,4-dichlorophenyl, 3,5-dichlorophenyl, 3,4,5-trichlorophenyl, 2,4,6-trifluorophenyl, 3,5-difluorophenyl, 3-chloro-4-fluorophenyl, 2-chloro-5-fluorophenyl, 3-fluoro-4-methoxyphenyl, 3-chloro-4-methoxyphenyl, 3-chloro-4-hydroxyphenyl, 4-methoxyphenyl, 3-methoxyphenyl, 2-methoxyphenyl, 2,4-dimethoxyphenyl, 3,4-dimethoxyphenyl, 2,4,6-trimethoxyphenyl, 2-methoxy-5-chlorophenyl, 2-methoxy-5-acetylaminophenyl, 2-chloro-5-acetylaminophenyl, 4-ethoxyphenyl, 4-trifluoromethoxyphenyl, 3-trifluoromethoxyphenyl, 2-trifluoromethoxyphenyl, 3-methoxy-5-trifluoromethylphenyl, 4-methylthiophenyl, 3-methylthiophenyl, 2-methylthiophenyl, 2-(1-methyl-1-vinyl)phenyl, 4-vinylphenyl, 3-dimethylaminophenyl, 4-methylaminophenyl, 2-(*N*-methyl-*N*-acetylamino)phenyl, 3-acetylaminophenyl, 4-propionylaminophenyl, 4-acetylaminophenyl, 2-acetylaminophenyl, 4-aminosulfonylphenyl, 3-aminosulfonylphenyl, 2-aminosulfonylphenyl, 4-methylthiophenyl, 3-methylthiophenyl, 2-methylthiophenyl, 4-methylsulfonylphenyl, 3-methylsulfonylphenyl,

2-methylsulfonylphenyl, 4-methylcarbamoylphenyl, 3-carbamoylphenyl, 2-ethylcarbamoylphenyl, 2-benzyloxyphenyl, 3-benzyloxyphenyl, 4-benzyloxyphenyl, 2-phenylphenyl, 3-phenylphenyl, 4-phenylphenyl, 2-cyanophenyl, 3-cyanophenyl, 4-cyanophenyl, 4-[2-oxo-(1-, 3-, 4-, or 5-)pyrrolidinyl]phenyl, 3-[2,5-dioxo-(1- or 3-)pyrrolidinyl]phenyl, 4-[4-methyl-(1-, 2-, or 3-)piperazinyl]phenyl, 3-[4-ethyl-(1-, 2-, or 3-)piperazinyl]phenyl, and 2-[4-isopropyl-(1-, 2-, or 3-)piperazinyl]phenyl.

Examples of cycloalkyl groups optionally substituted on the cycloalkyl ring with one or more lower alkyl groups include C_{3-8} cycloalkyl groups optionally substituted on the cycloalkyl ring with one to three straight and/or branched C_{1-6} alkyl groups, such as, in addition to the above-described cycloalkyl groups, 1-methylcyclopropyl, 1-methylcyclopentyl, 1-methylcyclohexyl, 2-methylcyclohexyl, 1-methylcyclobutyl, 1-ethylcyclooctyl, 1-*n*-propylcycloheptyl, 1,2-dimethylcyclohexyl, 1,4,5-trimethylcyclooctyl, 1-*n*-butylcyclopropyl, 1-*n*-pentylcyclopentyl, and 1-*n*-hexylcyclohexyl.

Examples of amino groups optionally substituted with one or more members selected from the group consisting of a phenyl group and lower alkyl groups include:

amino groups optionally substituted with one or two members selected from the group consisting of a phenyl group and straight and branched C_{1-6} alkyl groups;

such as amino, methylamino, ethylamino, *n*-propylamino, isopropylamino, *n*-butylamino, *tert*-butylamino, *n*-pentylamino, *n*-hexylamino, dimethylamino, diethylamino, di-*n*-propylamino, di-*n*-butylamino, di-*n*-pentylamino, di-*n*-hexylamino, *N*-methyl-*N*-ethylamino, *N*-ethyl-*N*-*n*-propylamino, *N*-methyl-*N*-*n*-butylamino, *N*-methyl-*N*-*n*-hexylamino, phenylamino, *N*,*N*-diphenylamino, *N*-methyl-*N*-phenylamino, *N*-ethyl-*N*-phenylamino, and *N*-*n*-propyl-*N*-phenylamino.

Examples of benzoyl groups optionally substituted on the phenyl ring with one or more members selected from the group

consisting of halogen atoms; a phenoxy group; a phenyl group; lower alkyl groups optionally substituted with one or more halogen atoms; lower alkoxy groups; lower alkanoyl groups; a nitro group; a cyano group; amino groups optionally substituted with one or more members selected from the group consisting of a phenyl group and lower alkyl groups; pyrrolidinyl groups optionally substituted on the pyrrolidine ring with one or more oxo groups; pyrrolyl groups; pyrazolyl groups; 1,2,4-triazolyl groups; and imidazolyl groups include:

benzoyl groups optionally substituted on the phenyl ring with one to three members selected from the group consisting of halogen atoms; a phenoxy group; a phenyl group; the above-described straight and branched C_{1-6} alkyl groups optionally substituted with one to three halogen atoms; the above-described straight and branched C_{1-6} alkoxy groups; the above-described straight and branched C_{1-6} alkanoyl groups; a nitro group; a cyano group; the above-described amino groups optionally substituted with one or two members selected from the group consisting of a phenyl group and straight and branched C_{1-6} alkyl groups; the above-described pyrrolidinyl groups optionally substituted on the pyrrolidine ring with one or two oxo groups; pyrrolyl groups; pyrazolyl groups; 1,2,4-triazolyl groups; and imidazolyl groups;

such as benzoyl, 4-methoxybenzoyl, 3-methoxybenzoyl, 2-methoxybenzoyl, 2,4-dimethoxybenzoyl, 3,4,5-trimethoxybenzoyl, 2-methoxy-5-chlorobenzoyl, 4-phenoxybenzoyl, 2-phenoxybenzoyl, 3-phenoxybenzoyl, 4-chlorobenzoyl, 3-chlorobenzoyl, 2-chlorobenzoyl, 2,6-dichlorobenzoyl, 2-chloro-4-fluorobenzoyl, 2,4,6-trifluorobenzoyl, 4-bromobenzoyl, 3-fluorobenzoyl, 4-trifluoromethylbenzoyl, 3-trifluoromethylbenzoyl, 2-trifluoromethylbenzoyl, 3-fluoro-2-methylbenzoyl, 4-methylbenzoyl, 3-methylbenzoyl, 2-methylbenzoyl, 3,4-dimethylbenzoyl, 2,4,5-trimethylbenzoyl, 2-phenylbenzoyl, 3-phenylbenzoyl, 4-phenylbenzoyl, 4-nitrobenzoyl, 3-nitrobenzoyl, 2-nitrobenzoyl, 2-dimethylaminobenzoyl, 3-methylaminobenzoyl, 4-(*N*-methylanilino)benzoyl, 2-anilinobenzoyl, 3-cyanobenzoyl, 4-

cyanobenzoyl, 2-cyanobenzoyl, 4-acetylbenzoyl, 2-propionylbenzoyl, 3-butyrylbenzoyl, 4-[(1-, 2-, or 3-)pyrrolyl]benzoyl, 4-[(1-, 3-, 4-, or 5-)pyrazolyl]benzoyl, 4-[(1-, 3- or 5-)1,2,4-triazolyl]benzoyl, 4-[(1-, 2-, 4-, or 5-)imidazolyl]benzoyl, and 4-[2-oxo-(1-, 3-, 4-, or 5-)pyrrolidinyl]benzoyl.

Examples of lower alkylenedioxy groups include straight and branched C_{1-4} alkylene groups, such as methylenedioxy, ethylenedioxy, trimethylenedioxy, and tetramethylenedioxy.

Examples of benzoyl groups substituted on the phenyl ring with one or more lower alkylenedioxy groups include:

benzoyl groups substituted on the phenyl ring with one or more of the above-described straight and branched C_{1-4} alkylenedioxy groups;

such as 3,4-methylenedioxybenzoyl, 2,3-ethylenedioxybenzoyl, 3,4-trimethylenedioxybenzoyl, and 2,3-tetramethylenedioxybenzoyl.

Examples of cycloalkylcarbonyl groups include cycloalkylcarbonyl groups wherein the cycloalkyl moiety is a C_{3-8} cycloalkyl group, such as cyclopropylcarbonyl, cyclobutylcarbonyl, cyclopentylcarbonyl, cyclohexylcarbonyl, cycloheptylcarbonyl, and cyclooctylcarbonyl.

Examples of furylcarbonyl groups include (2- or 3-) furylcarbonyl.

Examples of naphthylcarbonyl groups include (1- or 2-) naphthylcarbonyl.

Examples of phenoxycarbonyl groups optionally substituted on the phenyl ring with one or more members selected from the group consisting of lower alkoxy groups, lower alkyl groups, halogen atoms, and a nitro group include:

phenoxycarbonyl groups optionally substituted on the phenyl ring with one to three members selected from the group consisting of the above-described straight and branched C_{1-6} alkoxy groups, the above-described straight and branched C_{1-6} alkyl groups, halogen atoms, and a nitro group;

such as phenoxycarbonyl, 4-chlorophenoxycarbonyl, 3-

chlorophenoxycarbonyl, 2-chlorophenoxycarbonyl, 3,4-dichlorophenoxycarbonyl, 2,4,6-trichlorophenoxycarbonyl, 4-fluorophenoxycarbonyl, 3-fluorophenoxycarbonyl, 2-fluorophenoxycarbonyl, 2,4-difluorophenoxycarbonyl, 3,4,5-trifluorophenoxycarbonyl, 4-bromophenoxycarbonyl, 2-chloro-4-methoxyphenoxycarbonyl, 3-fluoro-5-methylphenoxycarbonyl, 4-methoxyphenoxycarbonyl, 3-methoxyphenoxycarbonyl, 2-methoxyphenoxycarbonyl, 3,4-dimethoxyphenoxycarbonyl, 2,4,5-trimethoxyphenoxycarbonyl, 4-methylphenoxycarbonyl, 3-methylphenoxycarbonyl, 2-methylphenoxycarbonyl, 2,5-dimethylphenoxycarbonyl, 2,3,4-trimethylphenoxycarbonyl, 4-nitrophenoxycarbonyl, 3-nitrophenoxycarbonyl, 2-nitrophenoxycarbonyl, 2,4-dinitrophenoxycarbonyl, and 2,4,6-trinitrophenoxycarbonyl.

Examples of phenyl lower alkoxycarbonyl groups optionally substituted on the phenyl ring with one or more members selected from the group consisting of halogen atoms and a nitro group include:

phenylalkoxycarbonyl groups wherein the alkoxy moiety is a straight or branched C_{1-6} alkoxy group, optionally substituted on the phenyl ring with one to three members selected from the group consisting of halogen atoms and a nitro group;

such as benzyloxycarbonyl, 2-phenylethoxycarbonyl, 1-phenylethoxycarbonyl, 3-phenylpropoxycarbonyl, 4-phenylbutoxycarbonyl, 5-phenylpentyloxycarbonyl, 6-phenylhexyloxycarbonyl, 1,1-dimethyl-2-phenylethoxycarbonyl, 2-methyl-3-phenylpropoxycarbonyl, 4-chlorobenzyloxycarbonyl, 3-chlorobenzyloxycarbonyl, 2-chlorobenzyloxycarbonyl, 3,4-dichlorobenzyloxycarbonyl, 2,4,6-trichlorobenzyloxycarbonyl, 4-fluorobenzyloxycarbonyl, 3-fluorobenzyloxycarbonyl, 2-fluorobenzyloxycarbonyl, 2,4-difluorobenzyloxycarbonyl, 3,4,5-trifluorobenzyloxycarbonyl, 4-bromobenzyloxycarbonyl, 4-nitrobenzyloxycarbonyl, 3-nitrobenzyloxycarbonyl, 2-nitrobenzyloxycarbonyl, 2,4-dinitrobenzyloxycarbonyl, 2,4,6-trinitrobenzyloxycarbonyl, and 2-nitro-4-chlorobenzyloxycarbonyl.

Examples of piperidinyl groups optionally substituted on the piperidine ring with one or more members selected from the group consisting of lower alkyl groups; lower alkanoyl groups; benzoyl groups optionally substituted on the phenyl ring with one or more halogen atoms; and phenyl groups optionally substituted on the phenyl ring with one or more halogen atoms include:

piperidinyl groups optionally substituted on the piperidine ring with one to three members selected from the group consisting of the above-described straight and branched C_{1-6} alkyl groups; the above-described straight and branched C_{1-6} alkanoyl groups; the above-described benzoyl groups optionally substituted on the phenyl ring with one to three halogen atoms; and the above-described phenyl groups optionally substituted on the phenyl ring with one to three halogen atoms;

such as (1-, 2-, 3-, or 4-)piperidinyl, 1-methyl-(2-, 3-, or 4-)piperidinyl, 1-acetyl-(2-, 3-, or 4-)piperidinyl, 1-benzoyl-(2-, 3-, or 4-)piperidinyl, 1-(4-chlorobenzoyl)-(2-, 3-, or 4-)piperidinyl, 1-(3-bromobenzoyl)-(2-, 3-, or 4-)piperidinyl, 1-benzoyl-(2-, 3-, or 4-)piperidinyl, 1-(4-fluorobenzoyl)-(2-, 3-, or 4-)piperidinyl, 1-(2,4-dichloro benzoyl)-(2-, 3-, or 4-)piperidinyl, 1-(2,4,6-trifluorobenzoyl)-(2-, 3-, or 4-)piperidinyl, 2-(3-chlorobenzoyl)-(1-, 3-, or 4-)piperidinyl, 3-(2-chlorobenzoyl)-(1-, 2-, or 4-)piperidinyl, 4-(2,3-dibromobenzoyl)-(1-, 2-, or 3-)piperidinyl, 1,2-dibenzoyl-(3- or 4-)piperidinyl, 1,2,4-tribenzoyl-3-piperidinyl, 1,4-dimethyl-(2-, 3-, 5-, or 6-)piperidinyl, 1,2,4-trimethyl-(3-, 5-, or 6-)piperidinyl, 1-benzoyl-2-methyl-(3-, 4-, 5-, or 6-)piperidinyl, 1-phenyl-2-methyl-(3-, 4-, 5-, or 6-)piperidinyl, 1-acetyl-3-methyl-(2-, 4-, 5-, or 6-)piperidinyl, 1-phenyl-(2-, 3-, or 4-)piperidinyl, 1-(4-chlorophenyl)-(2-, 3-, or 4-)piperidinyl, 1-(3-bromophenyl)-(2-, 3-, or 4-)piperidinyl, 1-(4-iodophenyl)-(2-, 3-, or 4-)piperidinyl, 1-(4-fluorophenyl)-(2-, 3-, or 4-)piperidinyl, 1-(2,4-dichlorophenyl)-(2-, 3-, or 4-)piperidinyl, 1-(2,4,6-trifluorophenyl)-(2-, 3-, or 4-)piperidinyl,

2-(3-chlorophenyl)-(1-, 3-, 4-, 5-, or 6-)piperidinyl, 3-(2-chlorophenyl)-(1-, 2-, 4-, 5-, or 6-)piperidinyl, 4-(2,3-dibromophenyl)-(1-, 2-, or 3-)piperidinyl, 1,2-diphenyl-(3-,4-, 5- or 6-)piperidinyl, and 1,2,4-triphenyl-(3-, 5-, or 6-) piperidinyl.

Examples of tetrahydropyranyl lower alkyl groups include tetrahydropyranylalkyl groups wherein the alkyl moiety is a straight or branched C_{1-6} alkyl group, such as [(2-, 3-, or 4-)tetrahydropyranyl]methyl, 2-[(2-, 3-, or 4-) tetrahydropyranyl]ethyl, 1-[(2-, 3-, or 4-)tetrahydropyranyl] ethyl, 3-[(2-, 3-, or 4-)tetrahydropyranyl]propyl, 4-[(2-, 3-, or 4-)tetrahydropyranyl]butyl, 1,1-dimethyl-2-[(2-, 3-, or 4-)tetrahydropyranyl]ethyl, 5-[(2-, 3-, or 4-) tetrahydropyranyl]pentyl, 6-[(2-, 3-, or 4-)tetrahydropyranyl] hexyl, 1-[(2-, 3- or 4-)tetrahydropyranyl]isopropyl, and 2-methyl-3-[(2-, 3-, or 4-)tetrahydropyranyl]propyl.

Examples of phenyl lower alkyl groups optionally substituted on the alkyl group with one or more lower alkoxycarbonyl groups; and optionally further substituted on the phenyl ring with one or more members selected from the group consisting of halogen atoms, lower alkyl groups optionally substituted with one or more halogen atoms, lower alkoxy groups optionally substituted with one or more halogen atoms, and a hydroxy group include:

mono- and di-phenylalkyl groups wherein the alkyl moiety is a straight or branched C_{1-6} alkyl group, optionally substituted on the alkyl group with one or more lower alkoxycarbonyl groups wherein the alkoxy moiety is a straight or branched C_{1-6} alkoxy group; and optionally further substituted on the phenyl group with one to three members selected from the group consisting of halogen atoms, the above-described straight and branched C_{1-6} alkyl groups optionally substituted with one to three halogen atoms, the above-described straight and branched C_{1-6} alkoxy groups optionally substituted with one to three halogen atoms, and a hydroxy group;

such as benzyl, 1-phenethyl, 2-phenethyl, 3-phenylpropyl, 2-phenylpropyl, 4-phenylbutyl, 5-phenylpentyl, 4-phenylpentyl, 6-phenylhexyl, 2-methyl-3-phenylpropyl, 1,1-dimethyl-2-phenylethyl, 1,1-dimethyl-1-phenylmethyl, 1,1-diphenylmethyl, 2,2-diphenylethyl, 3,3-diphenylpropyl, 1,2-diphenylethyl, 4-chlorobenzyl, 2-chlorobenzyl, 3-chlorobenzyl, 3-fluorobenzyl, 4-fluorobenzyl, 3-bromobenzyl, 2,3-dichlorobenzyl, 2,6-dichlorobenzyl, 2,4,6-trifluorobenzyl, 2-(4-chlorophenyl) ethyl, 2-(2-fluorophenyl)ethyl, 2-(3-fluorophenyl)ethyl, 3-trifluoromethylbenzyl, 4-trifluoromethylbenzyl, 2-methylbenzyl, 3-methylbenzyl, 4-methylbenzyl, 4-*tert*-butylbenzyl, 2,4-dimethylbenzyl, 2,4,6-trimethylbenzyl, 2-trifluoromethoxybenzyl, 3-trifluoromethoxybenzyl, 4-trifluoromethoxybenzyl, 2-methoxybenzyl, 3-methoxybenzyl, 4-methoxybenzyl, 4-ethoxybenzy, 2-(3-methoxyphenyl)ethyl, 3,4-dimethoxybenzyl, 3,4,5-trimethoxybenzyl, 4-hydroxybenzyl, 3-hydroxybenzyl, 2-hydroxybenzyl, 2,4-dihydroxybenzyl, 3,4,5-trihydroxybenzyl, 2-methoxy-4-chlorobenzyl, 3-methyl-5-fluorobenzyl, 2-(4-hydroxyphenyl)-1-methoxycarbonylethyl, and 2-(4-chlorophenyl)-1-ethoxycarbonylethyl.

Examples of lower alkylenedioxy-substituted phenyl lower alkyl groups include:

alkylenedioxy-substituted phenylalkyl groups wherein the alkyl moiety is a straight or branched C_{1-6} alkyl group, substituted on the phenyl ring with one or more of the above-described straight and branched C_{1-4} alkylenedioxy groups;

such as 3,4-methylenedioxybenzyl, 3,4-trimethylenedioxybenzyl, 2-(2,3-ethylenedioxyphenyl)ethyl, 1-(3,4-trimethylenedioxyphenyl)ethyl, 3-(2,3-tetramethylenedioxyphenyl)propyl, 4-(3,4-methylenedioxyphenyl) butyl, 5-(2,3-ethylenedioxyphenyl)pentyl, 6-(3,4-trimethylenedioxyphenyl)hexyl, 1,1-dimethyl-2-(2,3-methylenedioxyphenyl)ethyl, and 2-methyl-3-(3,4-ethylenedioxyphenyl)propyl.

Examples of furyl lower alkyl groups include furylalkyl

groups wherein the alkyl moiety is a straight or branched C_{1-6} alkyl group, such as [(2- or 3-)furyl]methyl, 2-[(2- or 3-)furyl]ethyl, 1-[(2- or 3-)furyl]ethyl, 3-[(2- or 3-)furyl]propyl, 4-[(2- or 3-)furyl]butyl, 5-[(2- or 3-)furyl]pentyl, 6-[(2- or 3-)furyl]hexyl, 1,1-dimethyl-2-[(2- or 3-)furyl]ethyl, and 2-methyl-3-[(2- or 3-)furyl]propyl.

Examples of carbamoyl lower alkyl groups optionally substituted with one or more members selected from the group consisting of lower alkyl groups and a phenyl group, each phenyl substituent optionally being substituted on the phenyl ring with one or more lower alkyl groups, include:

carbamoylalkyl groups wherein the alkyl moiety is a straight or branched C_{1-6} alkyl group, optionally substituted with one or two members selected from the group consisting of the above-described straight and branched C_{1-6} alkyl groups and the above-described phenyl groups optionally substituted on the phenyl ring with one to three straight and/or branched C_{1-6} alkyl groups;

such as carbamoylmethyl, 2-carbamoylethyl, 1-carbamoylethyl, 3-carbamoylpropyl, 4-carbamoylbutyl, 5-carbamoylpentyl, 6-carbamoylhexyl, 1,1-dimethyl-2-carbamoylethyl, 2-methyl-3-carbamoylpropyl, 2-(*N*-methyl-*N*-phenylcarbamoyl)ethyl, *N*-(4-methylphenyl)carbamoylmethyl, 2-[*N*-methyl-*N*-(3-methylphenyl)carbamoyl]ethyl, *N*-(2-methylphenyl)carbamoylmethyl, 2-[*N*-ethyl-*N*-(3,4-dimethylphenyl)carbamoyl]ethyl, *N*-(2,4,6-trimethylphenyl)carbamoylmethyl, *N*,*N*-dimethylcarbamoylmethyl, N,N-diphenylcarbamoylmethyl,*N*-methyl-*N*-ethylcarbamoylmethyl, *N*-methylcarbamoylmethyl, and 2-(*N*-methylcarbamoyl)ethyl.

Examples of imidazolyl lower alkyl groups optionally substituted on the lower alkyl group with one or more members selected from the group consisting of a carbamoyl group and lower alkoxycarbonyl groups include:

imidazolylalkyl groups wherein the alkyl moiety is a straight or branched C_{1-6} alkyl group, optionally substituted on

the lower alkyl group with one or more members selected from the group consisting of a carbamoyl group and alkoxycarbonyl groups wherein the alkoxy moiety is a straight or branched C_{1-6} alkoxy group;

such as, in addition to the above-described imidazolyl lower alkyl groups, 1-carbamoyl-2-[(1-, 2-, 4-, or 5-)imidazolyl] ethyl, 1-methoxycarbonyl-2-[(1-, 2-, 4-, or 5-)imidazolyl]ethyl, 1-carbamoyl-1-[(1-, 2-, 4-, or 5-)imidazolyl]methyl, 1-ethoxycarbonyl-1-[(1-, 2-, 4-, or 5-)imidazolyl]methyl, 1-carbamoyl-3-[(1-, 2-, 4-, or 5-)imidazolyl]propyl, 1-*n*-propoxycarbonyl-4-[(1-, 2-, 4-, or 5-)imidazolyl]butyl, 1-carbamoyl-5-[(1-, 2-, 4-, or 5-)imidazolyl]pentyl, and 1-*tert*-butoxycarbonyl-6-[(1-, 2-, 4-, or 5-)imidazolyl]hexyl.

Examples of amino-substituted lower alkyl groups optionally substituted on each amino group with one or more lower alkyl groups include:

amino-subsituted straight and branched C_{1-6} alkyl groups optionally substituted on the amino group with one or two straight and/or branched C_{1-6} alkyl groups;

such as aminomethyl, 2-aminoethyl, 1-aminoethyl, 3-aminopropyl, 4-aminobutyl, 5-aminopentyl, 6-aminohexyl, 1,1-dimethyl-2-aminoethyl, 2-methyl-3-aminopropyl, methylaminomethyl, 2-ethylaminoethyl, 3-*n*-propylaminopropyl, 3-isopropylaminopropyl, 4-*n*-butylaminobutyl, 5-*n*-pentylaminopentyl, 6-*n*-hexylaminohexyl, dimethylaminoethyl, 2-diisopropylaminopropyl, 3-diisopropylaminopropyl, (*N*-ethyl-*N*-*n*-propylamino)methyl, and 2-(*N*-methyl-*N*-*n*-hexylamino)methyl.

Examples of 2,3,4,5-tetrahydrofuryl groups optionally substituted on the 2,3,4,5-tetrahydrofuran ring with one or more oxo groups include:

2,3,4,5-tetrahydrofuryl groups optionally substituted on the 2,3,4,5-tetrahydrofuran ring with one or two oxo groups;

such as (2- or 3-)2,3,4,5-tetrahydrofuryl, 2-oxo-(3-, 4-, or 5-)2,3,4,5-tetrahydrofuryl, 3-oxo-(2-, 4-, or 5-)2,3,4,5-tetrahydrofuryl, and 2,5-dioxo-(3- or 4-)2,3,4,5-

tetrahydrofuryl.

Examples of pyrrolidinyl lower alkyl groups optionally substituted on the pyrrolidine ring with one or more lower alkyl groups include:

pyrrolidinylalkyl groups wherein the alkyl moiety is a straight or branched C_{1-6} alkyl group, optionally substituted on the pyrrolidine ring with one to three above-described straight and/or branched C_{1-6} alkyl groups;

such as [(1-, 2-, or 3-)pyrrolidinyl]methyl, 2-[(1-, 2-, or 3-)pyrrolidinyl]ethyl, 1-[(1-, 2-, or 3-)pyrrolidinyl]ethyl, 3-[(1-, 2-, or 3-)pyrrolidinyl]propyl, 4-[(1-, 2-, or 3-)pyrrolidinyl]butyl, 5-[(1-, 2-, or 3-)pyrrolidinyl]pentyl, 6-[(1-, 2-, or 3-)pyrrolidinyl]hexyl, 1,1-dimethyl-2-[(1-, 2-, or 3-)pyrrolidinyl]ethyl, 2-methyl-3-[(1-, 2-, or 3-)pyrrolidinyl]propyl, 1-ethyl-[(2- or 3-)pyrrolidinyl]methyl, 1-ethyl-[(2- or 3-)pyrrolidinyl]methyl, 2-methyl-[(1-, 3-, 4-, or 5-)pyrrolidinyl]methyl, 3-*n*-propyl-[(1-, 2-, 4-, or 5-)pyrrolidinyl]methyl, 1-*n*-butyl-[(2- or 3-)pyrrolidinyl]methyl, 2-*n*-pentyl-[(1-, 3-, 4-, or 5-)pyrrolidinyl]methyl, 1-*n*-hexyl-[(2- or 3-)pyrrolidinyl]methyl, 1,2-dimethyl-[(3-, 4-, or 5-) pyrrolidinyl]methyl, and 1,2,3-trimethyl-[(4- or 5-)pyrrolidinyl]methyl.

Examples of phenoxy lower alkanoyl groups include phenoxyalkanoyl groups wherein the alkanoyl moiety is a straight or branched C_{2-6} alkanoyl group, such as 2-phenoxyacetyl, 3-phenoxypropionyl, 2-phenoxypropionyl, 4-phenoxybutyryl, 5-phenoxypentanoyl, 6-phenoxyhexanoyl, 2,2-dimethyl-3-phenoxypropionyl, and 2-methyl-3-phenoxypropionyl.

Examples of morpholino lower alkyl groups include morpholinoalkyl groups wherein the alkyl moiety is a straight or branched C_{1-6} alkyl group, such as [(2-, 3-, or 4-)morpholino]methyl, 2-[(2-, 3-, or 4-)morpholino]ethyl, 1-[(2-, 3-, or 4-)morpholino]ethyl, 3-[(2-, 3-, or 4-)morpholino]propyl, 4-[(2-, 3-, or 4-)morpholino]butyl, 5-[(2-, 3-, or 4-)morpholino]pentyl, 6-[(2-, 3-, or 4-)

morpholino]hexyl, 1,1-dimethyl-2-[(2-, 3-, or 4-)morpholino]ethyl, and 2-methyl-3-[(2-, 3-, or 4-)morpholino]propyl.

Examples of pyridyl lower alkanoyl groups include pyridylalkanoyl groups wherein the alkanoyl moiety is a straight or branched C_{2-6} alkanoyl group, such as 2-[(2-, 3-, or 4-)pyridyl]acetyl, 3-[(2-, 3-, or 4-)pyridyl]propionyl, 2-[(2-, 3-, or 4-)pyridyl]propionyl, 4-[(2-, 3-, or 4-)pyridyl]butyryl, 5-[(2-, 3-, or 4-)pyridyl]pentanoyl, 6-[(2-, 3-, or 4-)pyridyl]hexanoyl, 2,2-dimethyl-3-[(2-, 3-, or 4-)pyridyl]propionyl, and 2-methyl-3-[(2-, 3-, or 4-)pyridyl]propionyl.

Examples of thienylcarbonyl groups include 2-thienylcarbonyl and 3-thienylcarbonyl.

Examples of thienyl lower alkanoyl groups include thienylalkanoyl groups wherein the alkanoyl moiety is a straight or branched C_{2-6} alkanoyl group, such as 2-[(2- or 3-)thienyl]acetyl, 3-[(2- or 3-)thienyl]propionyl, 2-[(2- or 3-)thienyl]propionyl, 4-[(2- or 3-)thienyl]butyryl, 5-[(2- or 3-)thienyl]pentanoyl, 6-[(2- or 3-)thienyl]hexanoyl, 2,2-dimethyl-3-[(2- or 3-)thienyl]propionyl, and 2-methyl-3-[(2- or 3-)thienyl]propionyl.

Examples of cycloalkyl lower alkanoyl groups include C_{3-8} cycloalkylalkanoyl groups wherein the alkanoyl moiety is a straight or branched C_{2-6} alkanoyl group, such as 2-cyclopropylacetyl, 2-cyclohexylacetyl, 3-cyclopropylpropionyl, 2-cyclobutylpropionyl, 2-cyclopentylacetyl, 3-cyclopentylpropionyl, 4-cyclohexylbutyryl, 5-cycloheptylpentanoyl, 6-cyclooctylhexanoyl, 2,2-dimethyl-3-cyclohexylpropionyl, and 2-methyl-3-cyclopropylpropionyl.

Examples of isoxazolylcarbonyl groups optionally substituted on the isoxazole ring with one or more lower alkyl groups include isoxazoylcarbonyl groups optionally substituted on the isoxazole ring with one or two straight and/or branched C_{1-6} alkyl groups, such as (3-, 4-, or 5-)isoxazolylcarbonyl, [3,5-dimethyl-4-isoxazolyl]carbonyl, [3-ethyl-(4- or 5-)

isoxazolyl]carbonyl, [4-*n*-propyl-(3- or 5-)isoxazolyl]carbonyl, [5-*n*-butyl-(3- or 4-)isoxazolyl]carbonyl, [3-*n*-pentyl-(4- or 5-)isoxazolyl]carbonyl, and [4-*n*-hexyl-(3- or 5-)isoxazolyl]carbonyl.

Examples of pyrazylcarbonyl groups include 2-pyrazylcarbonyl.

Examples of piperidinylcarbonyl groups optionally substituted on the piperidine ring with one or more members selected from the group consisting of a benzoyl group and lower alkanoyl groups include:

piperidinylcarbonyl groups optionally substituted on the piperidine ring with one to three members selected from the group consisting of a benzoyl group and the above-described straight and branched C_{1-6} alkanoyl groups;

such as (1-, 2-, 3-, or 4-)piperidinylcarbonyl, [1-acetyl-(2-, 3-, or 4-)piperidinyl]carbonyl, [1-benzoyl-(2-, 3-, or 4-)piperidinyl]carbonyl, [2-propionyl-(1-, 3-, 5-, or 6-)piperidinyl]carbonyl, [3-butyryl-(1-, 2-, 5-, or 6-)piperidinyl]carbonyl, [4-pentanoyl-(1-, 2-, or 3-)piperidinyl]carbonyl, [1-hexanoyl-(2-, 3-, or 4-)piperidinyl]carbonyl, [1-acetyl-4-benzoyl-(2-, 3-, 5-, or 6-)piperidinyl]carbonyl, and [1,2,4-triacetyl-(3-, 5-, or 6-)piperidinyl]carbonyl.

Examples of chromanylcarbonyl groups include 2-chromanylcarbonyl, 3-chromanylcarbonyl, 4-chromanylcarbonyl, 5-chromanylcarbonyl, 6-chromanylcarbonyl, 7-chromanylcarbonyl, and 8-chromanylcarbonyl.

Examples of isoindolinyl lower alkanoyl groups optionally substituted on the isoindoline ring with one or more oxo groups include:

isoindolinyl lower alkanoyl groups wherein the alkanoyl moiety is a straight or branched C_{2-6} alkanoyl group, optionally substituted on the isoindoline ring with one or two oxo groups;

such as 2-[(1-, 2-, 4-, or 5-)isoindolinyl]acetyl, 3-[(1-, 2-, 4-, or 5-)isoindolinyl]propionyl, 2-[(1-, 2-, 4-, or 5-)isoindolinyl]propionyl, 4-

[(1-, 2-, 4-, or 5-)isoindolinyl]butyryl, 5-[(1-, 2-, 4-, or 5-) isoindolinyl]pentanoyl, 6-[(1-, 2-, 4-, or 5-)isoindolinyl] hexanoyl, 2,2-dimethyl-3-[(1-, 2-, 4-, or 5-)isoindolinyl] propionyl, 2-methyl-3-[(1-, 2-, 4-, or 5-)isoindolinyl]propionyl, [1,3-dioxo-2-(2-, 4-, or 5-)isoindolinyl]acetyl, and [1-oxo-2-(2-, 3-, 4-, 5-, 6-, or 7-)isoindolinyl]acetyl.

Examples of thiazolidinyl lower alkanoyl groups optionally substituted on the thiazolidine ring with one or more members selected from the group consisting of an oxo group and a thioxo group include:

thiazolidinylalkanoyl groups wherein the alkanoyl moiety is a straight or branched C_{2-6} alkanoyl group, optionally substituted on the thiazolidine ring with one or two members selected from the group consisting of an oxo group and a thioxo group;

such as 2-[(2-, 3-, 4-, or 5-)thiazolidinyl]acetyl, 3-[(2-, 3-, 4-, or 5-)thiazolidinyl]propionyl, 2-[(2-, 3-, 4-, or 5-)thiazolidinyl]propionyl, 4-[(2-, 3-, 4-, or 5-)thiazolidinyl]butyryl, 5-[(2-, 3-, 4-, or 5-) thiazolidinyl]pentanoyl, 6-[(2-, 3-, 4-, or 5-)thiazolidinyl] hexanoyl, 2,2-dimethyl-3-[(2-, 3-, 4-, or 5-)thiazolidinyl] propionyl, 2-methyl-3-[(2-, 3-, 4-, or 5-)thiazolidinyl]propionyl, [2-thioxo-4-oxo-2-(3- or 5-)thiazolidinyl]acetyl, [2-thioxo-2-(3-, 4-, or 5-)thiazolidinyl]acetyl, [2-oxo-2-(3-, 4-, or 5-) thiazolidinyl]acetyl, [2,4-dithioxo-2-(3- or 5-)thiazolidinyl] acetyl, and [2,4-dioxo-2-(3- or 5-)thiazolidinyl]acetyl.

Examples of piperidinyl lower alkanoyl groups include piperidinylalkanoyl groups wherein the alkanoyl moiety is a straight or branched C_{2-6} alkanoyl group, such as 2-[(1-, 2-, 3-, or 4-)piperidinyl]acetyl, 3-[(1-, 2-, 3-, or 4-) piperidinyl]propionyl, 2-[(1-, 2-, 3-, or 4-)piperidinyl] propionyl, 4-[(1-, 2-, 3-, or 4-)piperidinyl]butyryl, 5-[(1-, 2-, 3- or 4-)piperidinyl]pentanoyl, 6-[(1-, 2-, 3-, or 4-) piperidinyl]hexanoyl, 2,2-dimethyl-3-[(1-, 2-, 3-, or 4-) piperidinyl]propionyl, and 2-methyl-3-[(1-, 2-, 3-, or 4-)

piperidinyl]propionyl.

Examples of phenyl lower alkenylcarbonyl groups optionally substituted on the phenyl ring with one or more halogen atoms include:

phenylalkenylcarbonyl groups containing one to three double bonds wherein the alkenyl moiety is a straight or branched C_{2-6} alkenyl group, optionally substituted on the phenyl ring with one to three halogen atoms;

such as styrylcarbonyl (trivial name: cinnamoyl group), 3-phenyl-2-propenylcarbonyl, 4-phenyl-2-butenylcarbonyl, 4-phenyl-3-butenylcarbonyl, 5-phenyl-4-pentenylcarbonyl, 5-phenyl-3-pentenylcarbonyl, 6-phenyl-5-hexenylcarbonyl, 6-phenyl-4-hexenylcarbonyl, 6-phenyl-3-hexenylcarbonyl, 4-phenyl-1,3-butadienylcarbonyl, 6-phenyl-1,3,5-hexatrienylcarbonyl, 2-chlorostyrylcarbonyl, 3-(4-bromophenyl)-2-propenylcarbonyl, 4-(3-fluorophenyl)-2-butenylcarbonyl, 4-(2,4-dichlorophenyl)-3-butenylcarbonyl, 5-(2,4,6-trifluorophenyl)-4-pentenylcarbonyl, 5-(4-iodophenyl)-3-pentenylcarbonyl, 6-(3-chlorophenyl)-5-hexenylcarbonyl, 6-(4-chlorophenyl)-4-hexenylcarbonyl, 6-(3,4-dichlorophenyl)-3-hexenylcarbonyl, 4-(3-chloro-4-fluorophenyl)-1,3-butadienylcarbonyl, and 6-(2,6-difluorophenyl)-1,3,5-hexatrienylcarbonyl.

Examples of phenyl lower alkenylcarbonyl groups optionally substituted on the phenyl ring with one or more lower alkylenedioxy groups include:

phenylalkenylcarbonyl groups containing one to three double bonds wherein the alkenyl moiety is a straight or branched C_{2-6} alkenyl group, optionally substituted on the phenyl ring with one or more of the above-described straight and branched C_{1-4} alkylenedioxy groups;

such as 3,4-methylenedioxystyrylcarbonyl, 3-(2,3-ethylenedioxyphenyl)-2-propenylcarbonyl, 4-(3,4-trimethylenedioxyphenyl)-2-butenylcarbonyl, 4-(2,3-tetramethylenedioxyphenyl)-3-butenylcarbonyl, 5-(2,3-methylenedioxyphenyl)-4-pentenylcarbonyl, 5-(3,4-

ethylenedioxyphenyl)-3-pentenylcarbonyl, 6-(2,3-trimethylenedioxyphenyl)-5-hexenylcarbonyl, 6-(3,4-tetramethylenedioxyphenyl)-4-hexenylcarbonyl, 6-(2,3-methylenedioxyphenyl)-3-hexenylcarbonyl, 4-(3,4-methylenedioxyphenyl)-1,3-butadienylcarbonyl, and 6-(2,3-methylenedioxyphenyl)-1,3,5-hexatrienylcarbonyl.

Examples of pyridyl lower alkenylcarbonyl groups include pyridylalkenylcarbonyl groups containing one to three double bonds wherein the alkenyl moiety is a straight or branched C_{2-6} alkenyl group, such as 2-[(2-, 3-, or 4-)pyridyl] vinylcarbonyl, 3-[(2-, 3-, or 4-)pyridyl]-2-propenylcarbonyl, 4-[(2-, 3-, or 4-)pyridyl]-2-butenylcarbonyl, 4-[(2-, 3-, or 4-) pyridyl]-3-butenylcarbonyl, 5-[(2-, 3- or 4-)pyridyl]-4-pentenyl carbonyl, 5-[(2-, 3-, or 4-)pyridyl]-3-pentenylcarbonyl, 6-[(2-, 3-, or 4-)pyridyl]-5-hexenylcarbonyl, 6-[(2-, 3-, or 4-) pyridyl]-4-hexenylcarbonyl, 6-[(2-, 3-, or 4-)pyridyl]-3-hexenylcarbonyl, 4-phenyl-1,3-butadienylcarbonyl, and 6-[(2-, 3-, or 4-)pyridyl]-1,3,5-hexatrienylcarbonyl.

Examples of pyridylthio lower alkanoyl groups include pyridylthioalkanoyl groups wherein the alkanoyl moiety is a straight or branched C_{2-6} alkanoyl group, such as 2-[(2-, 3-, or 4-)pyridylthio]acetyl, 3-[(2-, 3-, or 4-) pyridylthio]propionyl, 2-[(2-, 3-, or 4-)pyridylthio]propionyl, 4-[(2-, 3-, or 4-) pyridylthio]butyryl, 5-[(2-, 3-, or 4-) pyridylthio]pentanoyl, 6-[(2-, 3-, or 4-)pyridylthio]hexanoyl, 2,2-dimethyl-3-[(2-, 3-, or 4-)pyridylthio]propionyl, and 2-methyl-3-[(2-, 3-, or 4-)pyridylthio]propionyl.

Examples of indolylcarbonyl groups include 1-indolylcarbonyl, 2-indolylcarbonyl, 3-indolylcarbonyl, 4-indolylcarbonyl, 5-indolylcarbonyl, 6-indolylcarbonyl, and 7-indolylcarbonyl.

Examples of pyrrolylcarbonyl groups include 2-pyrrolylcarbonyl and 3-pyrrolylcarbonyl.

Examples of pyrrolidinylcarbonyl groups optionally substituted on the pyrrolidine ring with one or more oxo groups

include pyrrolidinylcarbonyl groups optionally substituted on the pyrrolidine ring with one or two oxo groups, such as (1-, 2-, or 3-)pyrrolidinylcarbonyl, 2-oxo-(1-, 3-, 4-, or 5-) pyrrolidinylcarbonyl, 3-oxo-(1-, 2-, 4-, or 5-)pyrrolidinyl carbonyl, 2,5-dioxo-(1- or 3-)pyrrolidinylcarbonyl, and 2,3-dioxo-(1-, 4-, or 5-)pyrrolidinyl carbonyl.

Examples of benzofurylcarbonyl groups include 2-benzofurylcarbonyl, 3-benzofurylcarbonyl, 4-benzofurylcarbonyl, 5-benzofurylcarbonyl, 6-benzofurylcarbonyl, and 7-benzofurylcarbonyl.

Examples of indolyl lower alkanoyl groups include indolylalkanoyl groups wherein the alkanoyl moiety is a straight or branched C_{2-6} alkanoyl group, such as 2-[(1-, 2-, 3-, 4-, 5-, 6-, or 7-)indolyl]acetyl, 3-[(1-, 2-, 3-, 4-, 5-, 6-, or 7-)indolyl]propionyl, 2-[(1-, 2-, 3-, 4-, 5-, 6-, or 7-)indolyl]propionyl, 4-[(1-, 2-, 3-, 4-, 5-, 6-, or 7-)indolyl]butyryl, 5-[(1-, 2-, 3-, 4-, 5-, 6-, or 7-)indolyl]pentanoyl, 6-[(1-, 2-, 3-, 4-, 5-, 6-, or 7-)indolyl]hexanoyl, 2,2-dimethyl-3-[(1-, 2-, 3-, 4-, 5-, 6-, or 7-)indolyl]propionyl, and 2-methyl-3-[(1-, 2-, 3-, 4-, 5-, 6-, or 7-)indolyl]propionyl.

Examples of benzothienylcarbonyl groups include 2-benzothienylcarbonyl, 3-benzothienylcarbonyl, 4-benzothienylcarbonyl, 5-benzothienylcarbonyl, 6-benzothienylcarbonyl, and 7-benzothienylcarbonyl.

Examples of phenyl lower alkanoyl groups optionally substituted on the phenyl ring with one or more halogen atoms include:

phenylalkanoyl groups wherein the alkanoyl moiety is a straight or branched C_{2-6} alkanoyl group, optionally substituted on the phenyl ring with one to three halogen atoms;

such as 2-phenylacetyl, 3-phenylpropionyl, 2-phenylpropionyl, 4-phenylbutyryl, 5-phenylpentanoyl, 6-phenylhexanoyl, 2,2-dimethyl-3-phenylpropionyl, 2-methyl-3-phenylpropionyl, 2-(4-fluorophenyl)acetyl, 3-(2,5-

difluorophenyl)propionyl, 2-(2,4-difluorophenyl)propionyl, 4-(3,4-difluorophenyl)butyryl, 5-(3,5-difluorophenyl)pentanoyl, 6-(2,6-difluorophenyl)hexanoyl, 2-(2-chlorophenyl)acetyl, 3-(3-chlorophenyl)propionyl, 2-(4-chlorophenyl)propionyl, 4-(2,3-dichlorophenyl)propionyl, 5-(2,4-dichlorophenyl)pentanoyl, 6-(2,5-dichlorophenyl)hexanoyl, 2-(3,4-dichlorophenyl)acetyl, 3-(2,6-dichlorophenyl)propionyl, 2-(3-fluorophenyl)propionyl, 4-(2-fluorophenyl)butyryl, 5-(3-bromophenyl)pentanoyl, 6-(4-iodophenyl)hexanoyl, 2-(2-bromophenyl)acetyl, 3-(4-bromophenyl) propionyl, 2-(3,5-dichlorophenyl)propionyl, 4-(2,4,6-trifluoro phenyl)butyryl, 5-(3,4-difluorophenyl)pentanoyl, 6-(2-iodophenyl) hexanoyl, 2-(3-iodophenyl)acetyl, 3-(4-iodophenyl)propionyl, 2-(2,3-dibromophenyl)propionyl, 4-(2,4-diiodophenyl)butyryl, and 2-(2,4,6-trichlorophenyl)acetyl.

Examples of phenylsulfonyl groups optionally substituted on the phenyl ring with one or more members selected from the group consisting of lower alkoxycarbonyl groups; a cyano group; a nitro group; amino groups optionally substituted with one or more lower alkanoyl groups; a hydroxy group; a carboxyl group; lower alkoxycarbonyl lower alkyl groups; halogen atoms; lower alkyl groups optionally substituted with one or more halogen atoms; and lower alkoxy groups optionally substituted with one or more halogen atoms include:

phenylsulfonyl groups optionally substituted on the phenyl ring with one to five members selected from the group consisting of the above-described lower alkoxycarbonyl groups wherein the alkoxy moiety is a straight or branched C_{1-6} alkoxy group; a cyano group; a nitro group; the above-described amino groups optionally substituted with one or two straight and/or branched C_{1-6} alkanoyl groups; a hydroxy group; a carboxyl group; the above-described alkoxycarbonylalkyl groups wherein the alkoxy moiety is a straight or branched C_{1-6} alkoxy group and the alkyl moiety is a straight or branched C_{1-6} alkyl group; halogen atoms; the above-described straight and branched C_{1-6} alkyl groups optionally substituted with one to three halogen atoms; and the

above-described straight and branched C_{1-6} alkoxy groups optionally substituted with one to three halogen atoms;

such as phenylsulfonyl, 4-methoxyphenylsulfonyl, 3-methoxyphenylsulfonyl, 2-methoxyphenylsulfonyl, 2-trifluoromethoxyphenylsulfonyl, 3-trifluoromethoxyphenylsulfonyl, 4-trifluoromethoxyphenylsulfonyl, 3,4-dimethoxyphenylsulfonyl, 2,5-dimethoxyphenylsulfonyl, 2,4,6-trimethoxyphenylsulfonyl, 4-*n*-butoxyphenylsulfonyl, 2-methoxy-5-chlorophenylsulfonyl, 2-methoxy-5-methylphenylsulfonyl, 2-methoxy-4-methylphenylsulfonyl, 4-chlorophenylsulfonyl, 3-chlorophenylsulfonyl, 2-chlorophenylsulfonyl, 4-fluorophenylsulfonyl, 3-fluorophenylsulfonyl, 2-fluorophenylsulfonyl, 4-bromophenylsulfonyl, 3-bromophenylsulfonyl, 2-bromophenylsulfonyl, 2,6-dichlorophenylsulfonyl, 2,3-dichlorophenylsulfonyl, 2,5-dichlorophenylsulfonyl, 2,4-dichlorophenylsulfonyl, 3,4-dichlorophenylsulfonyl, 3,5-dichlorophenylsulfonyl, 2-chloro-4-fluorophenylsulfonyl, 2-bromo-5-chlorophenylsulfonyl, 2,5-difluorophenylsulfonyl, 2,4-difluorophenylsulfonyl, 2,6-difluorophenylsulfonyl, 3,4-difluorophenylsulfonyl, 2,4-dichloro-5-methylphenylsulfonyl, 2,4,5-trifluorophenylsulfonyl, 2,3,4,5,6-pentafluorophenylsulfonyl, 3-chloro-4-fluorophenylsulfonyl, 2-chloro-6-methylphenylsulfonyl, 2,4-dichloro-6-methylphenylsulfonyl, 2-methyl-3-chlorophenylsulfonyl, 2-methyl-3-chlorophenylsulfonyl, 4-methyl-3-chlorophenylsulfonyl, 2-methyl-5-fluorophenylsulfonyl, 2-methyl-4-bromophenylsulfonyl, 2-fluoro-4-bromophenylsulfonyl, 2,5-dimethyl-4-chlorophenylsulfonyl, 2-methylphenylsulfonyl, 3-methylphenylsulfonyl, 4-methylphenylsulfonyl, 2,5-dimethylphenylsulfonyl, 2,4,6-trimethylphenylsulfonyl, 2,3,6-trimethyl-4-methoxyphenylsulfonyl, 4-*tert*-butylphenylsulfonyl, 4-ethylphenylsulfonyl, 4-isopropylphenylsulfonyl, 2-trifluoromethylphenylsulfonyl, 3-trifluoromethylphenylsulfonyl, 4-trifluoromethylphenylsulfonyl, 2-methoxycarbonylphenylsulfonyl, 2-cyanophenylsulfonyl, 3-cyanophenylsulfonyl, 4-cyanophenylsulfonyl, 3-nitrophenylsulfonyl, 2-nitrophenylsulfonyl, 4-nitrophenylsulfonyl, 3-nitro-4-

methylphenylsulfonyl, 3-nitro-6-methylphenylsulfonyl, 3-nitro-6-chlorophenylsulfonyl, 2-chloro-4-cyanophenylsulfonyl, 4-acetylaminophenylsulfonyl, 3-chloro-4-acetylaminophenylsulfonyl, 2-hydroxy-3,5-dichlorophenylsulfonyl, 2-hydroxyphenylsulfonyl, 3-hydroxyphenylsulfonyl, 4-hydroxyphenylsulfonyl, 2-nitro-4-methoxyphenylsulfonyl, 3-carboxyphenylsulfonyl, 4-carboxyphenylsulfonyl, 2-carboxyphenylsulfonyl, 4-(2-methoxycarbonylethyl)phenylsulfonyl, 3-carboxy-4-hydroxyphenylsulfonyl, 3-aminophenylsulfonyl, 2-aminophenylsulfonyl, and 4-aminophenylsulfonyl.

Examples of thienylsulfonyl groups optionally substituted on the thiophene ring with one or more members selected from the group consisting of halogen atoms and lower alkoxycarbonyl groups include:

thienylsulfonyl groups optionally substituted on the thiophene ring with one to three members selected from halogen atoms and the above-described alkoxycarbonyl groups wherein the alkoxy moiety is a straight or branched C_{1-6} alkoxy group;

such as (2- or 3-)thienylsulfonyl, [2-chloro-(3-, 4-, or 5-)thienyl]sulfonyl, [2,3-dichloro-(4- or 5-)thienyl]sulfonyl, [2,5-dichloro-(3- or 4-)thienyl]sulfonyl, [2-bromo-(3-, 4-, or 5-)thienyl]sulfonyl, [2-fluoro-(3-, 4-, or 5-)thienyl]sulfonyl, (2,3,4-trichloro-5-thienyl)sulfonyl, [2-methoxycarbonyl-(3-, 4-, or 5-)thienyl]sulfonyl, [3-ethoxycarbonyl-(2-, 4-, or 5-)thienyl]sulfonyl, [3-*n*-propoxycarbonyl-(2-, 4-, or 5-)thienyl]sulfonyl, [2-*tert*-butoxycarbonyl-(3-, 4-, or 5-)thienyl]sulfonyl, [2-*n*-pentyloxycarbonyl-(3-, 4-, or 5-)thienyl]sulfonyl, [3-*n*-hexyloxycarbonyl-(2-, 4-, or 5-)thienyl]sulfonyl, [2,3-dimethoxycarbonyl-(4- or 5-)thienyl]sulfonyl, and [2-chloro-3-methoxycarbonyl-(4- or 5-)thienyl]sulfonyl.

Examples of quinolylsulfonyl groups include 2-quinolylsulfonyl, 3-quinolylsulfonyl, 4-quinolylsulfonyl, 5-quinolylsulfonyl, 6-quinolylsulfonyl, 7-quinolylsulfonyl, and 8-quinolylsulfonyl.

Examples of imidazolylsulfonyl groups optionally substituted on the imidazole ring with one or more lower alkyl groups include imidazolylsulfonyl groups optionally substituted on the imidazole ring with one to three above-described straight and branched C_{1-6} alkyl groups, such as (1-, 2-, 4-, or 5-)imidazolylsulfonyl, [1-methyl-(2-, 4-, or 5-)imidazolyl]sulfonyl, [2-ethyl-(1-, 4-, or 5-)imidazolyl]sulfonyl, [1-isopropyl-(2-, 4-, or 5-)imidazolyl]sulfonyl, [4-*n*-butyl-(1-, 2-, or 5-)imidazolyl]sulfonyl, [5-*n*-pentyl-(1-, 2-, or 4-)imidazolyl]sulfonyl, [1-*n*-hexyl-(2-, 4-, or 5-)imidazolyl]sulfonyl, [1,2-dimethyl-(4- or 5-)imidazolyl]sulfonyl, and (1,2,4-trimethyl-5-imidazolyl)sulfonyl.

Examples of phenylsulfonyl groups optionally substituted on the phenyl ring with one or more lower alkylenedioxy groups include phenylsulfonyl groups optionally substituted on the phenyl ring with one or more one to three the above-described straight and branched C_{1-4} alkylenedioxy groups, such as (3,4-ethylenedioxyphenyl)sulfonyl, (2,3-methylenedioxyphenyl)sulfonyl, (3,4-trimethylenedioxyphenyl)sulfonyl, and (2,3-tetramethylenedioxyphenyl)sulfonyl.

Examples of lower alkenylsulfonyl groups include straight and branched C_{2-6} alkenylsulfonyl groups containing one to three double bonds, such as vinylsulfonyl, 1-propenylsulfonyl, 1-methyl-1-propenylsulfonyl, 2-methyl-1-propenylsulfonyl, 2-propenylsulfonyl, 2-butenylsulfonyl, 1-butenylsulfonyl, 3-butenylsulfonyl, 2-pentenylsulfonyl, 1-pentenylsulfonyl, 3-pentenylsulfonyl, 4-pentenylsulfonyl, 1, 3-butadienylsulfonyl, 1,3-pentadienylsulfonyl, 2-pentene-4-ynylsulfonyl, 2-hexenylsulfonyl, 1-hexenylsulfonyl, 5-hexenylsulfonyl, 3-hexenylsulfonyl, 4-hexenylsulfonyl, 3,3-dimethyl-1-propenylsulfonyl, 2-ethyl-1-propenylsulfonyl, 1,3,5-hexatrienylsulfonyl, 1,3-hexadienylsulfonyl, and 1,4-hexadienylsulfonyl.

Examples of cycloalkyl-substituted lower alkylsulfonyl

groups include C_{3-8} cycloalkyl-substituted alkylsulfonyl groups wherein the alkyl moiety is a straight or branched C_{1-6} alkyl group, such as cyclopropylmethylsulfonyl, cyclohexylmethylsulfonyl, 2-cyclopropylethylsulfonyl, 1-cyclobutylethylsulfonyl, cyclopentylmethylsulfonyl, 3-cyclopentylpropylsulfonyl, 4-cyclohexylbutylsulfonyl, 5-cycloheptylpentylsulfonyl, 6-cyclooctylhexylsulfonyl, 1,1-dimethyl-2-cyclohexylethylsulfonyl, and 2-methyl-3-cyclopropylpropylsulfonyl.

Examples of 3,4-dihydro-2H-1,4-benzoxazinylsulfonyl groups optionally substituted on the 3,4-dihydro-2H-1,4-benzoxazine ring with one or more lower alkyl groups include 3,4-dihydro-2H-1,4-benzoxazinylsulfonyl groups optionally substituted on the 3,4-dihydro-2H-1,4-benzoxazine ring with one to three above-described straight and/or branched C_{1-6} alkyl groups, such as (2-, 3-, 4-, 5-, 6-, 7- or 8-)3,4-dihydro-2H-1,4-benzoxazinylsulfonyl, [4-methyl-(2-, 3-, 5-, 6-, 7- or 8-)3,4-dihydro-2H-1,4-benzoxazinyl]sulfonyl, [5-ethyl-(2-, 3-, 4-, 6-, 7- or 8-)3,4-dihydro-2H-1,4-benzoxazinyl]sulfonyl, [6-*n*-propyl-(2-, 3-, 4-, 5-, 7- or 8-)3,4-dihydro-2H-1,4-benzoxazinyl]sulfonyl, [7-*n*-butyl-(2-, 3-, 5-, 6-, 7- or 8-)3,4-dihydro-2H-1,4-benzoxazinyl]sulfonyl, [8-*n*-pentyl-(2-, 3-, 5-, 6-, 7- or 8-)3,4-dihydro-2H-1,4-benzoxazinyl]sulfonyl, [2-*n*-hexyl-(3-, 4-, 5-, 6-, 7- or 8-)3,4-dihydro-2H-1,4-benzoxazinyl]sulfonyl, [3-methyl-(2-, 4-, 5-, 6-, 7- or 8-)3,4-dihydro-2H-1,4-benzoxazinyl]sulfonyl, [4,6-dimethyl-(2-, 3-, 5-, 7- or 8-)3,4-dihydro-2H-1,4-benzoxazinyl]sulfonyl, and [4,5,6-trimethyl-(2-, 3-, 7- or 8-)3,4-dihydro-2H-1,4-benzoxazinyl]sulfonyl.

Examples of pyrazolylsulfonyl groups optionally substituted on the pyrazole ring with one or more members selected from the group consisting of halogen atoms and lower alkyl groups include:

pyrazolylsulfonyl groups optionally substituted on the pyrazole ring with one to three members selected from the group consisting of halogen atoms and the above-described straight and

branched C_{1-6} alkyl groups;

such as (1-, 3-, 4-, or 5-)pyrazolylsulfonyl, (1,3-dimethyl-5-chloro-4-pyrazolyl)sulfonyl, [1-ethyl-(3-, 4-, or 5-)pyrazolyl]sulfonyl, [3-*n*-propyl-(1-, 4-, or 5-)pyrazolyl]sulfonyl, [4-*n*-butyl-(3-, 4-, or 5-)pyrazolyl]sulfonyl, [5-*n*-pentyl-(1-, 3-, or 4-)pyrazolyl]sulfonyl, [1-*n*-hexyl-(3-, 4-, or 5-)pyrazolyl]sulfonyl, [1,3-dimethyl-(4- or 5-)pyrazolyl]sulfonyl, (1,3,5-trimethyl-4-pyrazolyl)sulfonyl, [3-bromo-(1-, 4-, or 5-)pyrazolyl]sulfonyl, [4-fluoro-(1-, 3-, or 5-)pyrazolyl]sulfonyl, [5-iodo-(1-, 3-, or 4-)pyrazolyl]sulfonyl, [3,4-dichloro-(1- or 5-)pyrazolyl]sulfonyl, and (3,4,5-trichloro-4-pyrazolyl)sulfonyl.

Examples of isoxazolylsulfonyl groups optionally substituted on the isoxazole ring with one or more lower alkyl groups include isoxazolylsulfonyl groups optionally substituted on the isoxazole ring with one or two above-described straight and/or branched C_{1-6} alkyl groups, such as (3-, 4-, or 5-)isoxazolylsulfonyl, (3,5-dimethyl-4-isoxazolyl)sulfonyl, [3-methyl-(4- or 5-)isoxazolyl]sulfonyl, [3-ethyl-(4- or 5-)isoxazolyl]sulfonyl, [4-*n*-propyl-(3- or 5-)isoxazolyl]sulfonyl, [5-*n*-butyl-(3- or 4-)isoxazolyl]sulfonyl, [3-*n*-pentyl-(4- or 5-)isoxazolyl]sulfonyl, and [4-*n*-hexyl-(3- or 5-)isoxazolyl]sulfonyl.

Examples of thiazolylsulfonyl groups optionally substituted on the thiazole ring with one or more members selected from the group consisting of lower alkyl groups and an amino group, each amino substituent optionally being substituted with one or more lower alkanoyl groups, include:

thiazolylsulfonyl groups optionally substituted on the thiazole ring with one or two members selected from the group consisting of the above-described straight or branched C_{1-6} alkyl groups and the above-described amino groups optionally substituted with one or two straight and/or branched C_{1-6} alkanoyl groups;

such as (2-, 4-, or 5-)thiazolylsulfonyl, (2-acetylamino-4-methyl-5-thiazolyl)sulfonyl, [2-ethyl-(4- or 5-)

thiazolyl]sulfonyl, [4-*n*-propyl-(2- or 5-)thiazolyl]sulfonyl, [5-*n*-butyl-(2- or 4-)thiazolyl]sulfonyl, [2-*n*-pentyl-(4- or 5-)thiazolyl]sulfonyl, [4-*n*-hexyl-(2- or 5-)thiazolyl]sulfonyl, (2,4-dimethyl-5-thiazolyl)sulfonyl, [2-amino-(4- or 5-)thiazolyl]sulfonyl, [2-formylamino-(4- or 5-)thiazolyl]sulfonyl, [4-*n*-propionylamino-(2- or 5-)thiazolyl]sulfonyl, [5-*n*-butyryl amino-(2- or 4-)thiazolyl]sulfonyl, [2-*n*-pentanoylamino-(4- or 5-)thiazolyl]sulfonyl, [4-*n*-hexanoylamino-(2- or 5-)thiazolyl]sulfonyl, (2,4-diacetyl-5-thiazolyl)sulfonyl, and [2-(*N*,*N*-diacetylamino)-(4- or 5-)thiazolyl]sulfonyl.

Examples of phenyl lower alkylsulfonyl groups include mono- and di-phenylalkyl groups wherein the alkyl moiety is a straight or branched C_{1-6} alkyl group, such as benzylsulfonyl, 1-phenethylsulfonyl, 2-phenethylsulfonyl, 3-phenylpropylsulfonyl, 2-phenylpropylsulfonyl, 4-phenylbutylsulfonyl, 5-phenylpentylsulfonyl, 4-phenylpentylsulfonyl, 6-phenylhexylsulfonyl, 2-methyl-3-phenylpropylsulfonyl, 1,1-dimethyl-2-phenylethylsulfonyl, 1,1-dimethyl-1-phenylmethylsulfonyl, 1,1-diphenylmethylsulfonyl, 2,2-diphenylethylsulfonyl, 3,3-diphenylpropylsulfonyl, and 1,2-diphenylethylsulfonyl.

Examples of phenyl lower alkenylsulfonyl groups include:

phenylalkenylsulfonyl groups containing one to three double bonds wherein the alkenyl moiety is a straight or branched C_{2-6} alkenyl group, optionally substituted on the phenyl ring with one to three halogen atoms;

such as styrylsulfonyl, 3-phenyl-2-propenylsulfonyl, 4-phenyl-2-butenylsulfonyl, 4-phenyl-3-butenylsulfonyl, 5-phenyl-4-pentenylsulfonyl, 5-phenyl-3-pentenylsulfonyl, 6-phenyl-5-hexenylsulfonyl, 6-phenyl-4-hexenylsulfonyl, 6-phenyl-3-hexenylsulfonyl, 4-phenyl-1,3-butadienylsulfonyl, 6-phenyl-1,3,5-hexatrienylsulfonyl, 2-chlorostyrylsulfonyl, 3-(4-bromophenyl)-2-propenylsulfonyl, 4-(3-fluorophenyl)-2-butenylsulfonyl, 4-(2,4-dichlorophenyl)-3-butenylsulfonyl, 5-(2,4,6-trifluorophenyl)-4-

pentenylsulfonyl, 5-(4-iodophenyl)-3-pentenylsulfonyl, 6-(3-chlorophenyl)-5-hexenylsulfonyl, 6-(4-chlorophenyl)-4-hexenylsulfonyl, 6-(3,4-dichlorophenyl)-3-hexenylsulfonyl, 4-(3-chloro-4-fluorophenyl)-1, 3-butadienylsulfonyl, and 6-(2,6-difluorophenyl)-1,3,5-hexatrienylsulfonyl.

Examples of naphthyloxycarbonyl groups include 1-naphthyloxycarbonyl and 2-naphthyloxycarbonyl.

Examples of lower alkynyloxycarbonyl groups include alkynyloxycarbonyl groups wherein the alkynyl moiety is a straight or branched C_{2-6} alkynyl group, such as ethynyloxycarbonyl, 2-propynyloxycarbonyl, 2-butynyloxycarbonyl, 3-butynyloxycarbonyl, 1-methyl-2-propynyloxycarbonyl, 2-pentynyloxycarbonyl, and 2-hexynyloxycarbonyl.

Examples of lower alkenyloxycarbonyl groups include alkenyloxycarbonyl groups containing one to three double bonds wherein the alkenyl moiety is a straight or branched C_{2-6} alkenyl group, such as vinyloxycarbonyl, 1-propenyloxycarbonyl, 1-methyl-1-propenyloxycarbonyl, 2-methyl-1-propenyloxycarbonyl, 2-propenyloxycarbonyl, 2-butenyloxycarbonyl, 1-butenyloxycarbonyl, 3-butenyloxycarbonyl, 2-pentenyloxycarbonyl, 1-pentenyloxycarbonyl, 3-pentenyloxycarbonyl, 4-pentenyloxycarbonyl, 1,3-butadienyloxycarbonyl, 1,3-pentadienyloxycarbonyl, 2-pentene-4-ynyloxycarbonyl, 2-hexenyloxycarbonyl, 1-hexenyloxycarbonyl, 5-hexenyloxycarbonyl, 3-hexenyloxycarbonyl, 4-hexenyloxycarbonyl, 3,3-dimethyl-1-propenyloxycarbonyl, 2-ethyl-1-propenyloxycarbonyl, 1,3,5-hexatrienyloxycarbonyl, 1,3-hexadienyloxycarbonyl, and 1,4-hexadienyloxycarbonyl.

Examples of phenyl lower alkoxy-substituted lower alkoxycarbonyl groups include phenylalkoxy-substituted alkoxycarbonyl groups wherein each of the two alkoxy moieties is a straight or branched C_{1-6} alkoxy group, such as phenylmethoxymethoxycarbonyl, 2-(phenylmethoxy)ethoxycarbonyl, 1-(phenylmethoxy)ethoxycarbonyl, 3-(phenylmethoxy)propoxycarbonyl, 4-(phenylmethoxy)butoxycarbonyl, 5-(phenylmethoxy) pentyloxycarbonyl, 6-(phenylmethoxy)hexyloxycarbonyl, 1,1-

dimethyl-2-(phenylmethoxy)ethoxycarbonyl, 2-methyl-3-(phenylmethoxy)propoxycarbonyl, 1-(2-phenylethoxy)ethoxycarbonyl, 2-(1-phenylethoxy)ethoxycarbonyl, 3-(3-phenylpropoxy)propoxy carbonyl, 4-(4-phenylbutoxy)butoxycarbonyl, 5-(5-phenylpentyloxy) pentyloxycarbonyl, 6-(6-phenylhexyloxy)hexyloxycarbonyl, (1,1-dimethyl-2-phenylethoxy)methoxycarbonyl, and 3-(2-methyl-3-phenylpropoxy)propoxycarbonyl.

Examples of cycloalkyloxycarbonyl groups optionally substituted on the cycloalkyl ring with one or more lower alkyl groups include:

cycloalkyloxycarbonyl groups wherein the cycloalkoxy moiety is a C_{3-8} cycloalkoxy group, optionally substituted on the cycloalkyl ring with one to three above-described straight and branched C_{1-6} alkyl groups;

such as cyclopropyloxycarbonyl, cyclobutyloxycarbonyl, cyclopentyloxycarbonyl, cyclohexyloxycarbonyl, cycloheptyloxycarbonyl, cyclooctyloxycarbonyl, 3-methyl-6-isopropylcyclohexyloxycarbonyl, 2-ethylcyclopropyloxycarbonyl, 2-*n*-propylcyclobutyloxycarbonyl, 3-*n*-butylcycloheptyloxycarbonyl, 3-*n*-pentylcyclooctyloxycarbonyl, 2-methylcyclopentyloxycarbonyl, and 2,3,6-trimethylcyclohexyloxycarbonyl.

Examples of isoxazolyl groups optionally substituted on the isoxazole ring with one or more lower alkyl groups include isoxazolyl groups optionally substituted on the isoxazole ring with one or two straight and/or branched C_{1-6} alkyl groups, such as (3-, 4-, or 5-)isoxazolyl, 5-methyl-(3- or 4-) isoxazolyl, 3,5-dimethyl-4-isoxazolyl, 3-ethyl-(4- or 5-) isoxazolyl, 4-*n*-propyl-(3- or 5-)isoxazolyl, 5-*n*-butyl-(3- or 4-) isoxazolyl, 3-*n*-pentyl-(4- or 5-)isoxazolyl and 4-*n*-hexyl-(3- or 5-)isoxazolyl.

Examples of 5- to 7-membered saturated heterocyclic rings formed from R^6 and R^7 being linked together, together with the nitrogen atom to which they are bound, the heterocyclic ring optionally containing one or more additional heteroatoms, include:

5- to 7-membered saturated heterocyclic rings formed from R^6 and R^7 being linked together, together with the nitrogen atom to which they are bound, the heterocyclic group optionally containing one or more additional heteroatoms selected from oxygen, sulfur atom, and nitrogen atom;

such as pyrrolidine, piperazine, piperidine, morpholine, thiomorpholine, homopiperazine, homopiperidine, imidazolidine, thiazolidine, isothiazolidine, oxazolidine, isoxazolidine, isothiazolidine, and pyrazolidine.

Examples of phenyl groups optionally substituted on the phenyl ring with one or more members selected from the group consisting of halogen atoms; lower alkoxy groups optionally substituted with one or more halogen atoms; lower alkyl groups optionally substituted with one or more halogen atoms; a cyano group; and a hydroxy group include:

phenyl groups optionally substituted on the phenyl ring with one to three members selected from the group consisting of halogen atoms; the above-described straight and branched C_{1-6} alkoxy groups optionally substituted with one to three halogen atoms; the above-described straight and branched C_{1-6} alkyl groups optionally substituted with one to three halogen atoms; a cyano group; and a hydroxy group;

such as phenyl, 4-isopropylphenyl, 3-isopropylphenyl, 2-isopropylphenyl, 4-*tert*-butylphenyl, 4-methylphenyl, 3-methylphenyl, 2-methylphenyl, 2,3-dimethylphenyl, 2,4-dimethylphenyl, 3,5-dimethylphenyl, 2,4,6-trimethylphenyl, 4-methyl-3-methoxyphenyl, 4-trifluoromethylphenyl, 3-trifluoromethylphenyl, 2-trifluoromethylphenyl, 4-methyl-3-chlorophenyl, 4-chlorophenyl, 3-chlorophenyl, 2-chlorophenyl, 2-fluorophenyl, 3-fluorophenyl, 4-fluorophenyl, 3-bromophenyl, 3,4-dichlorophenyl, 3,5-dichlorophenyl, 3,4,5-trichlorophenyl, 2,4,6-trifluorophenyl, 3,5-difluorophenyl, 3-chloro-4-fluorophenyl, 2-chloro-5-fluorophenyl, 3-fluoro-4-methoxyphenyl, 3-chloro-4-methoxyphenyl, 3-chloro-4-hydroxyphenyl, 4-methoxyphenyl, 3-methoxyphenyl, 2-methoxyphenyl, 2,4-dimethoxyphenyl, 3,4-

dimethoxyphenyl, 2,4,6-trimethoxyphenyl, 2-methoxy-5-chlorophenyl, 4-ethoxyphenyl, 4-trifluoromethoxyphenyl, 3-trifluoromethoxyphenyl, 2-trifluoromethoxyphenyl, 3-methoxy-5-trifluoromethyl phenyl, 2-cyanophenyl, 3-cyanophenyl, 4-cyanophenyl, 3-hydroxyphenyl, 2-hydroxyphenyl, and 4-hydroxyphenyl.

Examples of phenyl lower alkyl groups optionally substituted on the phenyl ring with one or more halogen atoms include:

mono- and di-phenylalkyl groups wherein the alyl moiety is a straight or branched C_{1-6} alkyl group, optionally substituted on each phenyl ring with one to three halogen atoms;

such as benzyl, 1-phenethyl, 2-phenethyl, 3-phenylpropyl, 2-phenylpropyl, 4-phenylbutyl, 5-phenylpentyl, 4-phenylpentyl, 6-phenylhexyl, 2-methyl-3-phenylpropyl, 1,1-dimethyl-2-phenylethyl, 1,1-diphenylmethyl, 2,2-diphenylethyl, 3,3-diphenylpropyl, 1,2-diphenylethyl, 4-chlorobenzyl, 2-chlorobenzyl, 3-chlorobenzyl, 2-fluorobenzyl, 3-fluorobenzyl, 4-fluorobenzyl, 2,3-dichlorobenzyl, and 2,4,6-trifluorobenzyl.

Examples of phenyl lower alkoxy groups optionally substituted on the phenyl ring with one or more halogen atoms include:

phenylalkoxy groups wherein the alkoxy moiety is a straight or branched C_{1-6} alkoxy group, optionally substituted on the phenyl ring with one to three halogen atoms;

such as benzyloxy, 2-phenylethoxy, 1-phenylethoxy, 3-phenylpropoxy, 4-phenylbutoxy, 5-phenylpentyloxy, 6-phenylhexyloxy, 1,1-dimethyl-2-phenylethoxy, 2-methyl-3-phenylpropoxy, 4-chlorobenzyloxy, 2-chlorobenzyloxy, 3-chlorobenzyloxy, 2-fluorobenzyloxy, 3-fluorobenzyloxy, 4-fluorobenzyloxy, 2,4-dibromobenzyloxy, and 2,4,6-trifluorobenzyloxy.

Examples of carbamoyl lower alkyl groups optionally substituted with one or more members selected from the group consisting of phenyl group and lower alkyl groups include:

carbamoylalkyl groups wherein the alkyl moiety is a straight or branched C_{1-6} alkyl group, optionally substituted with one or two members selected from the group consisting of a phenyl group and the above-described straight and branched C_{1-6} alkyl groups;

such as carbamoylmethyl, 2-carbamoylethyl, 1-carbamoylethyl, 3-carbamoylpropyl, 4-carbamoylbutyl, 5-carbamoylpentyl, 6-carbamoylhexyl, 1,1-dimethyl-2-carbamoylethyl, 2-methyl-3-carbamoylpropyl, 2-(*N*-methyl-*N*-phenylcarbamoyl)ethyl, *N*-phenylcarbamoylmethyl, 2-(*N*,*N*-dimethylcarbamoyl)ethyl, 3-(*N*-phenylcarbamoyl)propyl, 2-(*N*-ethyl-*N*-phenylcarbamoyl)ethyl, *N*,*N*-dimethylcarbamoylmethyl, *N*-methyl-*N*-ethylcarbamoylmethyl, *N*-methylcarbamoylmethyl, and 2-(*N*-methylcarbamoyl)ethyl.

Examples of phenyl lower alkylidene groups optionally substituted on the phenyl ring with one or more halogen atoms include:

phenylalkylidene groups wherein the alkylidene moiety is a straight or branched C_{1-6} alkylidene group, optionally substituted on the phenyl ring with one to three halogen atoms;

such as phenylmethylidene, phenylethylidene, phenylpropylidene, phenylisopropylidene, phenylbutylidene, phenylpentylidene, phenylhexylidene, 2-chlorophenylmethylidene, 3-chlorophenylmethylidene, 4-chlorophenylmethylidene, 2-fluorophenylmethylidene, 3-fluorophenylmethylidene, 4-fluorophenylmethylidene, 2-bromophenylmethylidene, 3-bromophenylmethylidene, 4-bromophenylmethylidene, 2-iodophenylmethylidene, 2,3-dichlorophenylmethylidene, 2,4-difluorophenylmethylidene, 2,4,6-trichlorophenylmethylidene, 2,3,5-trifluorophenylmethylidene, and 2-fluoro-4-chlorophenylmethylidene.

Examples of phenyl lower alkoxycarbonyl groups include phenylalkoxycarbonyl groups wherein the alkoxy moiety is a straight or branched C_{1-6} alkoxy group, such as benzyloxycarbonyl, 2-phenylethoxycarbonyl, 1-phenylethoxycarbonyl, 3-phenylpropoxy carbonyl, 4-phenylbutoxycarbonyl, 5-phenylpentyloxycarbonyl, 6-

phenylhexyloxycarbonyl, 1,1-dimethyl-2-phenylethoxycarbonyl, and 2-methyl-3-phenylpropoxycarbonyl.

Examples of pyridyl groups optionally substituted on the pyridine ring with one or more members selected from the group consisting of a cyano group and lower alkyl groups include;

pyridyl groups optionally substituted on the pyridine ring with one to three members selected from the group consisting of a cyano group and the above-described straight and branched C_{1-6} alkyl groups;

such as (2-, 3-, or 4-)pyridyl, 2-methyl-(3-, 4-, 5-, or 6-)pyridyl, 3-methyl-(2-, 4-, 5-, or 6-)pyridyl, 4-methyl-(2- or 3-)pyridyl, 2-cyano-(3-, 4-, 5-, or 6-)pyridyl, 3-cyano-(2-, 4-, 5-, or 6-)pyridyl, 4-cyano-(2- or 3-)pyridyl, 2,3-dimethyl-(4-, 5-, or 6-)pyridyl, 3,4,5-trimethyl-(2- or 6-)pyridyl, 2,4-dicyano-(3-, 5-, or 6-)pyridyl, 2,4,5-tricyano-(3- or 6-)pyridyl, and 2-methyl-4-cyano-(3-, 5-, or 6-)pyridyl.

Examples of 1,3-dioxolanyl lower alkyl groups include 1,3-dioxolanylalkyl groups wherein the alkyl moiety is a straight or branched C_{1-6} alkyl group, such as [(2- or 4-)1,3-dioxolanyl]methyl, 2-[(2- or 4-)1,3-dioxolanyl]ethyl, 1-[(2- or 4-)1,3-dioxolanyl]ethyl, 3-[(2- or 4-)1,3-dioxolanyl]propyl, 4-[(2- or 4-)1,3-dioxolanyl]butyl, 1,1-dimethyl-2-[(2- or 4-)1,3-dioxolanyl]ethyl, 5-[(2- or 4-)1,3-dioxolanyl]pentyl, 6-[(2- or 4-)1,3-dioxolanyl]hexyl, 1-[(2- or 4-)1,3-dioxolanyl]isopropyl, and 2-methyl-3-[(1-, 2-, or 4-)1,3-dioxolanyl]propyl.

Examples of 5- to 8-membered saturated heterocyclic rings formed from R^8 and R^9 being linked together, together with the nitrogen atom to which they are bound, the heterocyclic ring optionally containing one or more additional heteroatoms, include:

5- to 8-membered saturated heterocyclic rings formed from R^8 and R^9 being linked together, together with the nitrogen atom to which they are bound, the heterocyclic ring optionally containing one or more additional heteroatoms selected from

oxygen, nitrogen, and sulfur atom;

such as pyrrolidine, piperazine, piperidine, morpholine, thiomorpholine, imidazolidine, thiazolidine, isothiazolidine, oxazolidine, isoxazolidine, isothiazolidine, pyrazolidine, perhydroazepine, and perhydroazocine.

Examples of octahydropyrrolo[1,2-*a*]pyrazinyl groups optionally substituted on the pyrazine ring with one or more lower alkyl groups include octahydropyrrolo[1,2-*a*]pyrazinyl groups optionally substituted on the pyrazine ring with one to three straight and/or branched C_{1-6} alkyl groups.

Examples of 8-azabicyclo[3.2.1]octyl groups optionally substituted on the 8-azabicyclo[3.2.1]octyl group with one or more phenoxy groups, each phenoxy substituent optionally being substituted on the phenyl ring with one or more halogen atoms, include 8-azabicyclo[3.2.1]octyl groups optionally substituted on the 8-azabicyclo[3.2.1]octyl group with one to three phenoxy groups, each phenoxy substituent optionally being substituted on the phenyl ring with one to three halogen atoms.

Examples of 5- or 6-membered saturated heterocyclic rings formed from R^{11} and R^{12}, or R^{13} and R^{14} being linked together, together with the nitrogen atom to which they are bound, the heterocyclic ring optionally containing one or more additional heteroatoms, include:

5- or 6-membered saturated heterocyclic rings formed from R^{11} and R^{12}, or R^{13} and R^{14} being linked together, together with the nitrogen atom to which they are bound, the heterocyclic ring optionally containing one or more additional heteroatoms selected from oxygen, nitrogen, and sulfur atom;

such as pyrrolidine, piperazine, piperidine, morpholine, thiomorpholine, imidazolidine, thiazolidine, isothiazolidine, oxazolidine, isoxazolidine, isothiazolidine, and pyrazolidine.

Examples of phenyl groups optionally substituted on the phenyl ring with one or more members selected from the group consisting of lower alkyl groups optionally substituted with one or more halogen atoms; lower alkylthio groups; lower alkoxy

groups optionally substituted with one or more halogen atoms; halogen atoms; a phenyl group; lower alkylamino groups; a cyano group; a phenoxy group; cycloalkyl groups; pyrrolidinyl groups optionally substituted with one or more oxo groups; 1,2,3,4-tetrahydroisoquinolylcarbonyl groups; 1,2,3,4-tetrahydroquinolylcarbonyl groups optionally substituted with one or more lower alkyl groups; 1,2,3,4-tetrahydroquinoxalinylcarbonyl groups optionally substituted with one or more lower alkyl groups; thiazolyl groups optionally substituted with one or more phenyl groups; a carbamoyl group; phenyl lower alkoxy groups; lower alkylsulfonylamino groups; anilino groups optionally substituted with one or more halogen atoms; phenyl lower alkyl groups; and hydroxy-substituted lower alkyl groups include:

phenyl groups optionally substituted on the phenyl ring with one to three members selected from the group consisting of straight and branched C_{1-6} alkyl groups optionally substituted with one to three halogen atoms; straight and branched C_{1-6} alkylthio groups; straight and branched C_{1-6} alkoxy groups optionally substituted with one to three halogen atoms; halogen atoms; a phenyl group; amino groups optionally substituted with one or two straight and/or branched C_{1-6} alkyl groups; a cyano group; a phenoxy group; C_{3-8} cycloalkyl groups; pyrrolidinyl groups optionally substituted with one or two oxo groups; 1,2,3,4-tetrahydroisoquinolylcarbonyl groups; 1,2,3,4-tetrahydroquinolylcarbonyl groups optionally substituted with one to three straight and/or branched C_{1-6} alkyl groups; 1,2,3,4-tetrahydroquinoxalinylcarbonyl groups optionally substituted with one to three straight and/or branched C_{1-6} alkyl groups; thiazolyl groups optionally substituted with one to three phenyl groups; a carbamoyl group; phenyl alkoxy groups wherein the alkoxy moiety is a straight or branched C_{1-6} alkoxy group; straight and branched C_{1-6} alkylsulfonylamino groups; anilino groups optionally substituted with one to three halogen atoms; phenyl alkyl groups wherein the alkyl moiety is a straight or branched C_{1-6} alkyl

group; and hydroxy-substituted alkyl groups wherein the alkyl moiety is a straight or branched C_{1-6} alkyl group, substituted with one to three hydroxy groups;

such as (2-, 3-, or 4-)trifluoromethylphenyl, (2-, 3-, or 4-)methylthiophenyl, (2-, 3-, or 4-) trifluoromethoxyphenyl, (2-, 3-, or 4-)ethylphenyl, (2-, 3-, or 4-)propylphenyl, (2-, 3-, or 4-)butylphenyl, (2-, 3-, or 4-)pentylphenyl, (2-, 3-, or 4-)hexylphenyl, (2-, 3-, or 4-)isopropylphenyl, (2-, 3-, or 4-)chlorophenyl, (2-, 3-, or 4-)fluorophenyl, (2-, 3-, or 4-)phenylphenyl, (2-, 3-, or 4-)dimethylaminophenyl, (2-, 3-, or 4-)cyanophenyl, (2-, 3-, or 4-)phenyloxyphenyl, (3,4-, 2,3-, 2,6-, or 3,5-) dimethylphenyl, (3,4-, 2,3-, 2,6-, or 3,5-)difluorophenyl, 2-chloro-4-methylphenyl, (2-, 3-, or 4-)cyclohexylphenyl, (2-, 3-, or 4-)benzyloxyphenyl, (2-, 3-, or 4-) methylsulfonylaminophenyl, (2-, 3- or 4-)anilinophenyl, (3,4-, 2,3-, 2,6- or 3,5-)dimethoxyphenyl, 3-chloro-4-methoxyphenyl, 3-chloro-4-methylphenyl, 3-methoxy-5-trifluoromethylphenyl, 2-chloro-5-trifluoromethylphenyl, 2-chloro-6-cyanophenyl, 2-chloro-5-carbamoylphenyl, (2-, 3-, or 4-)phenylmethylphenyl, (2-, 3-, or 4-)pyrrolidinylphenyl, (2-, 3-, or 4-)[(1-, 2-, 3-, or 4-) (1,2,3,4-tetrahydroisoquinolylcarbonyl)]phenyl, (2-, 3-, or 4-) [(1-, 2-, 3-, or 4-)(6-methyl-1,2,3,4-tetrahydroquinolyl carbonyl)]phenyl, (2-, 3-, or 4-)(4-fluoroanilino)phenyl, (2-, 3- or 4-)[4-methyl-1-(1,2,3,4-tetrahydroquinoxalinyl)carbonyl]phenyl, and (2-, 3-, or 4-) [(4- or 5-) phenylthiazolyl-2-yl]phenyl.

Examples of phenyl lower alkyl groups optionally substituted on the phenyl ring with one or more members selected from the group consisting of lower alkyl groups optionally substituted with one or more halogen atoms; lower alkoxy groups optionally substituted with one or more halogen atoms; halogen atoms; and a phenyl group include:

phenyl alkyl groups wherein the alkyl moiety is a straight or branched C_{1-6} alkyl group, optionally substituted on the phenyl ring with one to three members selected from the group

consisting of straight and branched C_{1-6} alkyl groups optionally substituted with one to three halogen atoms; straight and branched C_{1-6} alkoxy groups optionally substituted with one to three halogen atoms; halogen atoms; and a phenyl group;

such as benzyl, 1-phenethyl, 2-phenethyl, 3-phenylpropyl, 2-phenylpropyl, 4-phenylbutyl, 5-phenylpentyl, 4-phenylpentyl, 6-phenylhexyl, 2-methyl-3-phenylpropyl, 1,1-dimethyl-2-phenylethyl, 1,1-diphenylmethyl, 2,2-diphenylethyl, 3,3-diphenylpropyl, 1,2-diphenylethyl, 4-chlorobenzyl, 2-chlorobenzyl, 3-chlorobenzyl, 3-fluorobenzyl, 4-fluorobenzyl, (2- or 4-)bromobenzyl, 2,3-dichlorobenzyl, 2,4-dichlorobenzyl, 3-chloro-4-fluorobenzyl, 2,4,6-trifluorobenzyl, 3-trifluoromethylbenzyl, 4-trifluoromethylbenzyl, 2-methylbenzyl, 3-methylbenzyl, 4-methylbenzyl, 4-*tert*-butylbenzyl, 2,4-dimethylbenzyl, 2,4,6-trimethylbenzyl, 2-phenylbenzyl, 3-phenylbenzyl, 4-phenylbenzyl, 2,4-diphenylbenzyl, 2,4,6-triphenylbenzyl, 2-trifluoromethoxybenzyl, 3-trifluoromethoxybenzyl, 4-trifluoromethoxybenzyl, 3-chloro-4-difluoromethoxybenzyl, 4-chloro-3-trifluoromethylbenzyl, 2-methoxybenzyl, 3-methoxybenzyl, 4-methoxybenzyl, 3,4-dimethoxybenzyl, 3,4,5-trimethoxybenzyl, 2-(4-methoxyphenyl)ethyl, 2-(2-methoxyphenyl)ethyl, and 2-(4-chlorophenyl)ethyl.

Examples of lower alkyl-substituted amino lower alkyl groups include:

aminoalkyl groups wherein the alkyl moiety is a straight or branched C_{1-6} alkyl group, having on the amino group one or two straight and/or branched C_{1-6} alkyl groups;

such as *N*-methylaminomethyl, *N,N*-diethylaminomethyl, *N,N*-di-*n*-propylaminoethyl, *N,N*-diisopropylaminoethyl, 3-(*N,N*-dimethylamino)propyl, 4-(*N,N*-dimethylamino)butyl, 5-(*N,N*-dimethylamino)pentyl, and 6-(*N,N*-dimethylamino)hexyl.

Examples of pyrazinyl lower alkyl groups optionally substituted on the pyrazine ring with one or more lower alkyl groups include:

pyrazinylalkyl groups wherein the alkyl moiety is a

straight or branched C_{1-6} alkyl group, optionally substituted on the pyrazine ring with one to three straight and/or branched C_{1-6} alkyl groups;

such as (2- or 3-)pyrazinylmethyl, (1- or 2-)(2- or 3-pyrazinyl)ethyl, 3-(2- or 3-)pyrazinylpropyl, 4-(2- or 3-)pyrazinylbutyl, 5-(2- or 3-)pyrazinylpentyl, 6-(2- or 3-)pyrazinylhexyl, 2-methyl-5-pyrazinylmethyl, (1- or 2-)(2-methyl-5-pyrazinyl)ethyl, 3-(2-methyl-5-pyrazinyl)propyl, 4-(2-ethyl-5-pyrazinyl)butyl, 5-(2-ethyl-5-pyrazinyl)pentyl, and 6-(2-methyl-5-pyrazinyl)hexyl.

Examples of pyrazolyl lower alkyl groups optionally substituted on the pyrazoline ring with one or more lower alkyl groups include:

pyrazolylalkyl groups wherein the alkyl moiety is a straight or branched C_{1-6} alkyl group, optionally substituted on the pyrazoline ring with one to three straight and/or branched C_{1-6} alkyl groups;

such as (3-, 4-, or 5-)pyrazolylmethyl, (1- or 2-)(3-, 4-, or 5-)pyrazolylethyl, 3-(3-, 4-, or 5-)pyrazolylpropyl, 4-(3-, 4-, or 5-)pyrazolylbutyl, 5-(3-, 4-, or 5-)pyrazolylpentyl, 6-(3-, 4-, or 5-)pyrazolylhexyl, [1-methyl-(3-, 4-, or 5-)pyrazolyl]methyl, [1,5-dimethyl-(3- or 4-)pyrazolyl]methyl, and [1,5-dimethyl-(3- or 4-)pyrazolyl]ethyl.

Examples of piperidinyl groups optionally substituted on the piperidine ring with one or more members selected from the group consisting of lower alkyl groups; a benzoyl group; and phenyl lower alkyl groups optionally substituted on the phenyl ring with one or more members selected from halogen atoms and lower alkyl groups include:

piperidinyl groups optionally substituted on the piperidine ring with one to three members selected from the group consisting of straight and branched C_{1-6} alkyl groups; a benzoyl group; and phenyl lower alkyl groups wherein the alkyl moiety is a straight or branched C_{1-6} alkyl group, optionally substituted on the phenyl ring with one to three members selected from the group

consisting of halogen atoms and straight and branched C_{1-6} alkyl groups;

such as , *N*-methyl-(2-, 3-, or 4-)piperidinyl, *N*-ethyl-(2-, 3-, or 4-)piperidinyl, *N*-*n*-propyl-(2-, 3-, or 4-)piperidinyl, *N*-benzoyl-(2-, 3-, or 4-)piperidinyl, 1-benzyl-4-piperidinyl, 1-phenylethyl-4-piperidinyl, 1-(2-, 3-, or 4-)chlorophenylmethyl-4-piperidinyl, and 1-(2-, 3-, or 4-)methylphenylmethyl-4-piperidinyl, 1,2,3-trimethyl-(4-, 5-, or 6-)piperidinyl, 1-benzyl-3-methyl-(2- ,4-, 5-,or 6-)piperidinyl, and 1-benzoyl-2-benzyl-(3-, 4-, 5-, or 6-)piperidinyl.

Examples of 3,4-dihydrocarbostyril groups optionally substituted with one or more lower alkyl groups include 3,4-dihydrocarbostyril groups optionally substituted with one to three straight and/or branched C_{1-6} alkyl groups, such as 3,4-dihydro-(5-, 6-, 7-, or 8-)carbostyril and (6-, 7-, or 8-)methyl-3,4-dihydro-5-carbostyril.

Examples of quinolyl groups optionally substituted with one or more lower alkyl groups include quinolyl groups optionally substituted with one to three straight and/or branched C_{1-6} alkyl groups, such as (2-, 3-, 4-, 5-, 6-, 7- or 8-)quinolyl and 2-methyl-4-quinolyl.

Examples of carbazolyl groups optionally substituted with one or more lower alkyl groups include carbazolyl groups optionally substituted with one to three straight and branched C_{1-6} alkyl groups, such as *N*-methyl-(2-, 3-, 4-, or 5-)carbazolyl and *N*-ethyl-(2-, 3-, 4-, or 5-)carbazolyl.

Examples of phenyl lower alkylcarbamoyl lower alkyl groups include phenylalkylcarbamoylalkyl groups wherein each of the two alkyl moieties is a straight or branched C_{1-6} alkyl group, such as phenylmethylcarbamoylmethyl, (1- or 2-)phenylethyl carbamoylmethyl, (1- or 2-)phenylethylcarbamoylethyl, 3-(2-phenylethylcarbamoyl)propyl, 4-(2-phenylethylcarbamoyl)butyl, 5-(2-phenylethylcarbamoyl)pentyl, and 6-(2-phenylethylcarbamoyl) hexyl.

Examples of phenylcarbamoyl lower alkyl groups include

phenylcarbamoylalkyl groups wherein the alkyl moiety is a straight or branched C_{1-6} alkyl group, such as phenylcarbamoylmethyl, (1- or 2-)phenylcarbamoylethyl, 3-(phenylcarbamoyl)propyl, 4-(phenylcarbamoyl)butyl, 5-(phenylcarbamoyl)pentyl, and 6-(phenylcarbamoyl)hexyl.

Examples of anilino groups optionally substituted on the phenyl ring with one or more lower alkoxy groups, each lower alkoxy substituent optionally being substituted with one or more halogen atoms, include:

anilino groups optionally substituted on the phenyl ring with one to three straight and/or branched C_{1-6} alkoxy groups, each alkoxy substituent optionally being substituted with one to three halogen atoms;

such as (2-, 3-, or 4-)chloromethoxyanilino, and (2-, 3-, or 4-)trifluoromethoxyanilino.

Examples of anilino groups substituted on the amino group with one or more lower alkyl groups and further substituted on the phenyl ring with one or more halogen atoms include:

anilino groups substituted on the amino group with one to three straight and/or branched C_{1-6} alkyl groups and further substituted on the phenyl ring with one to three halogen atoms;

such as *N*-methyl-(2-, 3-, or 4-)chloroanilino, *N*-ethyl-(2-, 3-, or 4-)chloroanilino, *N*-methyl-(2-, 3-, or 4-)bromoanilino, *N*-methyl-(2-, 3-, or 4-)fluoroanilino, *N*-ethyl-(2-, 3-, or 4-)iodoanilino, and *N*-*n*-propyl-(2-, 3-, or 4-)chloroanilino.

Examples of 5- and 6-membered unsaturated heterocyclic rings formed from R^8 and R^9 being linked together, together with the nitrogen atom to which they are bound, include (2- or 3-)pyrroline, 1,2-dihydropyridine, 2,3-dihydropyridine, 1,2,3,4-tetrahydropyridine, and 1,2,5,6-tetrahydropyridine.

Examples of benzoyl groups optionally substituted on the phenyl ring with one or more members selected from the group consisting of lower alkyl groups optionally substituted with one or more halogen atoms; a phenyl group; halogen atoms; a cyano

group; a phenoxy group; lower alkoxycarbonyl groups; pyrazolyl groups; and lower alkoxy groups optionally substituted with one or more halogen atoms include:

benzoyl groups optionally substituted on the phenyl ring with one to three members selected from the group consisting of the above-described straight and branched C_{1-6} alkyl groups optionally substituted with one to three halogen atoms; a phenyl group; halogen atoms; a cyano group; a phenoxy group; the above-described straight and branched C_{1-6} alkoxycarbonyl groups; pyrazolyl groups; and the above-described straight and branched C_{1-6} alkoxy groups optionally substituted with one to three halogen atoms;

such as benzoyl, 4-methylbenzoyl, 3-methylbenzoyl, 2-methylbenzoyl, 4-*tert*-butylbenzoyl, 2,4-dimethylbenzoyl, 2,4,6-trimethylbenzoyl, 3-trifluoromethylbenzoyl, 4-trifluoromethylbenzoyl, 2-trifluoromethylbenzoyl, 4-phenylbenzoyl, 4-chlorobenzoyl, 3-chlorobenzoyl, 2-chlorobenzoyl, 4-fluorobenzoyl, 3-fluorobenzoyl, 2-fluorobenzoyl, 3-bromobenzoyl, 2-bromobenzoyl, 4-bromobenzoyl, 3,4-dichlorobenzoyl, 2,3-dichlorobenzoyl, 2-chloro-4-fluorobenzoyl, 2-methoxy-5-chlorobenzoyl, 4-methoxybenzoyl, 3-methoxybenzoyl, 2-methoxybenzoyl, 3,4-dimethoxybenzoyl, 3,4,5-trimethoxybenzoyl, 3-trifluoromethoxybenzoyl, 4-trifluoromethoxybenzoyl, 2-trifluoromethoxybenzoyl, 3-cyanobenzoyl, 4-cyanobenzoyl, 2-cyanobenzoyl, 3-phenoxybenzoyl, 2-phenoxybenzoyl, 4-phenoxybenzoyl, 4-methoxycarbonylbenzoyl, 3-ethoxycarbonylbenzoyl, 2-*tert*-butoxycarbonylbenzoyl, and 4-(1-pyrazolyl)benzoyl.

Examples of alkanoyl groups include straight and branched C_{1-10} alkanoyl groups, such as, in addition to the above-described lower alkanoyl groups, heptanoyl, octanoyl, nonanoyl, decanoyl, and 2-ethyl-hexanoyl.

Examples of phenyl lower alkanoyl groups optionally substituted on the phenyl ring with one or more members selected from the group consisting of halogen atoms and lower alkyl groups include:

phenylalkanoyl groups wherein the alkanoyl moiety is a straight or branched C_{2-6} alkanoyl group, optionally substituted on the phenyl ring with one to three members selected from the group consisting of halogen atoms and straight and branched C_{1-6} alkyl groups;

such as 2-phenylacetyl, 3-phenylpropionyl, 2-phenylpropionyl, 4-phenylbutyryl, 5-phenylpentanoyl, 6-phenylhexanoyl, 2,2-dimethyl-3-phenylpropionyl, 2-methyl-3-phenylpropionyl, 2-(4-fluorophenyl)acetyl, 3-(2,5-difluorophenyl)propionyl, 2-(2,4-difluorophenyl)propionyl, 4-(3,4-difluorophenyl)butyryl, 5-(3,5-difluorophenyl)pentanoyl, 6-(2,6-difluorophenyl)hexanoyl, 2-(2-chlorophenyl)acetyl, 3-(3-chlorophenyl)propionyl, 2-(4-chlorophenyl)propionyl, 4-(2,3-dichlorophenyl)propionyl, 5-(2,4-dichlorophenyl)pentanoyl, 6-(2,5-dichlorophenyl)hexanoyl, 2-(3,4-dichlorophenyl)acetyl, 3-(2,6-dichlorophenyl)propionyl, 2-(3-fluorophenyl)propionyl, 4-(2-fluorophenyl)butyryl, 5-(3-bromophenyl)pentanoyl, 6-(4-iodophenyl)hexanoyl, 2-(2-bromophenyl)acetyl, 3-(4-bromophenyl)propionyl, 2-(3,5-dichlorophenyl)propionyl, 4-(2,4,6-trifluorophenyl)butyryl, 5-(3,4-difluorophenyl)pentanoyl, 6-(2-iodophenyl)hexanoyl, 2-(3-iodophenyl)acetyl, 3-(4-iodophenyl)propionyl, 2-(2,3-dibromophenyl)propionyl, 4-(2,4-diiodophenyl)butyryl, 2-(2,4,6-trichlorophenyl)acetyl, 2-(4-methylphenyl)acetyl, 3-(2,5-dimethylphenyl)propionyl, 2-(2,4-diethylphenyl)propionyl, 4-(3,4-di-*n*-propylphenyl)butyryl, 2-(2-ethylphenyl)acetyl, 3-(3-*n*-propylphenyl)propionyl, 2-(4-*tert*-butylphenyl)propionyl, 2-(2,4,6-trimethylphenyl)acetyl, 2-(2,5-dichloro-4-methylphenyl)acetyl, 2-(3-methyl-4-chlorophenyl)acetyl, 4-(2-*n*-butylphenyl)butyryl, 5-(3-*n*-pentylphenyl)pentanoyl, and 6-(4-*n*-hexylphenyl)hexanoyl.

Examples of phenoxy lower alkanoyl groups optionally substituted on the phenyl ring with one or more halogen atoms include:

phenoxyalkanoyl groups wherein the alkanoyl moiety is a straight or branched C_{2-6} alkanoyl group, optionally substituted

on the phenyl ring with one to three halogen atoms;

such as, in addition to the above-described phenoxy lower alkanoyl groups, 2-(4-chlorophenoxy)acetyl, 2-(4-fluorophenoxy)acetyl, 3-(2,5-difluorophenoxy)propionyl, 2-(2,4-difluorophenoxy)propionyl, 4-(3,4-difluorophenoxy)butyryl, 5-(3,5-difluorophenoxy)pentanoyl, 6-(2,6-difluorophenoxy)hexanoyl, 2-(2-chlorophenoxy)acetyl, 3-(3-chlorophenoxy)propionyl, 2-(4-chlorophenoxy)propionyl, 4-(2,3-dichlorophenoxy)propionyl, 5-(2,4-dichlorophenoxy)pentanoyl, 6-(2,5-dichlorophenoxy)hexanoyl, 2-(3,4-dichlorophenoxy)acetyl, 3-(2,6-dichlorophenoxy)propionyl, 2-(3-fluorophenoxy)propionyl, 4-(2-fluorophenoxy)butyryl, 5-(3-bromophenoxy)pentanoyl, 6-(4-iodophenoxy)hexanoyl, 2-(2-bromophenoxy)acetyl, 3-(4-bromophenoxy)propionyl, 2-(3,5-dichlorophenoxy)propionyl, 4-(2,4,6-trifluorophenoxy)butyryl, 5-(3,4-difluorophenoxy)pentanoyl, 6-(2-iodophenoxy)hexanoyl, 2-(3-iodophenoxy)acetyl, 3-(4-iodophenoxy)propionyl, 2-(2,3-dibromophenoxy)propionyl, 4-(2,4-diiodophenoxy)butyryl, and 2-(2,4,6-trichlorophenoxy)acetyl.

Examples of phenyl lower alkenylcarbonyl groups include phenylalkenylcarbonyl groups containing one to three double bonds wherein the alkenyl moiety is a straight or branched C_{2-6} alkenyl group, such as styrylcarbonyl (trivial name: cinnamoyl), 3-phenyl-2-propenylcarbonyl, 4-phenyl-2-butenylcarbonyl, 4-phenyl-3-butenylcarbonyl, 5-phenyl-4-pentenylcarbonyl, 5-phenyl-3-pentenylcarbonyl, 6-phenyl-5-hexenylcarbonyl, 6-phenyl-4-hexenylcarbonyl, 6-phenyl-3-hexenylcarbonyl, 4-phenyl-1,3-butadienylcarbonyl, and 6-phenyl-1,3,5-hexatrienylcarbonyl.

Examples of pyridylcarbonyl groups optionally substituted on the pyridine ring with one or more members selected from the group consisting of halogen atoms and lower alkyl groups, each lower alkyl substituent optionally being substituted with one or more halogen atoms, include:

pyridylcarbonyl groups optionally substituted on the pyridine ring with one to three members selected from the group consisting of halogen atoms and the above-described straight and

branched C_{1-6} alkyl groups optionally substituted with one to three halogen atoms;

such as (2-, 3-, or 4-)pyridylcarbonyl, 2-chloro-(3-, 4-, 5-, or 6-)pyridylcarbonyl, 2,6-dichloro-(3-, 4-, or 5-)pyridylcarbonyl, 2,3-dichloro-(4-, 5-, or 6-)pyridylcarbonyl, 2-trifluoromethyl-(3-, 4-, 5-, or 6-)pyridylcarbonyl, 2-bromo-(3-, 4-, 5-, or 6-)pyridylcarbonyl, 2,6-difluoro-(3-, 4-, or 5-)pyridylcarbonyl, 4-methyl-(2-, 3-, 5-, or 6-)pyridylcarbonyl, 3-chloro-(2-, 4-, 5-, or 6-)pyridylcarbonyl, 2,5-dibromo-(3-, 4-, or 5-)pyridylcarbonyl, 2-ethyl-4-chloro-(3-, 5-, or 6-)pyridylcarbonyl, 2,4,6-trifluoro-(3- or 5-)pyridylcarbonyl, 2,4-dimethyl-(3-, 5-, or 6-)pyridylcarbonyl, 2,4,6-trimethyl-(3- or 5-)pyridylcarbonyl, and 2-methyl-4-chloro-(3-, 5-, or 6-)pyridylcarbonyl.

Examples of piperidinylcarbonyl groups optionally substituted on the piperidine ring with one or more lower alkanoyl groups include piperidinylcarbonyl groups optionally substituted on the piperidine ring with one to three straight and/or branched C_{1-6} alkanoyl groups, such as (2-, 3-, or 4-)piperidinylcarbonyl, 1-acetyl-(2-, 3-, or 4-)piperidinylcarbonyl, 1-*n*-propanoyl-(2-, 3-, or 4-)piperidinylcarbonyl, 1-isopropanoyl-(2-, 3-, or 4-)piperidinylcarbonyl, 1-*n*-butyryl-(2-, 3-, or 4-)piperidinylcarbonyl, 1-*n*-pentanoyl-(2-, 3-, or 4-)piperidinylcarbonyl, 1-*n*-hexanoyl-(2-, 3-, or 4-)piperidinylcarbonyl, 1,2-diacetyl-(3-, 4-, 5-, or 6-)piperidinylcarbonyl, 1,2,3-triacetyl-(4-, 5-, or 6-)piperidinylcarbonyl, 2-acetyl-(1-, 3-, 4-, 5-, or 6-)piperidinylcarbonyl, 3-propanoyl-(1-, 2-, 4-, 5-, or 6-)piperidinylcarbonyl, and 2-formyl-4-propanoyl-(1-, 3-, 5-, or 6-)piperidinylcarbonyl.

Examples of tetrahydropyranylcarbonyl groups include 2-tetrahydropyranylcarbonyl, 3-tetrahydropyranylcarbonyl, and 4-tetrahydropyranylcarbonyl.

Examples of benzothienylcarbonyl groups optionally

substituted on the benzothiophene ring with one or more halogen atoms include benzothienylcarbonyl groups optionally substituted on the benzothiophene ring with one to three halogen atoms, such as (2-, 3-, 4-, 5-, 6-, or 7-)benzothienylcarbonyl, [3-chloro-(2-, 4-, 5-, 6-, or 7-)benzothienyl]carbonyl, [4-bromo-(2-, 3-, 5-, 6-, or 7-)benzothienyl]carbonyl, [5-fluoro-(2-, 3-, 4-, 6-, or 7-)benzothienyl]carbonyl, [6-iodo-(2-, 3-, 4-, 5-, or 7-)benzothienyl]carbonyl, [7-chloro-(2-, 3-, 4-, 5-, or 6-)benzothienyl]carbonyl, [2-chloro-(3-, 4-, 5-, 6-, or 7-)benzothienyl]carbonyl, [2,3-dichloro-(4-, 5-, 6-, or 7-)benzothienyl]carbonyl, and [3,4,6-trichloro-(2-, 5- or 7-)benzothienyl]carbonyl.

Examples of pyridyl lower alkyl groups optionally substituted on the pyridine ring with one or more members selected from the group consisting of halogen atoms and lower alkyl groups, each lower alkyl substituent optionally being substituted with one or more halogen atoms, include:

pyridylalkyl groups wherein the alkyl moiety is a straight or branched C_{1-6} alkyl group, optionally substituted on the pyridine ring with one to three members selected from the group consisting of halogen atoms and the above-described straight and branched C_{1-6} alkyl groups optionally substituted with one to three halogen atoms;

such as (2-, 3-, or 4-)pyridylmethyl, 2-[(2-, 3-, or 4-)pyridyl]ethyl, 1-[(2-, 3-, or 4-)pyridyl]ethyl, 3-[(2-, 3-, or 4-)pyridyl]propyl, 4-[(2-, 3-, or 4-)pyridyl]butyl, 1,1-dimethyl-2-[(2-, 3-, or 4-)pyridyl]ethyl, 5-[(2-, 3-, or 4-)pyridyl]pentyl, 6-[(2-, 3-, or 4-)pyridyl]hexyl, 1-[(2-, 3-, or 4-)pyridyl]isopropyl, 2-methyl-3-[(2-, 3-, or 4-)pyridyl]propyl, [2-chloro-(3-, 4-, 5-, or 6-)pyridyl]methyl, [2,3-dichloro-(4-, 5-, or 6-)pyridyl]methyl, [2-bromo-(3-, 4-, 5-, or 6-)pyridyl]methyl, [2,4,6-trifluoro-(3-, 5-, or 6-)pyridyl]methyl, [2-trifluoromethyl-(3-, 4-, 5-, or 6-)pyridyl]methyl, [2-methyl-(3-, 4-, 5-, or 6-)pyridyl]methyl, [2-ethyl-(3-, 4-, 5-, or 6-)pyridyl]methyl, 2-[2-

n-propyl-(3-, 4-, 5-, or 6-)pyridyl]ethyl, 3-[2-*n*-butyl-(3-, 4-, 5-, or 6-)pyridyl]propyl, 4-[2-*n*-pentyl-(3-, 4-, 5-, or 6-)pyridyl]butyl, 5-[2-*n*-hexyl-(3-, 4-, 5-, or 6-)pyridyl]pentyl, 6-[2-isopropyl-(3-, 4-, 5-, or 6-)pyridyl]hexyl, [2-*tert*-butyl-(3-, 4-, 5-, or 6-)pyridyl]methyl, [2,4-dimethyl-(3-, 5-, or 6-)pyridyl]methyl, [2,4,6-trimethyl-(3- or 5-)pyridyl]methyl, [2,4-ditrifluoromethyl-(3-, 5-, or 6-)pyridyl]methyl, 2-(2,4-bistrifluoromethyl)-(3-, 5-, or 6-)pyridyl)ethyl, and 3-[2-methyl-6-chloro-(3-, 4-, or 5-)pyridyl]propyl.

Examples of thienyl lower alkyl groups optionally substituted on the thiophene ring with one or more halogen atoms include:

thienylalkyl groups wherein the alkyl moiety is a straight or branched C_{1-6} alkyl group, optionally substituted on the thiophene ring with one to three halogen atoms;

such as [(2- or 3-)thienyl]methyl, 2-[(2- or 3-)thienyl]ethyl, 1-[(2- or 3-)thienyl]ethyl, 3-[(2- or 3-)thienyl]propyl, 4-[(2- or 3-)thienyl]butyl, 5-[(2- or 3-)thienyl]pentyl, 6-[(2- or 3-)thienyl]hexyl, 1,1-dimethyl-2-[(2- or 3-)thienyl]ethyl, 2-methyl-3-[(2- or 3-)thienyl]propyl, [2-chloro-(3-, 4-, or 5-)thienyl]methyl, [4-bromo-(2-, 3-, or 5-)thienyl]methyl, [5-fluoro-(2-, 3-, or 4-) thienyl]methyl, [3-iodo-(2-, 4-, or 5-)thienyl]methyl, [2,3-dichloro-(4- or 5-)thienyl]methyl, (2,4,5-trichloro-3-thienyl)methyl, 2-[2-fluoro-(3-, 4-, or 5-)thienyl]ethyl, 1-[4-iodo-(2-, 3-, or 5-)thienyl]ethyl, 3-[3-chloro-(2-, 4-, or 5-) thienyl]propyl, 4-[4,5-dichloro-(2- or 3-)thienyl]butyl, 5-(2,4,5-trichloro-3-thienyl)pentyl, and 6-[2-chloro-(3-, 4-, or 5-)thienyl]hexyl.

Examples of amino groups optionally substituted with one or more members selected from the group consisting of lower alkyl groups and lower alkanoyl groups include:

amino groups optionally substituted with one or two members selected from the group consisting of straight and branched C_{1-6} alkyl groups and straight and branched C_{1-6} alkanoyl

groups;

such as amino, formylamino, acetylamino, propionylamino, butyrylamino, isobutyrylamino, pentanoylamino, *tert*-butylcarbonylamino, hexanoylamino, *N*,*N*-diacetylamino, *N*-acetyl-*N*-propionylamino, methylamino, ethylamino, *n*-propylamino, isopropylamino, *n*-butylamino, *n*-pentylamino, *n*-hexylamino, dimethylamino, 3-diethylamino, diisopropylamino, *N*-ethyl-*N*-*n*-propylamino, *N*-methyl-*N*-*n*-hexylamino, *N*-methyl-*N*-acetylamino, and *N*-ethyl-*N*-acetylamino.

Examples of phenyl lower alkyl groups optionally substituted on the phenyl ring with one or more members selected from the group consisting of lower alkoxy groups optionally substituted with one or more halogen atoms; a cyano group; lower alkyl groups optionally substituted with one or more halogen atoms; amino groups optionally substituted with one or more members selected from the group consisting of lower alkyl groups and lower alkanoyl groups; halogen atoms; lower alkoxycarbonyl groups; lower alkanoyloxy groups; lower alkylsulfonyl groups; lower alkylthio groups; and pyrrolidinyl groups include:

mono- and di-phenylalkyl groups wherein the alkyl moiety is a straight or branched C_{1-6} alkyl group, optionally substituted on the phenyl ring with one to three members selected from the group consisting of the above-described straight and branched C_{1-6} alkoxy groups optionally substituted with one to three halogen atoms; a cyano group; the above-described straight and branched C_{1-6} alkyl groups optionally substituted with one to three halogen atoms; the above-described amino groups optionally substituted with one or two members selected from the group consisting of straight and branched C_{1-6} alkyl groups and straight and branched C_{1-6} alkanoyl groups; halogen atoms; the above-described straight and branched C_{1-6} alkoxycarbonyl groups; the above-described straight and branched C_{2-6} alkanoyloxy groups; the above-described straight and branched C_{1-6} alkylsulfonyl groups; the above-described straight and branched C_{1-6} alkylthio groups; and pyrrolidinyl groups;

such as benzyl, 1-phenethyl, 2-phenethyl, 3-phenylpropyl, 2-phenylpropyl, 4-phenylbutyl, 5-phenylpentyl, 4-phenylpentyl, 6-phenylhexyl, 2-methyl-3-phenylpropyl, 1,1-dimethyl-2-phenylethyl, 1,1-diphenylmethyl, 2,2-diphenylethyl, 3,3-diphenylpropyl, 1,2-diphenylethyl, 4-chlorobenzyl, 2-chlorobenzyl, 3-chlorobenzyl, 3-fluorobenzyl, 4-fluorobenzyl, 2-fluorobenzyl, 4-bromobenzyl, 3-bromobenzyl, 2-bromobenzyl, 1-(2-chlorophenyl)ethyl, 2,3-dichlorobenzyl, 2,4,6-trifluorobenzyl, 2-trifluoromethylbenzyl, 3-trifluoromethylbenzyl, 4-trifluoromethylbenzyl, 2-methylbenzyl, 3-methylbenzyl, 4-methylbenzyl, 4-*tert*-butylbenzyl, 4-*n*-butylbenzyl, 2,4-dimethylbenzyl, 2,4,6-trimethylbenzyl, 2-phenylbenzyl, 4-phenylbenzyl, 2,4-diphenylbenzyl, 2,4,6-triphenylbenzyl, 2-trifluoromethoxybenzyl, 3-trifluoromethoxybenzyl, 4-trifluoromethoxybenzyl, 4-difluoromethoxybenzyl, 2-methoxybenzyl, 3-methoxybenzyl, 4-methoxybenzyl, 4-*n*-butoxybenzyl, 4-*tert*-butoxybenzyl, 1-(3-methoxyphenyl)ethyl, 1-(4-methoxyphenyl)ethyl, 1-(2-methoxyphenyl)ethyl, 3,4-dimethoxybenzyl, 3,4,5-trimethoxybenzyl, 4-methoxycarbonylbenzyl, 3-ethoxycarbonylbenzyl, 2-*n*-propoxycarbonylbenzyl, 2,4-dimethoxycarbonylbenzyl, 2,4,6-trimethoxycarbonylbenzyl, 1-(4-*n*-butoxyphenyl)ethyl, 4-*tert*-butoxycarbonylbenzyl, 4-methylthiobenzyl, 3-methylthiobenzyl, 2-methylthiobenzyl, 4-ethylthiobenzyl, 2,4-dimethylthiobenzyl, 2,4,6-trimethylthiobenzyl, 4-methylsulfonylbenzyl, 3-methylsulfonylbenzyl, 2-methylsulfonylbenzyl, 3,4-dimethylsulfonylbenzyl, 3,4,5-trimethylsulfonylbenzyl, 4-methoxy-3-chlorobenzyl, 4-(*N*-acetylamino)benzyl, 4-(*N*,*N*-diethylamino)benzyl, 4-(*N*,*N*-dimethylamino)benzyl, 4-(*N*-methylamino)benzyl, 3-aminobenzyl, 2-aminobenzyl, 4-aminobenzyl, 4-acetyloxybenzyl, 2,3-diaminobenzyl, 3,4,5-triaminobenzyl, 4-methyl-3-fluorobenzyl, 4-cyanobenzyl, 3-cyanobenzyl, 2-cyanobenzyl, 4-(1-pyrrolidinyl)benzyl, 4-methoxy-2-chlorobenzyl, and 3-chloro-5-methylbenzyl.

Examples of thiazolyl lower alkyl groups include thiazolylalkyl groups wherein the alkyl moiety is a straight or

branched C_{1-6} alkyl group, such as [(2-, 4-, or 5-)thiazolyl]methyl, 2-[(2-, 4-, or 5-)thiazolyl]ethyl, 1-[(2-, 4-, or 5-)thiazolyl]ethyl, 3-[(2-, 4-, or 5-)thiazolyl]propyl, 4-[(2-, 4-, or 5-)thiazolyl]butyl, 5-[(2-, 4-, or 5-)thiazolyl]pentyl, 6-[(2-, 4-, or 5-)thiazolyl]hexyl, 1,1-dimethyl-2-[(2-, 4-, or 5-)thiazolyl]ethyl, and [2-methyl-3-[(2-, 4-, or 5-)thiazolyl]propyl.

Examples of imidazolyl lower alkyl groups optionally substituted on the imidazole ring with one or more lower alkyl groups include:

imidazolylalkyl groups wherein the alkyl moiety is a straight or branched C_{1-6} alkyl group, optionally substituted on the imidazole ring with one to three above-described straight and branched C_{1-6} alkyl groups;

such as [(1-, 2-, 4-, or 5-)imidazolyl]methyl, 2-[(1-, 2-, 4-, or 5-)imidazolyl]ethyl, 1-[(1-, 2-, 4-, or 5-)imidazolyl]ethyl, 3-[(1-, 2-, 4-, or 5-)imidazolyl]propyl, 4-[(1-, 2-, 4-, or 5-)imidazolyl]butyl, 1,1-dimethyl-2-[(1-, 2-, 4-, or 5-)imidazolyl]ethyl, 5-[(1-, 2-, 4-, or 5-)imidazolyl]pentyl, 6-[(1-, 2-, 4-, or 5-)imidazolyl]hexyl, 1-[(1-, 2-, 4-, or 5-)imidazolyl]isopropyl, 2-methyl-3-[(1-, 2-, 4-, or 5-)imidazolyl]propyl, [1-methyl-(2-, 4-, or 5-)imidazolyl]methyl, [1-ethyl-(2-, 4-, or 5-)imidazolyl]methyl, [1-*n*-propyl-(2-, 4-, or 5-)imidazolyl]methyl, [1-*n*-butyl-(2-, 4-, or 5-)imidazolyl]methyl, [1-*n*-pentyl-(2-, 4-, or 5-)imidazolyl]methyl, [1-*n*-hexyl-(2-, 4-, or 5-)imidazolyl]methyl, 2-[2-methyl-(1-, 4-, or 5-)imidazolyl]ethyl, 1-[1-ethyl-(2-, 4-, or 5-)imidazolyl]ethyl, 3-[1-ethyl-(2-, 4-, or 5-)imidazolyl]methyl, 4-[1-*n*-propyl-(2-, 4-, or 5-)imidazolyl]butyl, 5-[1-*n*-butyl-(2-, 4-, or 5-)imidazolyl]pentyl, 6-[1-*n*-pentyl-(2-, 4-, or 5-)imidazolyl]hexyl, [1,2-dimethyl-(4- or 5-)imidazolyl]methyl, and (1,2,4-trimethyl-5-imidazolyl)methyl.

Examples of pyrrolyl lower alkyl groups optionally substituted on the pyrrole ring with one or more lower alkyl groups include:

pyrrolylalkyl groups wherein the alkyl moiety is a straight or branched C_{1-6} alkyl group, optionally substituted on the pyrrole ring with one to three above-described straight and branched C_{1-6} alkyl groups;

such as [(1-, 2-, or 3-)pyrrolyl]methyl, 2-[(1-, 2-, or 3-)pyrrolyl]ethyl, 1-[(1-, 2-, or 3-)pyrrolyl]ethyl, 3-[(1-, 2-, or 3-)pyrrolyl]propyl, 4-[(1-, 2-, or 3-)pyrrolyl]butyl, 1,1-dimethyl-2-[(1-, 2-, or 3-)pyrrolyl]ethyl, 5-[(1-, 2-, or 3-)pyrrolyl]pentyl, 6-[(1-, 2-, or 3-)pyrrolyl]hexyl, 1-[(1-, 2-, or 3-)pyrrolyl]isopropyl, 2-methyl-3-[(1-, 2-, or 3-)pyrrolyl]propyl, [1-methyl-(2- or 3-)pyrrolyl]methyl, [1-ethyl-(2- or 3-)pyrrolyl]methyl, [1-*n*-propyl-(2- or 3-)pyrrolyl]methyl, [1-*n*-butyl-(2- or 3-)pyrrolyl]methyl, [1-*n*-pentyl-(2- or 3-)pyrrolyl]methyl, [1-*n*-hexyl-(2- or 3-)pyrrolyl]methyl, 2-[2-methyl-(1-, 3-, 4-, or 5-)pyrrolyl]ethyl, 1-[1-ethyl-(2- or 3-)pyrrolyl]ethyl, 3-[1-ethyl-(2- or 3-)pyrrolyl]methyl, 4-[1-*n*-propyl-(2- or 3-)pyrrolyl]butyl, 5-[1-*n*-butyl-(2- or 3-)pyrrolyl]pentyl, 6-[1-*n*-pentyl-(2- or 3-)pyrrolyl]hexyl, [1,2-dimethyl-(3-, 4-, or 5-)pyrrolyl]methyl, and [1,2,4-trimethyl-(3- or 5-)pyrrolyl]methyl.

Examples of lower alkylthio lower alkyl groups include alkylthioalkyl groups wherein each of the two alkyl moieties is a straight or branched C_{1-6} alkyl group, such as methylthiomethyl, 2-methylthioethyl, 1-ethylthioethyl, 2-ethylthioethyl, 3-*n*-butylthiopropyl, 4-*n*-propylthiobutyl, 1,1-dimethyl-2-*n*-pentylthioethyl, 5-*n*-hexylthiopentyl, 6-methylthiohexyl, 1-ethylthioisopropyl, and 2-methyl-3-methylthiopropyl.

Examples of phenoxycarbonyl groups optionally substituted on the phenyl ring with one or more members selected from the group consisting of halogen atoms, lower alkyl groups, and lower alkoxy groups include:

phenoxycarbonyl groups optionally substituted on the phenyl ring with one to three members selected from the group consisting of halogen atoms, the above-described straight and branched C_{1-6} aklyl groups, and the above-described straight and

branched C_{1-6} alkoxy groups;

such as phenoxycarbonyl, 4-chlorophenoxycarbonyl, 3-chlorophenoxycarbonyl, 2-chlorophenoxycarbonyl, 3,4-dichlorophenoxycarbonyl, 2,4,6-trichlorophenoxycarbonyl, 4-fluorophenoxycarbonyl, 3-fluorophenoxycarbonyl, 2-fluorophenoxycarbonyl, 2,4-difluorophenoxycarbonyl, 3,4,5-trifluorophenoxycarbonyl, 4-bromophenoxycarbonyl, 2-chloro-4-methoxyphenoxycarbonyl, 3-fluoro-5-methylphenoxycarbonyl, 4-methoxyphenoxycarbonyl, 3-methoxyphenoxycarbonyl, 2-methoxyphenoxycarbonyl, 3,4-dimethoxyphenoxycarbonyl, 2,4,5-trimethoxyphenoxycarbonyl, 4-methylphenoxycarbonyl, 3-methylphenoxycarbonyl, 2-methylphenoxycarbonyl, 2,5-dimethylphenoxycarbonyl, and 2,3,4-trimethylphenoxycarbonyl.

Examples of phenyl lower alkoxycarbonyl groups optionally substituted on the phenyl ring with one or more halogen atoms include:

phenylalkoxycarbonyl groups wherein the alkoxy moiety is a straight or branched C_{1-6} alkoxy group, optionally substituted on the phenyl ring with one to three halogen atoms;

such as benzyloxycarbonyl, 2-phenylethoxycarbonyl, 1-phenylethoxycarbonyl, 3-phenylpropoxycarbonyl, 4-phenylbutoxycarbonyl, 5-phenylpentyloxycarbonyl, 6-phenylhexyloxycarbonyl, 1,1-dimethyl-2-phenylethoxycarbonyl, 2-methyl-3-phenylpropoxycarbonyl, 2-chlorobenzyloxycarbonyl, 3-chlorobenzyloxycarbonyl, 2-chlorobenzyloxycarbonyl, 3,4-dichlorobenzyloxycarbonyl, 2,4,6-trichlorobenzyloxycarbonyl, 4-fluorobenzyloxycarbonyl, 3-fluorobenzyloxycarbonyl, 2-fluorobenzyloxycarbonyl, 2,4-difluorobenzyloxycarbonyl, 3,4,5-trifluorobenzyloxycarbonyl, 4-bromobenzyloxycarbonyl, 4-nitrobenzyloxycarbonyl, and 3-nitrobenzyloxycarbonyl.

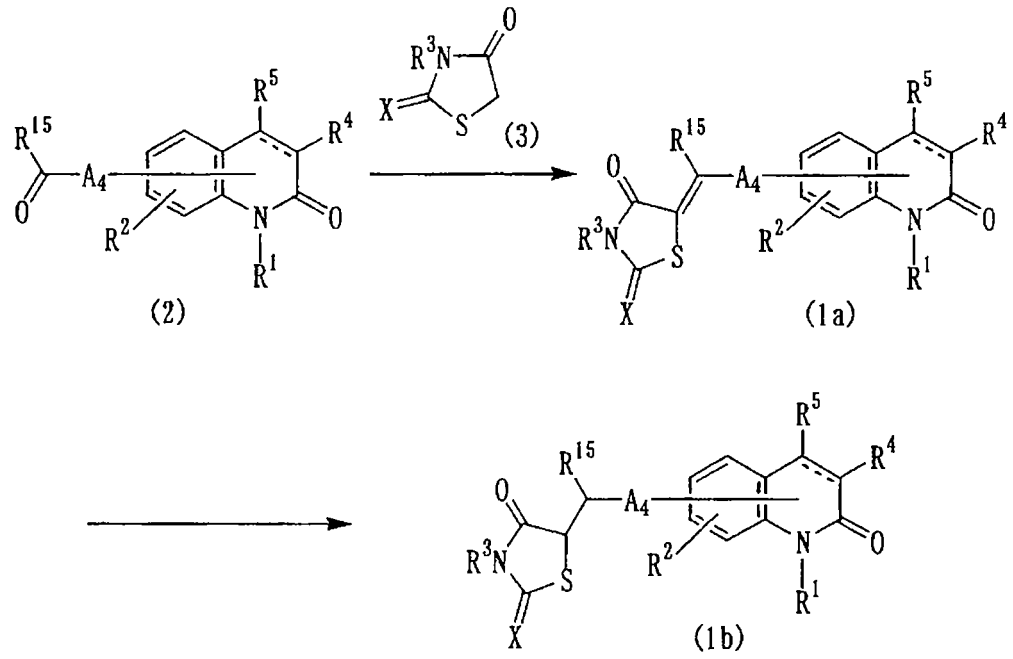
Examples of quinoxalinylcarbonyl groups include 2-quinoxalinylcarbonyl, 5-quinoxalinylcarbonyl, and 6-quinoxalinylcarbonyl.

Examples of phenyl lower alkanoyl groups include phenylalkanoyl groups wherein the alkanoyl moiety is a straight

or branched C_{2-6} alkanoyl group, such as 2-phenylacetyl, 3-phenylpropionyl, 2-phenylpropionyl, 4-phenylbutyryl, 5-phenylpentanoyl, 6-phenylhexanoyl, 2,2-dimethyl-2-phenylpropionyl, and 2-methyl-3-phenylpropionyl.

The compounds of the present invention can be produced according to, for example, Reaction Schemes 1 to 16. All the starting materials and target compounds shown in Reaction Schemes 1 to 16 may be in the form of suitable salts. Examples of such salts are as described for carbostyril compound of Formula (1) below.

Reaction Scheme 1



wherein R^1, R^2, R^3, R^4, R^5, X, and the bond between the 3- and 4-positions of the carbostyril skeleton are as defined above, R^{15} is a hydrogen atom or lower alkyl group, and A_4 represents a direct bond or lower alkylene group, provided that the total number of carbon atoms of the group substituting the carbostyril skeleton, i.e., $-CH(R^{15})-A_4-$, is no greater than 6.

The reaction of Compound (2) with Compound (3) is carried out in a suitable solvent in the presence of a basic

compound or acid.

Examples of solvents usable herein are aromatic hydrocarbons such as benzene, toluene and xylene, ethers such as diethyl ether, tetrahydrofuran, dioxane, monoglyme and diglyme, halogenated hydrocarbons such as dichloromethane, dichloroethane, chloroform and carbon tetrachloride, lower alcohols such as methanol, ethanol, isopropanol, butanol, *tert*-butanol and ethylene glycol, aliphatic acids such as acetic acid, esters such as ethyl acetate and methyl acetate, ketones such as acetone and methyl ethyl ketone, acetonitrile, pyridine, dimethyl sulfoxide, *N,N*-dimethylformamide, hexamethylphosphoric triamide, mixed solvents of such solvents, etc.

Examples of basic compounds are carbonates such as sodium carbonate, potassium carbonate, sodium hydrogencarbonate, potassium hydrogencarbonate and cesium carbonate, metal hydroxides such as sodium hydroxide, potassium hydroxide and calcium hydroxide, sodium hydride, potassium hydride, potassium, sodium, sodium amide, metal alcoholates such as sodium methylate, sodium ethylate and sodium *n*-butoxide, piperidine, pyridine, imidazole, *N*-ethyldiisopropylamine, dimethylaminopyridine, triethylamine, trimethylamine, dimethylaniline, *N*-methylmorpholine, 1,5-diazabicyclo[4.3.0]nonene-5 (DBN), 1,8-diazabicyclo[5.4.0]undecene-7 (DBU), 1,4-diazabicyclo[2.2.2]octane (DABCO), and like organic bases and mixtures thereof.

Examples of acids are organic acids such as *p*-toluenesulfonic acid and like sulfonic acids, and acetic acid, trifluoroacetic acid, trichloroacetic acid and like aliphatic acids; inorganic acids such as hydrochloric acid, sulfuric acid, hydrobromic acid, and phosphoric acid; and mixtures thereof.

In the present invention, a basic compound and an acid may be used in combination.

Basic compound or acid is usually used in a catalytic amount, and preferably about 0.01 to about 1 mol, per mol of Compound (2).

Compound (3) is usually used in an amount of at least 1 mol, and preferably about 1 to about 2 mol, per mol of Compound (2).

The reaction is usually carried out at about room temperature to about 200° C, and preferably about room temperature to about 150° C. The reaction is usually finished in about 0.5 to about 20 hours.

The reaction for producing Compound (1b) from Compound (1a) is carried out, for example, either without a solvent or in a suitable solvent, in the presence of a reducing agent.

Examples of solvents usable herein are water, lower alcohols such as methanol, ethanol, isopropanol, butanol, *tert*-butanol and ethylene glycol, acetonitrile, aliphatic acids such as formic acid and acetic acid, ethers such as diethyl ether, tetrahydrofuran, dioxane, monoglyme and diglyme, aromatic hydrocarbons such as benzene, toluene and xylene, halogenated hydrocarbons such as dichloromethane, dichloroethane, chloroform and carbon tetrachloride, *N*,*N*-dimethylformamide, mixtures of such solvents, etc.

Examples of reducing agents are mixtures of silicon dioxide and pyridine compounds such as diethyl 1,4-dihydro-2,6-dimethyl-3,5-pyridinedicarboxylate; sodium borohydride, lithium borohydride, sodium cyanoborohydride, sodium triacetoxy borohydride, aluminium lithium hydride, and like hydride reducing agents; mixtures of such hydride reducing agents; palladium black, palladium carbon, platinum oxide, platinum black, Raney nickel, and like catalytic hydrogenation reducing agent; etc.

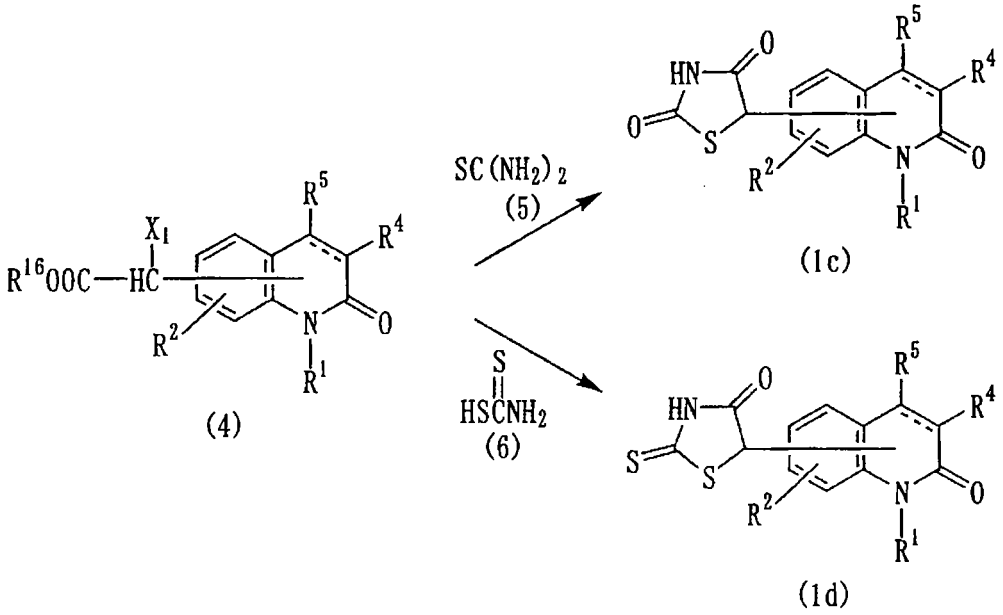
When a mixture of a pyridine compound and silicon dioxide is used as a reducing agent, a suitable reaction temperature is usually about room temperature to about 200° C, and preferably about room temperature to about 150° C. The reaction is usually finished in about 0.5 to about 50 hours. The pyridine compound is usually used in an amount of at least 1 mol, and preferably 1 to 3 mol, per mol of Compound (1a). Silicon dioxide is usually used in an amount of at least 1 mol, and preferably 1

to 10 mol, per mol of Compound (1a).

When a hydride reducing agent is used, a suitable reaction temperature is usually about -80 to about 100°C and preferably about -80 to about 70°C. The reaction is usually finished in about 30 minutes to about 60 hours. The hydride reducing agent is usually used in an amount of about 0.1 to about 20 mol, and preferably about 0.1 to about 6 mol, per mol of Compound (1b). In particular, when lithium aluminium hydride is used as a hydride reducing agent, it is preferable to use diethyl ether, tetrahydrofuran, dioxane, monoglyme, diglyme, and like ethers, and benzene, toluene, xylene, and like aromatic hydrocarbons as solvents. Cobalt(II) chloride, cobalt(III) chloride, cobalt(II) acetate, or like cobalt compound may be added to the reaction system of the reaction in the presence of pyridine, trimethylamine, triethylamine, *N*-ethyldiisopropylamine, or like amine; sodium hydroxide or like inorganic base; and/or dimethylglyoxime, 2,2'-bipyridyl, 1,10-phenanthroline, or like ligand.

When a catalytic hydrogenation reducing agent is used, the reaction is usually carried out at about -30 to about 100°C, and preferably about 0 to about 100°C, in a hydrogen atmosphere of about atmospheric pressure to about 20 atm, and preferably about atmospheric pressure to about 10 atm, or in the presence of formic acid, ammonium formate, cyclohexene, hydrazine hydrate, or like hydrogen donor. The reaction is usually finished in about 1 to about 12 hours. The catalytic hydrogenation reducing agent is usually used in an amount of about 0.01 to about 5 times, and preferably about 1 to about 3 times, the weight of Compound (1a).

Reaction Scheme 2



wherein R^1, R^2, R^4, R^5, and the bond between the 3- and 4-positions of the carbostyril skeleton are as defined above; and R^{16} is a lower alkyl group.

Compound (1c) is produced by reacting Compound (4) and Compound (5) in a suitable solvent in the presence of a basic compound followed by acid treatment. This acid treatment is hereinafter referred to as "Acid Treatment A".

Examples of solvents usable herein are water, aromatic hydrocarbons such as benzene, toluene and xylene, ethers such as diethyl ether, tetrahydrofuran, dioxane, 2-methoxyethanol, monoglyme and diglyme, halogenated hydrocarbons such as dichloromethane, dichloroethane, chloroform and carbon tetrachloride, lower alcohols such as methanol, ethanol, isopropanol, butanol, *tert*-butanol and ethylene glycol, aliphatic acids such as acetic acid, esters such as ethyl acetate and methyl acetate, ketones such as acetone and methyl ethyl ketone, acetonitrile, pyridine, dimethyl sulfoxide, *N,N*-dimethylformamide, hexamethylphosphoric triamide, mixed solvents of such solvents, etc.

Examples of basic compounds are carbonates such as sodium carbonate, potassium carbonate, sodium hydrogencarbonate,

potassium hydrogencarbonate and cesium carbonate, metal hydroxides such as sodium hydroxide, potassium hydroxide and calcium hydroxide, sodium hydride, potassium hydride, potassium, sodium, sodium amide, metal alcoholates such as sodium methylate, sodium ethylate and sodium *n*-butoxide, sodium acetate, piperidine, pyridine, imidazole, *N*-ethyldiisopropylamine, dimethylaminopyridine, triethylamine, trimethylamine, dimethylaniline, *N*-methylmorpholine, DBN, DBU, DABCO, other organic bases, and mixtures thereof.

Basic compound is usually used in an amount of at least about 1 mol, and preferably about 1 to about 3 mol, per mol of Compound (4).

Compound (5) is usually used in an amount of at least about 1 mol, and preferably about 1 to about 2 mol, per mol of Compound (4).

The reaction is usually carried out at about room temperature to about 200° C, and preferably about room temperature to about 150° C. The reaction is usually finished in about 0.5 to about 10 hours.

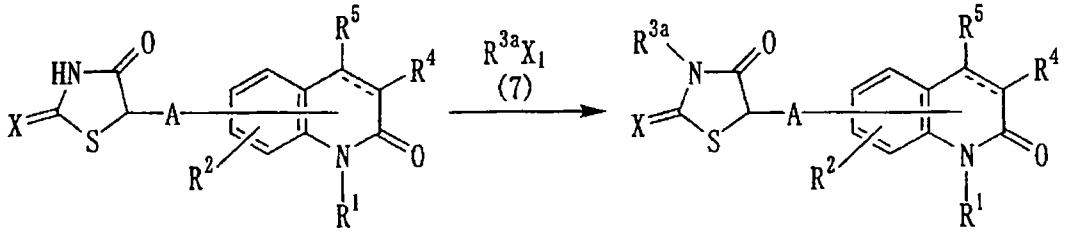
Examples of acids usable in acid-treating the reaction product are inorganic acids such as hydrochloric acid, sulfuric acid, hydrobromic acid, and the like. Such acids are usually used in a large excess relative to the reaction product to be treated.

Examples of solvents usable in the acid treatment include those that are usable in the reaction of Compound (4) with Compound (5) above.

The acid treatment is usually carried out at about room temperature to about 200° C, and preferably about room temperature to about 150° C. The acid treatment is usually finished in about 0.5 to about 30 hours.

The reaction of Compound (4) with Compound (6) is carried out under the same conditions selected for the reaction of Compound (4) with Compound (5).

Reaction Scheme 3



(1e) (1f)

wherein R^1, R^2, R^4, R^5, X, A, and the bond between the 3- and 4-positions of the carbostyril skeleton are as defined above; X_1 is a halogen atom; and R^{3a} is a group other than a hydrogen atom as defined in connection with R^3 above.

The reaction of Compound (1e) and Compound (7) is carried out in a suitable inert solvent in the presence of a basic compound.

Examples of inert solvents usable herein are aromatic hydrocarbons such as benzene, toluene and xylene, ethers such as diethyl ether, tetrahydrofuran, dioxane, 2-methoxyethanol, monoglyme and diglyme, halogenated hydrocarbons such as dichloromethane, dichloroethane, chloroform and carbon tetrachloride, lower alcohols such as methanol, ethanol, isopropanol, butanol, *tert*-butanol and ethylene glycol, aliphatic acids such as acetic acid, esters such as ethyl acetate and methyl acetate, ketones such as acetone and methyl ethyl ketone, acetonitrile, pyridine, dimethyl sulfoxide, *N,N*-dimethylformamide, hexamethylphosphoric triamide, mixed solvents of such solvents, etc.

Examples of basic compounds are carbonates such as sodium carbonate, potassium carbonate, sodium hydrogencarbonate, potassium hydrogencarbonate and cesium carbonate, metal hydroxides such as sodium hydroxide, potassium hydroxide and calcium hydroxide, sodium hydride, potassium hydride, potassium, sodium, sodium amide, metal alcoholates such as sodium methylate, sodium ethylate, sodium *n*-butoxide, sodium *tert*-butoxide and potassium *tert*-butoxide, pyridine, imidazole, *N*-ethyldiisopropylamine, dimethylaminopyridine, triethylamine,

trimethylamine, dimethylaniline, *N*-methylmorpholine, DBN, DBU, DABCO, other organic bases, and mixtures thereof.

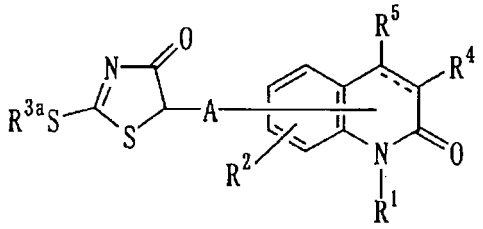
Basic compound is usually used in an amount of at least 1 mol, and preferably 1 to 10 mol, per mol of Compound (1e).

Compound (7) is usually used in an amount of at least 1 mol, and preferably 1 to 10 mol, per mol of Compound (1e).

The reaction is usually carried out at about 0 to about 200° C, and preferably 0 to about 150° C. The reaction is usually finished in about 5 minutes to about 80 hours.

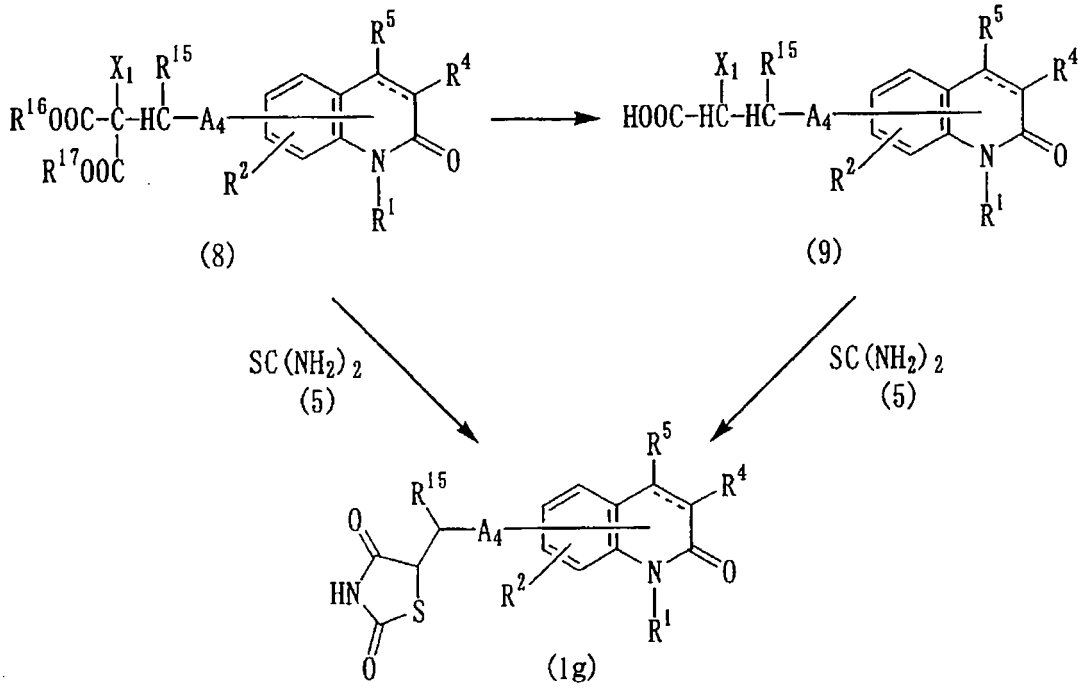
Sodium iodide, potassium iodide, or like alkali metal halide compound may be introduced into the reaction system of the reaction.

When a Compound (1e) in which X is sulfur is used in the reaction of Compound (1e) with Compound (7), a compound represented by the formula:



wherein R^1, R^2, R^4, R^5, R^{3a}, A, and the bond between the 3- and 4-positions of the carbostyril skeleton are as defined above, is sometimes generated. This compound can be easily separated from the reaction mixture.

Reaction Scheme 4



wherein R^1, R^2, R^4, R^5, A_4, R^{15}, R^{16}, X_1, and the bond between the 3- and 4-positions of the carbostyril skeleton are as defined above, and R^{17} is a lower alkyl group.

The reaction to produce Compound (9) from Compound (8) is carried out by hydrolyzing Compound (8).

This hydrolysis reaction is performed, for example, either in a suitable solvent or without a solvent, in the presence of an acid or basic compound.

Examples of usable solvents are water, lower alcohols such as methanol, ethanol, isopropanol and *tert*-butanol, ketones such as acetone and methyl ethyl ketone, ethers such as diethyl ether, dioxane, tetrahydrofuran, monoglyme and diglyme, aliphatic acids such as acetic acid and formic acid, esters such as methyl acetate and ethyl acetate, halogenated hydrocarbons such as chloroform, dichloroethane, dichloromethane, carbon tetrachloride, dimethyl sulfoxide, *N,N*-dimethylformamide, hexamethylphosphoric triamide, mixed solvents of such solvents, etc.

Examples of acids are mineral acids such as hydrochloric acid, sulfuric acid and hydrobromic acid; and organic acids such as formic acid, acetic acid, trifluoroacetic

acid, *p*-toluenesulfonic acid and like sulfonic acids. Such acids may be used singly or as a combination of two or more such acids.

Examples of basic compounds are carbonates such as sodium carbonate, potassium carbonate, sodium hydrogencarbonate and potassium hydrogencarbonate; metal hydroxides such as sodium hydroxide, potassium hydroxide, calcium hydroxide and lithium hydroxide; etc. Such basic compounds may be used singly or as a combination of two or more such compounds.

The hydrolysis reaction advantageously proceeds usually at about 0 to about 200° C, and preferably about 0 to about 150° C. The reaction is usually finished in about 10 minutes to about 30 hours.

Compound (1g) can be produced by reacting Compound (8) with Compound (5) in a suitable solvent in the presence or absence of basic compound, and then acid-treating the reaction product. Alternatively, Compound (1g) can be produced by reacting Compound (9) with Compound (5) in a suitable solvent in the presence or absence of basic compound, and then acid-treating the reaction product.

Examples of solvents for use in the reaction of Compound (8) with Compound (5) and the reaction of Compound (9) with Compound (5) include, in addition to sulfolane, those that are usable in the reaction of Compound (4) with Compound (5) shown in Reaction Scheme 2 presented above.

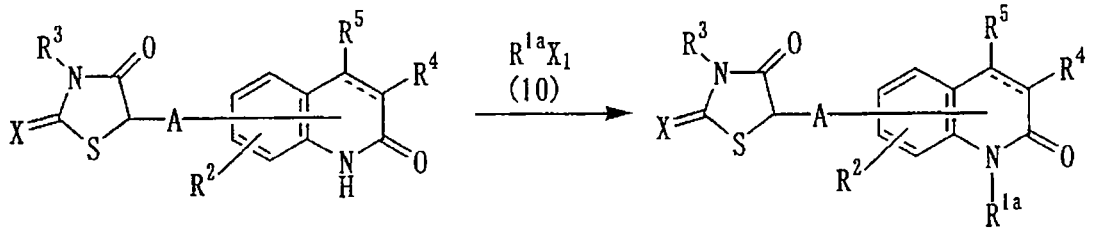
Examples of usable basic compounds include those that are usable in the reaction of Compound (4) with Compound (5) shown in Reaction Scheme 2 presented above.

Basic compound is usually used in an amount of at least 1 mol, and preferably 1 to 2 mol, per mol of Compound (5). Compound (8) and Compound (9) are usually used in amounts of at least 1 mol, and preferably 1 to 5 mol, per mol of Compound (5).

The reaction is usually carried out at about room temperature to about 200° C, and preferably about room temperature to about 150° C. The reaction is usually finished in about 0.5 to about 10 hours.

The subsequent acid treatment is carried out under the same conditions as described with respect to "Acid Treatment A" in Reaction Scheme 2 above.

Reaction Scheme 5

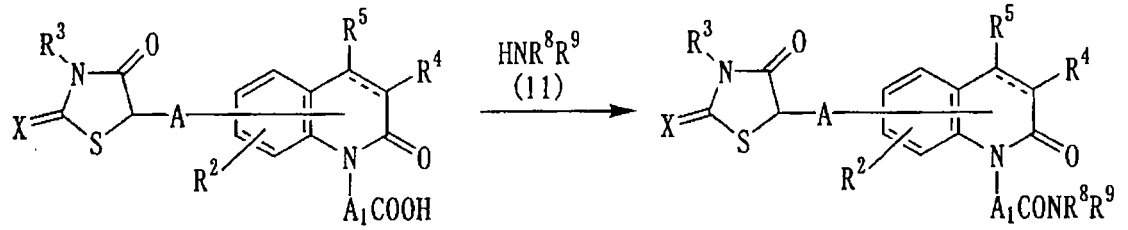


(1h) (1i)

wherein R^1, R^2, R^3, R^4, R^5, X, A, X_1, and the bond between the 3- and 4-positions of the carbostyril skeleton are as defined above, and R^{1a} is a group other than a hydrogen atom as defined in connection with R^1.

The reaction of Compound (1h) with Compound (10) is carried out under the same conditions as described in connection with the reaction of Compound (1e) with Compound (7) shown in Reaction Scheme 3 above.

Reaction Scheme 6



(1j) (1k)

wherein R^2, R^3, R^4, R^5, X, A, R^8, R^9, A_1, and the bond between the 3- and 4-positions of the carbostyril skeleton are as defined above.

A wide variety of reaction conditions selected for an ordinary amide bond formation reaction are applicable to the reaction of Compound (1j) with Compound (11), such as, in particular, (a) a mixed acid anhydride process in which Carboxylic Acid (1j) is reacted with an alkyl halocarboxylate to

form a mixed acid anhydride and reacting this anhydride with Amine (11), (b) an activated ester process in which Carboxylic Acid (1j) is activated into an activated ester such as phenyl ester, *p*-nitrophenyl ester, *N*-hydroxysuccinimide ester, 1-hydroxybenzotriazole ester, etc., or into an activated amide with benzoxazoline-2-thione, and then reacted with Amine (11), (c) a carbodiimide process in which Carboxylic Acid (1j) and Amine (11) are subjected to a condensation reaction in the presence of an activating agent such as dicyclohexylcarbodiimide, 1-(3-dimethylaminopropyl)-3-ethylcarbodiimide (WSC), carbonyldiimidazole, or the like, (d) other processes, for example, in which Carboxylic Acid (1j) is converted into a carboxylic anhydride using a dehydration agent such as acetic anhydride, and reacting this carboxylic anhydride with Amine (11); an ester of Carboxylic Acid (1j) formed with a lower alcohol is reacted with Amine (11) at a high temperature and high pressure; an acid halide of Carboxylic Acid (1j), i.e., a carboxylic acid halide, is reacted with Amine (11), and like processes.

A mixed acid anhydride for use in the mixed acid anhydride process described above can be obtained by an ordinary Schotten-Baumann reaction, and the reaction product is usually used for the reaction with Amine (11) to give the desired compound of Formula (1k) without isolation from the reaction mixture.

The above-described Schotten-Baumann reaction is usually carried out in the presence of a basic compound.

Such basic compounds include any conventional basic compounds for use in Schotten-Baumann reactions, for example, triethylamine, trimethylamine, pyridine, dimethylaniline, *N*-ethyldiisopropylamine, dimethylaminopyridine, *N*-methylmorpholine, DBN, DBU, DABCO, and like organic bases; and carbonates such as sodium carbonate, potassium carbonate, sodium hydrogencarbonate and potassium hydrogencarbonate, metal hydroxides such as sodium hydroxide, potassium hydroxide and calcium hydroxide, potassium

hydride, sodium hydride, potassium, sodium, sodium amide, metal alcoholates such as sodium methylate and sodium ethylate, and like inorganic bases. Such basic compounds are used singly or as a combination of two or more such compounds. The reaction is usually carried out at about -20 to about 100°C, and preferably about 0 to about 50°C. The reaction time is about 5 minutes to about 10 hours, and preferably about 5 minutes to about 2 hours.

The reaction of the resulting mixed acid anhydride with Amine (11) is usually carried out at about -20 to about 150°C, and preferably about 10 to about 50°C. The reaction time is about 5 minutes to about 10 hours, and preferably about 5 minutes to about 5 hours.

The mixed acid anhydride process is usually carried out in a solvent. Examples of solvents are those that are commonly used in connection with mixed acid anhydride processes. Specific examples are chloroform, dichloromethane, dichloroethane, carbon tetrachloride, and like halogenated hydrocarbons; benzene, toluene, xylene, and like aromatic hydrocarbons; diethyl ether, diisopropyl ether, tetrahydrofuran, dimethoxyethane, and like ethers; methyl acetate, ethyl acetate, isopropyl acetate, and like esters; *N,N*-dimethylformamide, dimethyl sulfoxide, hexamethylphosphoric triamide, and like aprotic polar solvents; mixtures of such solvents; etc.

Examples of alkyl halocarboxylates usable in the mixed anhydride process are methyl chloroformate, methyl bromoformate, ethyl chloroformate, ethyl bromoformate, isobutyl chloroformate, etc.

In the mixed acid anhydride process, Carboxylic Acid (1j), an alkyl halocarboxylate, and Amine (11) are preferably used equimolar to each other. However, an alkyl halocarboxylate and Amine (11) are each usable in an amount of about 1 to about 1.5 mol per mol of Carboxylic Acid (1j).

Process (c) in which a condensation reaction carried out in the presence of an activating agent as described above is performed in a suitable solvent either in the presence or absence

of a basic compound. Examples of solvents and basic compounds usable herein are those that are usable in the process in which a carboxylic acid halide is reacted with Amine (1b) as described in Processes (d) below. The amount of activating agent is usually used in an amount of at least 1 mol, and preferably 1 to 5 mol, per mol of Compound (1j). When WSC is used as an activating agent, the reaction advantageously progresses by introducing 1-hydroxybenzotriazole into the reaction system. The reaction is usually carried out at about -20 to 180°C, and preferably about 0 to about 150°C. The reaction usually completes in about 5 minutes to about 90 hours.

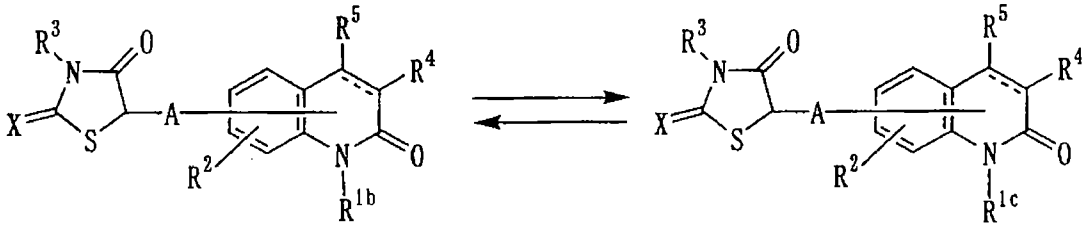
Among Processes (d), if a process in which a carboxylic acid halide is reacted with Amine (11) is selected, this reaction is carried out in the presence of a basic compound in a suitable solvent. Examples of basic compounds for use include a wide variety of known compounds such as those described above in connection with the Schotten-Baumann reaction. Examples of solvents include, in addition to those usable in the aforementioned mixed acid anhydride process, methanol, ethanol, isopropanol, propanol, butanol, 3-methoxy-1-butanol, ethyl cellosolve, methyl cellosolve, and like alcohols, acetonitrile, pyridine, acetone, water, etc. The ratio of carboxylic acid halide to Amine (11) is not limited and can be suitably selected from a broad range. It is usually such that, per mol of the former, the latter is used in an amount of at least about 1 mol, and preferably about 1 to about 5 mol. The reaction is usually carried out at about -20 to about 180°C, and preferably about 0 to about 150°C. The reaction is usually finished in about 5 minutes to about 30 hours.

Moreover, the amide bond formation reaction shown in Reaction Scheme 6 can be carried out by reacting Carboxylic Acid (1j) and Amine (11) in the presence of a condensing agent composed of a phosphorus compound such as triphenylphosphine, diphenylphosphinyl chloride, phenyl-*N*-phenylphosphoramide chloridate, diethyl chlorophosphate, diethyl cyanophosphate,

diphenyl azidophosphate, bis(2-oxo-3-oxazolidinyl)phosphinic chloride, etc. Such condensing agents can be used singly or as a combination of two or more such agents.

The reaction is usually carried out at about -20 to about 150°C, and preferably about 0 to about 100°C, using a solvent and basic compound that are also usable in the aforementioned process in which a carboxylic acid halide and Amine (11) are reacted. The reaction is usually finished in about 5 minutes to about 30 hours. Condensing agent and Amine (11) are each used in an amount of at least about 1 mol, and preferably about 1 to about 2 mol, per mol of Carboxylic Acid (1j).

Reaction Scheme 7



(11) (1m)

wherein R^2, R^3, R^4, R^5, X, A, and the bond between the 3- and 4-positions of the carbostyril skeleton are as defined above; R^{1b} is a group as defined in (1-9) in connection with R^1 above; and R^{1c} is a group as defined in (1-8) in connection with R^1 above.

The reaction for producing Compound (1m) from Compound (11) is carried out under conditions as described in connection with the reaction for producing Compound (9) from Compound (8) shown in Reaction Scheme 4 above.

The reaction for producing Compound (11) from Compound (1m) can be carried out by reacting Compound (1m) with a compound represented by the formula

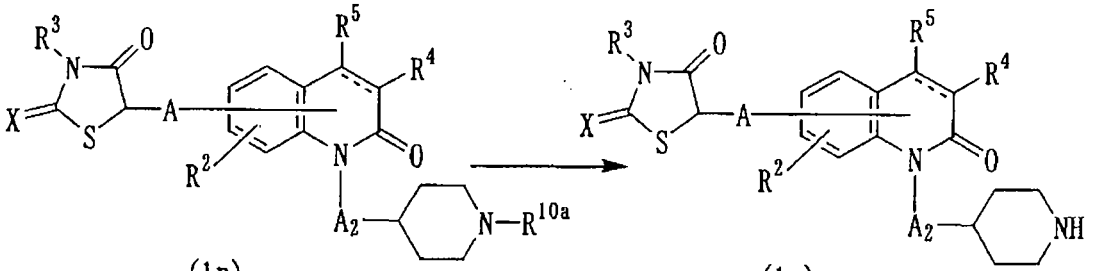
$$R^{23}OH \qquad (50)$$

wherein R^{23} is a lower alkyl group.

Conditions usually selected for esterification reactions are applicable to the reaction. For example, it may be carried out in the presence of hydrochloric acid, sulfuric acid,

or like a mineral acid; or thionyl chloride, phosphorus oxychloride, phosphorus pentachloride, phosphorus trichloride, or like halogenating agent. Compound (50) is used in a large excess relative to Compound (1m). The reaction advantageously progresses usually at about 0 to about 150°C, and preferably about 50 to about 100°C. The reaction is usually finished in about 1 to about 10 hours.

Reaction Scheme 8



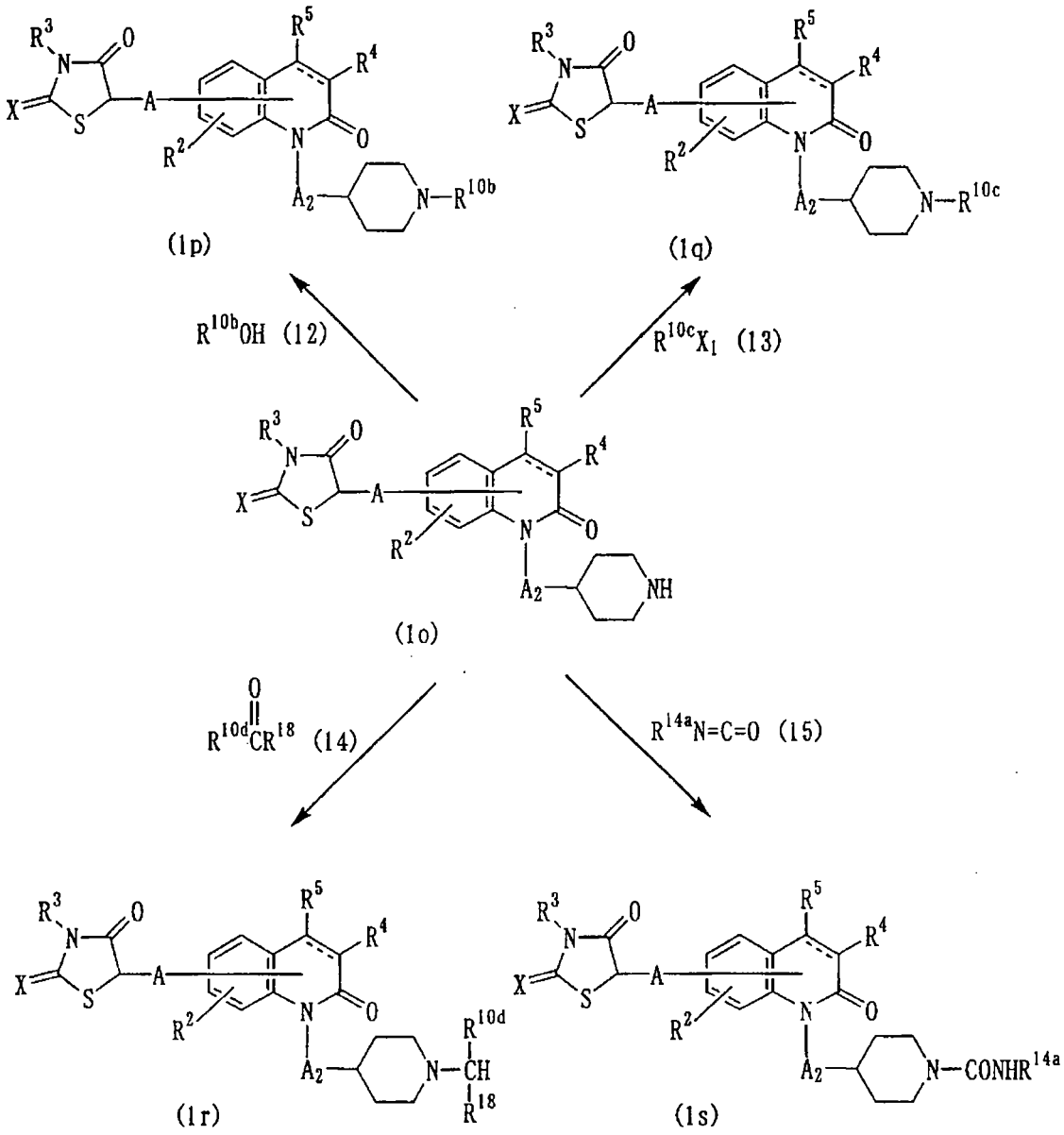
(1n) (1o)

wherein R^2, R^3, R^4, R^5, X, A, A_2, and the bond between the 3- and 4-positions of the carbostyril skeleton are as defined above, and R^{10a} is a group as defined in (7-3) and (7-44) in connection with R^{10} above.

The reaction for producing Compound (1o) from Compound (1n) is carried out under the same conditions as described in connection with the reaction for producing Compound (9) from Compound (8) shown in Reaction Scheme 4 above.

When R^{10a} of Compound (1n) is a group as defined in (7-44), the above-presented reaction may be carried out in the presence of a fluorine compound. Examples of fluorine compounds are ammonium tetrafluoride, tetra-*N*-butyl ammonium fluoride, pyridine hydrofluoride, etc. Among such examples, tetra-*N*-butyl ammonium fluoride is preferable. Fluorine compound is usually used in at least 1 mol, and preferably 1 to 2 mol, per mol of Compound (1n).

Reaction Scheme 9



wherein R^2, R^3, R^4, R^5, X, A, A_2, X_1, and the bond between the 3- and 4-positions of the carbostyril skeleton are as defined above;

R^{10b} is a group as defined in (7-3) to (7-7), (7-9) to (7-20), (7-30) to (7-35), and (7-44) in connection with R^{10} above;

R^{10c} is a group as defined in (7-2), (7-8), (7-21) to (7-29), and (7-37) to (7-43) in connection with R^{10} above;

R^{10d} is a group as defined in (7-1), (7-2), (7-21) to (7-29), and (7-40) in connection with R^{10} above; furyl group; pyridyl group optionally substituted on the pyridine ring with one or more

members selected from the group consisting of halogen atoms and lower alkyl groups, each lower alkyl substituent optionally being substituted with one or more halogen atoms; thienyl group optionally substituted on the thiophene ring with one or more halogen atoms; phenyl group optionally substituted on the phenyl ring with one or more members selected from the group consisting of lower alkoxy groups optionally substituted with one or more halogen atoms, a cyano group, lower alkyl groups optionally substituted with one or more halogen atoms, amino groups optionally substituted with one or more members selected from the group consisting of lower alkyl groups and lower alkanoyl groups, halogen atoms, lower alkoxycarbonyl groups, lower alkanoyloxy groups, lower alkylsulfonyl groups, lower alkylthio groups, and pyrrolidinyl groups; thiazolyl group; imidazolyl group optionally substituted on the imidazole ring with one or more lower alkyl groups; pyrrolyl group optionally substituted on the pyrrole ring with one or more lower alkyl groups; or cycloalkyl group;
R^{14a} is a group as defined in (10-1) to (10-3) in connection with R^{14} above; and
R^{18} is a hydrogen atom or lower alkyl group,
provided that the total number of carbon atoms of the group $CH(R^{10d})R^{18}$ of Compound (1r) is not greater than 6.

The reaction of Compound (1o) with Compound (12) is carried out under the same conditions as described in connection with the reaction of Compound (1j) with Compound (11) shown in Reaction Scheme 6 above, provided that with respect to the reaction of Compound (1o) with Compound (12), the amounts of alkyl halocarboxylate, Carboxylic Acid (12), activating agent, condensing agent, carboxylic acid halide, etc., are relative to Compound (1o).

The reaction of Compound (1o) with Compound (13) is carried out under the same conditions as described in connection with the reaction of Compound (1e) with Compound (7) shown in Reaction Scheme 3 above.

The reaction of Compound (1o) with Compound (14) may be

carried out, for example, either in a suitable solvent or without a solvent, in the presence of a reducing agent.

Examples of solvents usable herein are water, lower alcohols such as methanol, ethanol, isopropanol, butanol, *tert*-butanol and ethylene glycol, acetonitrile, aliphatic acids such as formic acid and acetic acid, ethers such as diethyl ether, tetrahydrofuran, dioxane, monoglyme and diglyme, aromatic hydrocarbons such as benzene, toluene and xylene, halogenated hydrocarbons such as dichloromethane, dichloroethane, chloroform, carbon tetrachloride, mixtures of such solvents, etc.

Examples of reducing agents are aliphatic acids such as formic acid, aliphatic acid alkali metal salts such as sodium formate and sodium acetate, hydride reducing agents such as sodium borohydride, sodium cyanoborohydride, sodium triacetoxyborohydride and aluminium lithium hydride, mixtures of such hydride reducing agents, catalytic hydrogenation reducing agent such as palladium black, palladium carbon, platinum oxide, platinum black, Raney nickel, etc.

When an aliphatic acid such as formic acid or an aliphatic acid alkali metal salt such as sodium formate or sodium acetate is used as a reducing agent, a suitable reaction temperature is usually about room temperature to about 200°C, and preferably about 50 to about 150°C. The reaction is usually finished in about 10 minutes to about 10 hours. Such aliphatic acids and aliphatic acid alkali metal salts are usually used in a large excess relative to Compound (1o).

When a hydride reducing agent is used, a suitable reaction temperature is usually about -80 to about 100°C, and preferably about -80 to about 70°C. The reaction is usually finished in about 30 minutes to about 60 hours. The hydride reducing agent is usually used in an amount of about 1 to about 20 mol, and preferably about 1 to about 6 mol, per mol of Compound (1o). In particular, when aluminium lithium hydride is used as a hydride reducing agent, it is preferable to use diethyl ether, tetrahydrofuran, dioxane, monoglyme, diglyme, or like

ether; or benzene, toluene, xylene, or like aromatic hydrocarbon as a solvent. Trimethylamine, triethylamine, *N*-ethyldiisopropylamine, or like amine; or molcular sieves 3A (MS-3A), molcular sieves 4A (MS-4A), or like molcular sieves may be introduced into the reaction system of the reaction.

When a catalytic hydrogenation reducing agent is used, the reaction is usually carried out at about -30 to about 100° C, and preferably about 0 to about 60° C, in a hydrogen atmosphere usually of about atmospheric pressure to about 20 atm, and preferably about atmospheric pressure to about 10 atm, or in the presence of formic acid, ammonium formate, cyclohexene, hydrazine hydrate, or like hydrogen donor. The reaction is usually finished in about 1 to about 12 hours. The catalytic hydrogenation reducing agent is usually used in an amount of about 0.1 to about 40 wt.%, and preferably about 1 to about 20 wt.%, relative to Compound (1o).

In the reaction of Compound (1o) with Compound (14), Compound (14) is usually used in an amount at least equimolar, and preferably equimolar to a large excess, relative to Compound (1o).

The reaction of Compound (1o) with Compound (15) is carried out in the presence or absence of basic compound, but preferably in the absence of basic compound, in a suitable inert solvent or without a solvent.

Examples of inert solvents and basic compounds include those that are for use in one of the Processes (d) in which a carboxylic acid halide is reacted with Amine (11) for the reaction of Compound (1o) with Compound (12) (amide bond formation reaction).

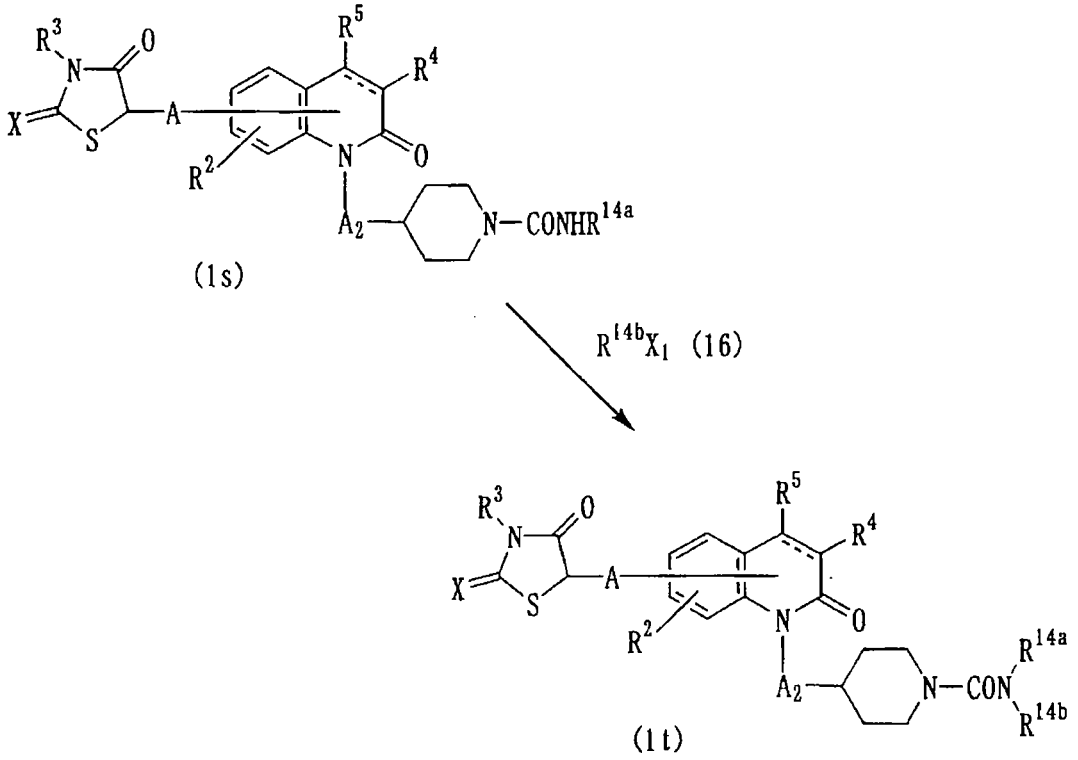
The amount of Compound (15) is usually about 1 to about 5 mol, and preferably about 1 to about 3 mol, per mol of Compound (1o).

The reaction advantageously proceeds usually at about 0 to about 200° C, and preferably about room temperature to about 150° C. The reaction is usually finished in about 5 minutes to

about 30 hours.

Boron trifluoride diethyl ether complex or like boron compound may be introduced into the reaction system of the reaction.

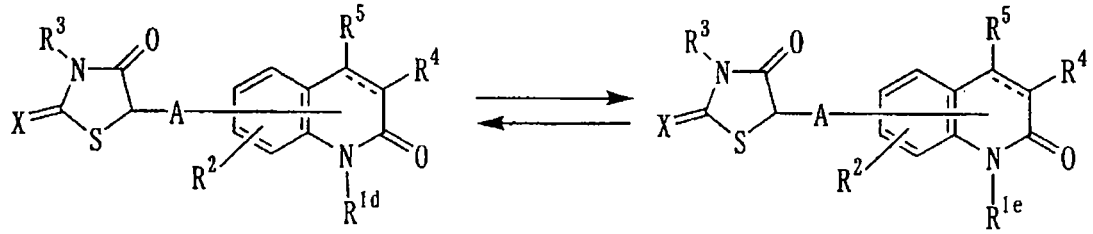
Reaction Scheme 10



wherein R^2, R^3, R^4, R^5, X, A, A_2, X_1, R^{14a}, and the bond between the 3- and 4-positions of the carbostyril skeleton are as defined above, and R^{14b} is a group as defined in (10-2) and (10-3) in connection with R^{14} above.

The reaction of Compound (1s) with Compound (16) is carried out under the same conditions as described in connection with the reaction of Compound (1e) with Compound (7) shown in Reaction Scheme 3 above.

Reaction Scheme 11



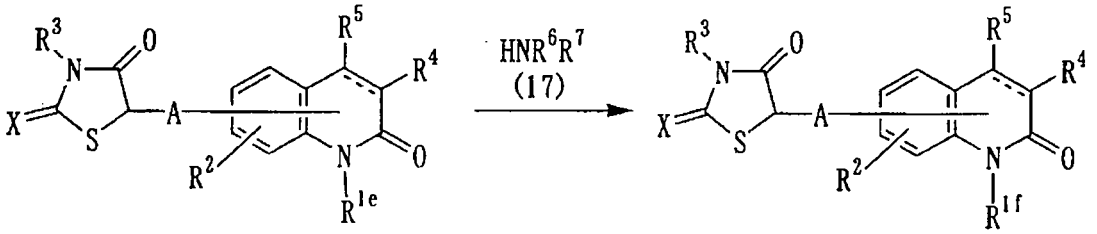
(1u) (1v)

wherein R^2, R^3, R^4, R^5, X, A, and the bond between the 3- and 4-positions of the carbostyril skeleton are as defined above; R^{1d} is a group as defined in (1-3) in connection with R^1 above except for having at least one lower alkoxycarbonyl group on the phenyl ring; and R^{1e} is a group as defined in (1-3) in connection with R^1 above except for having at least one carboxy group on the phenyl ring.

The reaction for producing Compound (1v) from Compound (1u) is carried out under the same conditions as described in connection with the reaction for producing Compound (9) from Compound (8) shown in Reaction Scheme 4 above.

The reaction for producing Compound (1u) from Compound (1v) is carried out under the same conditions as described in connection with the reaction for producing Compound (11) from Compound (1m) shown in Reaction Scheme 7 above.

Reaction Scheme 12

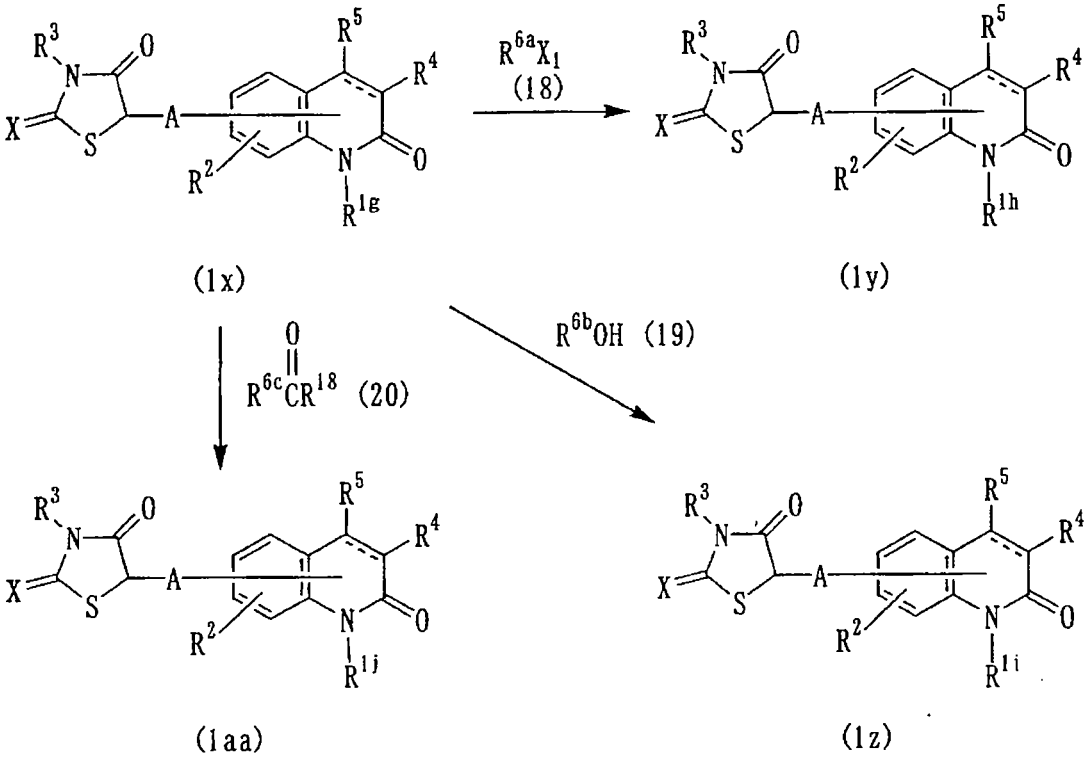


(1v) (1w)

wherein R^2, R^3, R^4, R^5, X, A, R^6, R^7, R^{1e}, and the bond between the 3- and 4-positions of the carbostyril skeleton are as defined above; and R^{1f} is a group as defined in (1-3) in connection with R^1 above except for having at least one $-CONR^6R^7$ group on the phenyl ring.

The reaction of Compound (1v) with Compound (17) is carried out under the same conditions as described in connection with the reaction of Compound (1j) with Compound (11) shown in Reaction Scheme 6 above.

Reaction Scheme 13



wherein R^2, R^3, R^4, R^5, X, A, X_1, R^{18}, and the bond between the 3- and 4-positions of the carbostyril skeleton are as defined above;

R^{1g} is a group as defined in (1-3) in connection with R^1 above except for having at least one $-(B)_lNHR^{7a}$ group on the phenyl ring, provided that l is as defined above;

R^{1h} is a group as defined in (1-3) in connection with R^1 above except for having at least one $-(B)_lN(R^{6a})R^{7a}$ group on the phenyl ring;

R^{1i} is a group as defined in (1-3) in connection with R^1 above except for having at least one $-(B)_lN(R^{6b})R^{7a}$ group on the phenyl ring;

R^{1j} is a group as defined in (1-3) in connection with R^1 above except for having at least one $-(B)_lN[CH(R^{6c})R^{18}]R^{7a}$ group on the

phenyl ring, provided that the total number of carbon atoms of $CH(R^{6c})R^{18}$ is no greater than 6;

l is as defined above;

R^{7a} is a group as defined in (4-1) to (4-79) in connection with R^7 above;

R^{6a} is a group as defined in (4-2), (4-4), (4-6), (4-8) to (4-11), (4-19) to (4-32), (4-34) to (4-37), (4-60), (4-62) to (4-72), (4-78), and (4-79) in connection with R^6 above;

R^{6b} is a group as defined in (4-3), (4-5), (4-7), (4-12) to (4-18), (4-33), (4-38) to (4-59), (4-61), (4-73) to (4-77) in connection with R^6 above; and

R^{6c} is a group as defined in (4-1), (4-2), (4-6), (4-9), (4-20), (4-21), (4-23) to (4-29), (4-31), (4-32), and (4-34); pyridyl group; tetrahydropyranyl group; cycloalkyl group; phenyl group optionally substituted on the phenyl ring with one or more members selected from the group consisting of halogen atoms, lower alkyl groups optionally substituted with one or more halogen atoms, lower alkoxy groups optionally substituted with one or more halogen atoms, and hydroxy groups; lower alkylenedioxy-substituted phenyl group; furyl group; imidazolyl group optionally substituted on the imidazole ring with one or more members selected from the group consisting of a carbamoyl group and lower alkoxycarbonyl groups; pyrrolidinyl group optionally substituted on the pyrrolidine ring with one or more lower alkyl groups; or morpholino group.

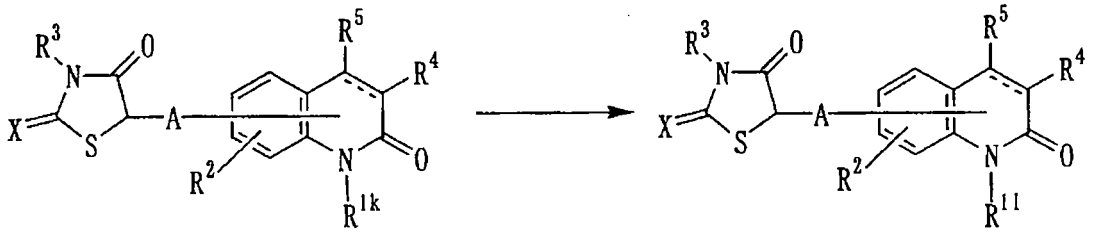
The reaction of Compound (1x) with Compound (18) is carried out under the same conditions as described in connection with the reaction of Compound (1o) with Compound (12) shown in Reaction Scheme 9 above.

The reaction of Compound (1x) with Compound (19) is carried out under the same conditions as described in connection with the reaction of Compound (1o) with Compound (13) shown in Reaction Scheme 9 above.

The reaction of Compound (1x) with Compound (20) is carried out under the same conditions as described in connection

with the reaction of Compound (1o) with Compound (14) shown in Reaction Scheme 9 above.

Reaction Scheme 14



(1bb) (1cc)

wherein R^2, R^3, R^4, R^5, X, A, and the bond between the 3- and 4-positions of the carbostyril skeleton are as defined above; R^{1k} is a group as defined in (1-3) in connection with R^1 above except for having at least one nitro group on the phenyl ring; and R^{11} is a group as defined in (1-3) in connection with R^1 above except for having at least one amino group on the phenyl ring.

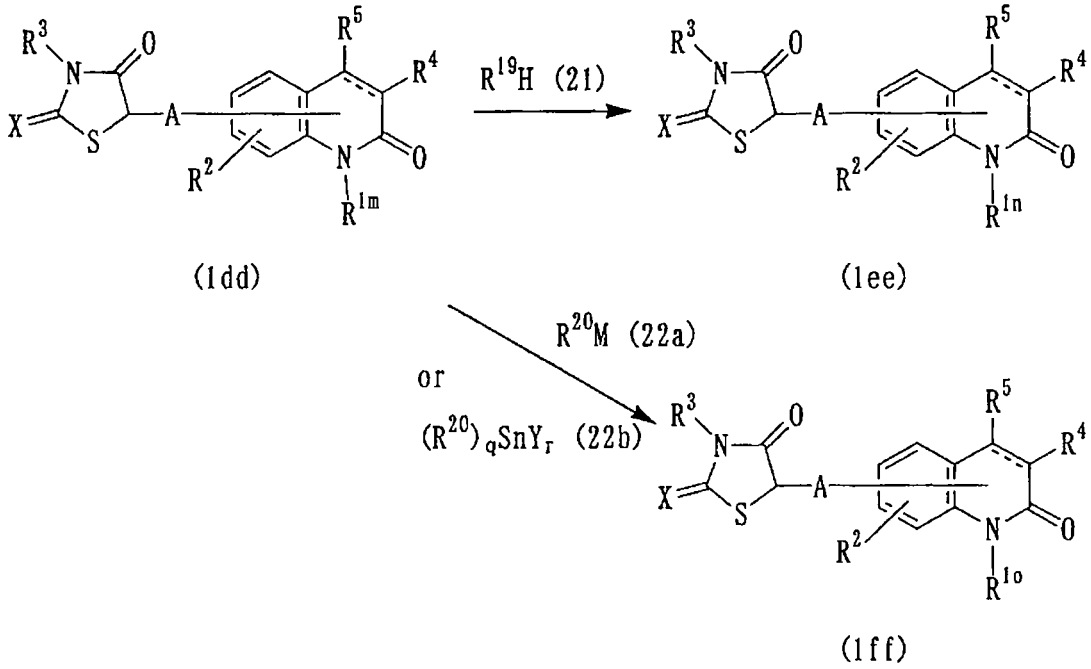
The reaction for producing Compound (1cc) from Compound (1bb) can be carried out by, for example, (1) reducing Compound (1bb) in a suitable solvent using a catalytic hydrogenation reducing agent, or (2) reducing Compound (1bb) in a suitable inert solvent using as a reducing agent a mixture of an acid with a metal or metal salt, a mixture of a metal or metal salt with an alkali metal hydroxide, sulfide, or ammonium salt, or the like.

When using Method (1) above, examples of usable solvents are water, acetic acid, alcohols such as methanol, ethanol and isopropanol, hydrocarbons such as *n*-hexane and cyclohexane, ethers such as dioxane, tetrahydrofuran, diethyl ether and diethylene glycol dimethyl ether, esters such as ethyl acetate and methyl acetate, aprotic polar solvents such as *N,N*-dimethylformamide, mixtures of such solvents, etc. Examples of usable catalytic hydrogenation reducing agent include palladium, palladium black, palladium carbon, platinum carbon, platinum, platinum oxide, copper chromite, Raney nickel, etc. Such reducing agent may be used singly or as a combination of two or more such agents. Reducing agent is usually used in an amount of about 0.02

times to equal to the weight of Compound (1bb). The reaction temperature is usually about -20 to about 150° C, and preferably about 0 to about 100° C. The hydrogen pressure is usually about 1 to 10 atm. The reaction is usually finished in about 0.5 to about 100 hours. An acid such as hydrochloric acid may be introduced into the reaction system of the reaction.

When using Method (2) above, a mixture of iron, zinc, tin, or tin(II) chloride, with a mineral acid such as hydrochloric acid, or sulfuric acid; or a mixture of iron, iron(II) sulfate, zinc, or tin, with an alkali metal hydroxide such as sodium hydroxide, a sulfide such as ammonium sulfide, aqueous ammonia, or an ammonium salt such as ammonium chloride, or the like can be used as a reducing agent. Examples of inert solvents are water, acetic acid, alcohols such as methanol and ethanol, ethers such as dioxane, mixtures of such solvents, etc. Conditions for the reduction reaction can be suitably selected according to the reducing agent to be used. For example, when a mixture of tin(II) chloride and hydrochloric acid is used as a reducing agent, it is advantageous to carry out the reaction at about 0 to about 150° C for about 0.5 to about 10 hours. Reducing agent is used in an amount of at least 1 mol, and usually about 1 to 5 mol, per mol of Compound (1bb).

Reaction Scheme 15



wherein R^2, R^3, R^4, R^5, X, A, and the bond between the 3- and 4-positions of the carbostyril skeleton are as defined above;

R^{1m} is a group as defined in (1-10) in connection with R^1 above except for having at least one halogen atom on the pyridine ring;

R^{1n} is a group as defined in (1-10) in connection with R^1 above except for having on the pyridine ring at least one member selected from piperidinyl groups; morpholino group; piperazinyl group optionally substituted on the piperazine ring with one or more members selected from the group consisting of a phenyl group and lower alkyl groups; anilino group optionally substituted on the amino group with one or more lower alkyl groups; pyridylamino group; or pyridylcarbonylamino group;

R^{1o} is a group as defined in (1-10) in connection with R^1 above except for having at least one member selected from thienyl groups, a phenyl group, pyridyl groups and a biphenyl group;

R^{19} is a piperidinyl group; morpholino group; piperazinyl group optionally substituted on the piperazine ring with one or more members selected from the group consisting of a phenyl group and lower alkyl groups; anilino group optionally substituted on the amino group with one or more lower alkyl groups; pyridylamino group; or pyridylcarbonylamino group;

R^{20} is a thienyl group, phenyl group, pyridyl group, or biphenyl group;

M is an alkali metal such as lithium, potassium, sodium or the like, $-MgX_1$ (X_1 is as defined above), $-ZnX_1$ (X_1 is as defined above), or $-B(OH)_2$;

Y is a lower alkyl group;

q is 1 to 4; and

r is 1 to 3, provided that q + r equals 4.

The reaction of Compound (1dd) with Compound (21) is carried out in a suitable solvent in the presence of a basic compound and a catalyst.

Examples of solvents and basic compounds usable herein include those that are usable in the reaction of Compound (1e) with Compound (7) shown in Reaction Scheme 3 above.

Examples of catalysts are bis(tributyltin)/bis(dibenzylideneacetone)palladium, *R*-tris(dibenzylideneacetone)dipalladium, *S*-tris(dibenzylideneacetone)dipalladium, palladium(II) acetate, and like palladium compounds; *R*-2,2'-bis(diphenylphosphino)-1,1'-binaphthyl (*R*-BINAP), *S*-2,2'-bis(diphenylphosphino)-1,1'-binaphthyl (*S*-BINAP), *RAC*-2,2'-bis(diphenylphosphino)-1,1'-binaphthyl (*RAC*-BINAP), 2,2-bis(diphenylimidazolidinylidene), and like compounds; 4,5-bis(diphenylphosphino)-9,9-dimethylxanthene, and like xanthene compounds; *tert*-butylphosphine, *tert*-butylphosphine tetrafluoroborate, and like alkylphosphines; salts thereof; mixtures thereof; etc.

Basic compound is usually used in an amount of at least 1 mol, and preferably 1 to 2 mol, per mol of Compound (1dd).

Catalyst is used in a typical catalytic amount relative to Compound (1dd).

Compound (21) is usually used in an amount of at least 1 mol, and preferably 1 to 2 mol, per mol of Compound (1dd).

The reaction is usually carried out at about room temperature to about 200°C, and preferably about room temperature to about 150°C. The reaction is usually finished in about 0.5 to

about 20 hours.

The reaction of Compound (1dd) with Compound (22a) or (22b) is carried out in a suitable solvent in the presence of a basic compound and a catalyst.

Solvents usable herein include, in addition to water, those that are usable in the reaction of Compound (1e) with Compound (7) shown in Reaction Scheme 3 above.

Basic compounds usable herein include those that are usable in the reaction of Compound (1e) with Compound (7) shown in Reaction Scheme 3 above.

Examples of catalysts are tetrakis(triphenylphosphine)palladium(0), dichlorobis(triphenylphosphine)palladium(II), and like palladium compounds.

Basic compound is usually used in an amount of at least 1 mol, and preferably 1 to 5 mol, per mol of Compound (1dd).

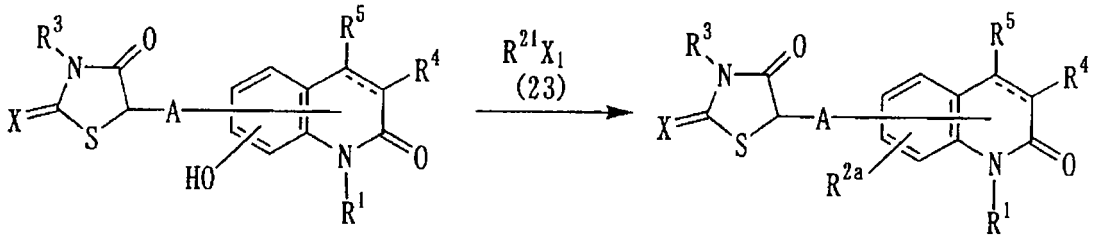
Catalyst is usually used in an amount of 0.001 to 1 mol per mol of Compound (1dd), and preferably 0.01 to 0.5 mol, per mol of Compound (1dd).

Compound (21) is usually used in an amount of at least 1 mol, and preferably 1 to 5 mol, per mol of Compound (1dd).

The reaction is usually carried out at about -30 to about 200°C, and preferably about 0 to about 150°C. The reaction is usually finished in about 0.5 to about 20 hours.

With respect to the reaction, when M is an alkali metal salt or MgX_1, the reaction proceeds in the absence of basic compound and catalyst.

Reaction Scheme 16



(1gg) (1hh)

wherein R^1, R^3, R^4, R^5, X, A, X_1, and the bond between the 3- and 4-positions of the carbostyril skeleton are as defined above; R^{2a} is a group as defined in (2-2), (2-4), (2-5), and (2-7) to (2-32) in connection with R^2 above; and

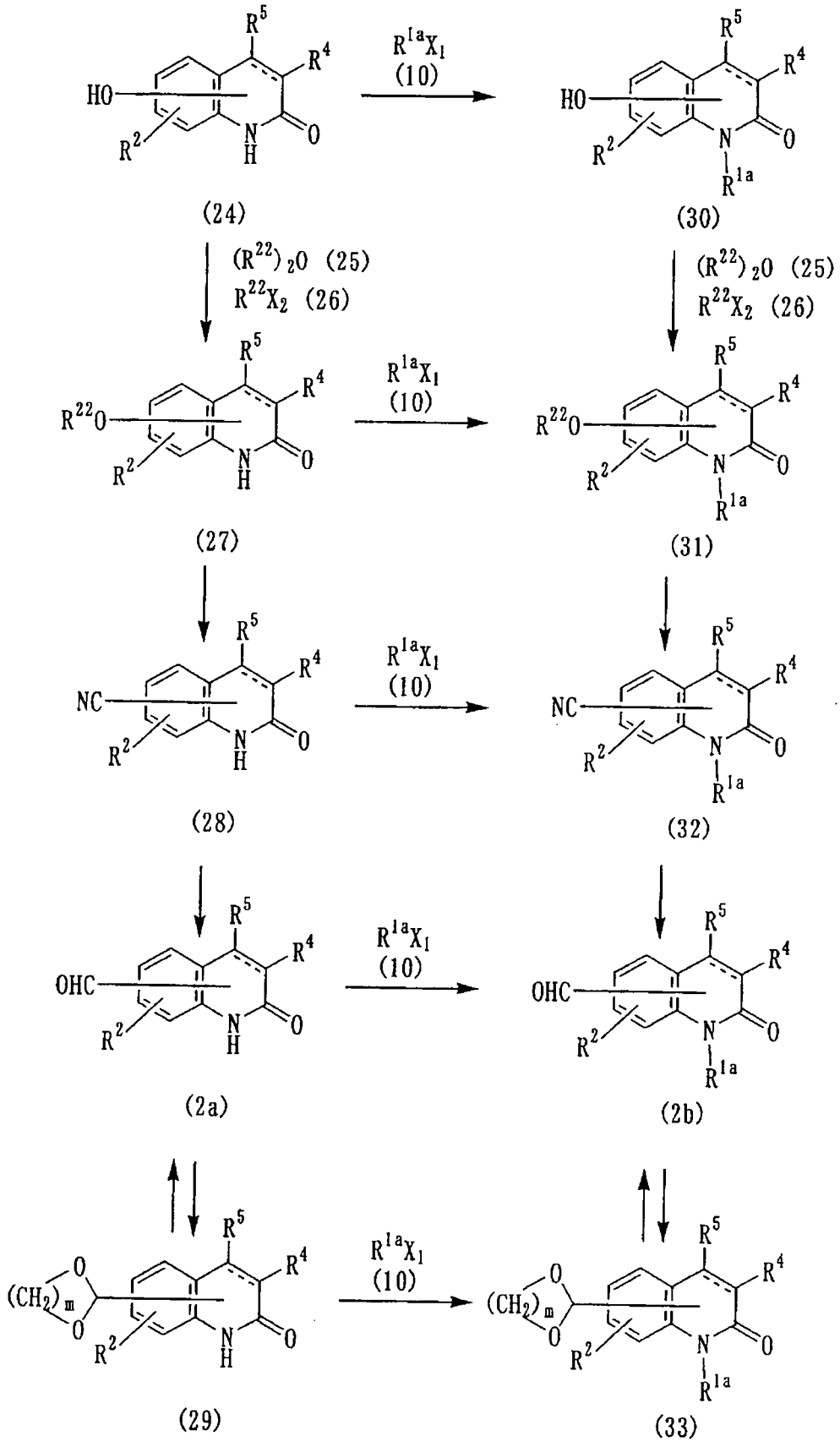
R^{21} is a lower alkyl group; carboxy lower alkyl group; lower alkoxycarbonyl lower alkyl; phenyl lower alkyl group optionally substituted on the phenyl ring with one or more members selected from the group consisting of halogen atoms, lower alkyl groups optionally substituted with one or more halogen atoms, lower alkylthio groups optionally substituted with one or more halogen atoms, lower alkoxy groups, a nitro group, lower alkylsulfonyl groups, lower alkoxycarbonyl groups, phenyl lower alkenyl groups, lower alkanoyloxy groups, and 1,2,3-thiodiazolyl groups; piperidinyl lower alkyl group optionally substituted on the piperidine ring with one or more lower alkyl groups; amino-substituted lower alkyl group optionally substituted with one or more lower alkyl groups; lower alkenyl group; pyridyl lower alkyl group optionally substituted on the pyridine ring with one or more lower alkyl groups, each lower alkyl substituent optionally being substituted with one or more halogen atoms; lower alkynyl group; phenyl lower alkynyl group; phenyl lower alkenyl group; furyl lower alkyl group optionally substituted on the furan ring with one or more lower alkoxycarbonyl groups; tetrazolyl lower alkyl group optionally substituted on the tetrazole ring with a substituent selected from the group consisting of a phenyl group, phenyl lower alkyl groups, and cycloalkyl lower alkyl groups; 1,2,4-oxadiazolyl lower alkyl group optionally substituted on the 1,2,4-oxadiazole ring with a phenyl group, the phenyl substituent optionally being substituted on the phenyl ring with one or more lower alkyl groups; isooxazolyl lower alkyl group optionally substituted on the isoxazole ring with one or more lower alkyl groups; 1,3,4-oxadiazolyl lower alkyl group optionally substituted on the 1,3,4-oxadiazole ring with a phenyl group, the phenyl substituent optionally being substituted on the phenyl ring with one or more lower alkyl groups; lower alkanoyl lower

alkyl group; thiazolyl lower alkyl group optionally substituted on the thiazole ring with one or more members selected from the group consisting of lower alkyl groups and phenyl groups, each phenyl substituent optionally being substituted on the phenyl ring with one or more halogen atoms; piperidinyl group optionally substituted on the piperidine ring with one or more benzoyl groups, each benzoyl substituent optionally being substituted on the phenyl ring with one or more halogen atoms; thienyl lower alkyl group; phenylthio lower alkyl group; carbamoyl-substituted lower alkyl group optionally substituted with one or more lower alkyl groups; benzoyl lower alkyl group; pyridylcarbonyl lower alkyl group; imidazolyl lower alkyl group optionally substituted on the imidazole ring with one or more phenyl lower alkyl groups; phenoxy lower alkyl group; phenyl lower alkoxy-substituted lower alkyl group; 2,3-dihydro-1*H*-indenyl group; or isoindolinyl lower alkyl group optionally substituted on the isoindoline ring with one or more oxo groups.

The reaction of Compound (1gg) with Compound (23) is carried out under the same conditions as described in connection with the reaction of Compound (1e) with Compound (7) shown in Reaction Scheme 3 above.

Compounds (2), (4) and (8) used as starting materials as shown in the reaction scheme given above can be produced according to, for example, the reaction scheme below.

Reaction Scheme 17


R5
R4
HO
R2
N
H
O
R1aX1
(10)
(24)
(30)
(R22)20 (25)
R22X2 (26)
R22O
(27)
(31)
NC
(28)
(32)
OHC
(2a)
(2b)
(CH2)m
(29)
(33)

wherein R^{1a}, R^2, R^4, R^5, X_1, and the bond between the 3- and 4-positions of the carbostyril skeleton are as defined above; R^{22} is a lower alkylsulfonyl group optionally having at least one halogen atom; X_2 is a halogen atom; and m is 1 to 4.

The reaction of Compound (24) with Compound (25) or (26) and the reaction of Compound (30) with Compound (25) or (26) can be carried out under the same conditions as described in one of the Processes (d) in which an acid halide of Carboxylic Acid (1j), i.e., a carboxylic acid halide, is reacted with Amine (11) for the reaction of Compound (1j) with Compound (11) shown in Reaction Scheme 6 above.

The reaction for producing Compound (28) from Compound (27) and the reaction for producing Compound (32) from Compound (31) can be achieved by reacting Compound (27) with a metal cyanide, and Compound (31) with a metal cyanide, respectively, in a suitable solvent in the presence of a catalyst.

Examples of metal cyanides are sodium cyanide, potassium cyanide, silver cyanide, zinc cyanide, cuprous cyanide, etc.

Examples of solvents and catalysts usable in these reactions include those that are usable in the reaction of Compound (1dd) with Compound (22) shown in Reaction Scheme 15 above.

Catalyst is usually used in an amount of 0.01 to 1 mol, and preferably 0.01 to 0.5 mol, per mol of Compound (27) or (31).

Metal cyanide is usually used in an amount of at least 1 mol, and preferably 1 to 3 mol, per mol of Compound (27) or (31).

The reactions are usually carried out at about room temperature to 200°C, and preferably about room temperature to about 150°C. The reactions are usually finished in about 1 hour to about 1 week.

The reaction for producing Compound (2a) from Compound (28) and the reaction for producing Compound (2b) from Compound

(32) are carried out in a suitable solvent in the presence of a reducing agent.

Examples of solvents usable herein are formic acid and like aliphatic acids; dioxane, tetrahydrofuran, diethyl ether, diethylene glycol dimethyl ether, and like ethers; benzene, toluene, xylene, and like aromatic hydrocarbons, dichloromethane, dichloroethane, chloroform, carbon tetrachloride, and like halogenated hydrocarbons; and mixtures of such solvents.

Examples of reducing agents are diisobutylaluminum hydride and like alkylaluminum hydrides, Raney nickel, etc. Reducing agent is usually used in an amount at least equal to, and preferably equal to to 5 times, the weight of Compound (28) or (32).

The reactions are usually carried out at about room temperature to 200° C, and preferably about room temperature to about 150° C. The reactions are usually finished in about 0.5 to about 20 hours.

Compounds (2a) and (2b) can be produced by reducing compounds (28) and (32), respectively, under the same conditions as described in connection with the reaction, as shown in Reaction scheme 1, for producing Compound (1b) from Compound (1a) when a catalytic hydrogenation reducing agent is used. It is desirable to introduce an inorganic acid such as hydrochloric acid or sulfuric acid into the reaction system usually in an amount of at least 1 mol, and preferably 1 to 2 mol, per mol of compounds (28) or (32).

The reaction for producing Compound (29) from Compound (2a) and the reaction for producing Compound (33) from Compound (2b) are carried out, in a suitable solvent in the presence of an acid, by separately reacting Compound (2a) and Compound (2b) with an alcohol compound represented by

$$HO\text{-}(CH_2)_m\text{-}OH \qquad (51)$$

wherein m is as defined above.

Solvents and acids usable herein include those that are usable in the reaction of Compound (2) with Compound (3) shown in

Reaction Scheme 1 above.

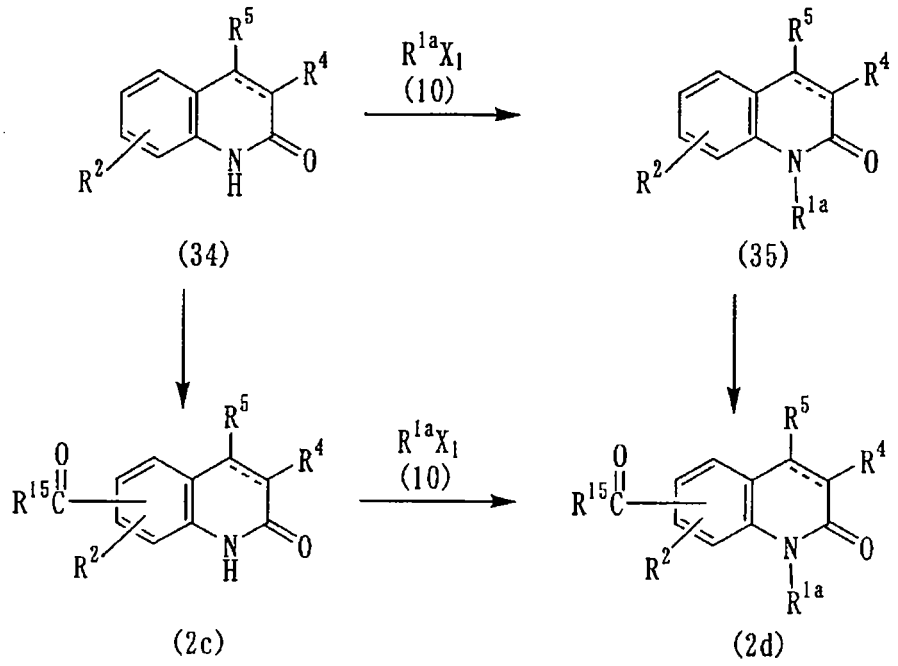
It is usually advantageous to use an acid in a catalytic amount. The amount of Compound (51) is usually at least 1 mol, and preferably 1 to 5 mol, per mol of Compound (2a) or (2b).

The reactions are usually carried out at about room temperature to 200° C, and preferably about room temperature to about 150° C. The reactions are usually finished in about 0.5 hours to about 10 hours.

The reaction of Compound (24) with Compound (10), the reaction of Compound (27) with Compound (10), the reaction of Compound (28) with Compound (10), the reaction of Compound (2a) with Compound (10), and the reaction of Compound (29) with Compound (10) are carried out under the same conditions as described in connection with the reaction of Compound (1e) with Compound (7) shown in Reaction scheme 3.

The reaction for producing Compound (2a) from Compound (29) and the reaction for producing Compound (2b) from Compound (33) are carried out under the same conditions as described in connection with the reaction for producing Compound (9) from Compound (8) shown in Reaction scheme 4. In these reactions, pyridinium *p*-toluenesulfonate and like sulfonates are usable as acids.

Reaction Scheme 18



wherein R^{1a}, R^2, R^4, R^5, R^{15}, X_1, and the bond between the 3- and 4-positions of the carbostyril skeleton are as defined above.

The reaction for producing, from Compound (34), Compound (2c) wherein R^{15} is a hydrogen atom, and the reaction for producing, from Compound (35), Compound (2d) wherein R^{15} is a hydrogen atom, are carried out, in a suitable solvent in the presence of a catalyst, by separately reacting Compound (34) and Compound (35) with a compound represented by

$$X_1(X_2)CHOR^{24} \qquad (52)$$

wherein X_1 and X_2 are as defined above, and R^{24} is a lower alkyl group.

Solvents usable herein include those that are usable in the reaction of Compound (1dd) with Compound (22) shown in Reaction Scheme 15 above.

Examples of catalysts are titanium tetrachloride and like titanium compounds; tin(IV) chloride and like tin compounds; aluminium chloride and like aluminium compounds; etc. Catalyst is usually used in an amount of at least 1 mol, and preferably 1 to 5 mol, per mol of Compound (34) or (35).

Compound

(52) is usually used in an amount of at least 1 mol, and preferably 1 to 5 mol, per mol of Compound (34) or (35).

The reaction is usually carried out at about 0 to about 70° C, and preferably about 0 to about 50° C. The reaction is usually finished in about 1 minute to about 1 hour.

The reaction for producing, from Compound (34), Compound (2c) wherein R^{15} is a hydrogen atom, and the reaction for producing, from Compound (35), Compound (2d) wherein R^{15} is a hydrogen atom, can be carried out, in the presence of a halogenating agent and an acid, by separately reacting Compound (34) and Compound (35) with *p*-formaldehyde and then hexamethylenetetramine.

Examples of halogenating agents usable herein are hydrochloric acid, hydrobromic acid, etc. Examples of acids are sulfuric acid, phosphoric acid, and like inorganic acids; *p*-toluenesulfonic acid, formic acid, acetic acid, and like organic acids; and mixtures of such acids. Halogenating agent and acid are usually used in large excess.

p-Formaldehyde is usually used in an amount at least 0.1 times, and preferably 0.1 times to equal to, Compound (34) or (35).

Hexamethylenetetramine is usually used in an amount of at least 1 mol, and preferably 1 to 5 mol, per mol of compound (34) or (35).

The reaction is usually carried out at about room temperature to about 150° C, and preferably about room temperature to about 100° C. The reaction is usually finished in about 0.5 to about 10 hours.

The reaction for producing, from Compound (34), Compound (2c) wherein R^{15} is a hydrogen atom and the reaction for producing, from Compound (35), Compound (2d) wherein R^{15} is a hydrogen atom can be carried out, in a suitable solvent in the presence of an acid, by separately reacting Compound (34) and Compound (35) with hexamethylenetetramine.

These reactions are generally called Duff reactions.

Acids usable herein are those that are preferably used in Duff reactions, for example, acetic acid, boric acid/anhydrous glycerol, trifluoroacetic acid, etc. Acid is usually used in an amount at least equimolar, and preferably equimolar to a large excess, per mol of Compound (34) or (35).

Solvents usable herein include those that are usable in the reaction of Compound (1dd) with Compound (22) shown in Reaction Scheme 15 above.

The reactions are usually carried out at about room temperature to about 200° C, and preferably about room temperature to about 150° C. The reactions are usually finished in about 0.5 to about 10 hours.

Compound (2c) wherein R^{15} is a lower alkyl group and Compound (2d) wherein R^{15} is a lower alkyl group are produced by separately reacting, in a suitable solvent in the presence of an acid, reacting Compound (34) and Compound (35) with a compound represented by

$$X_1COR^{15a} \qquad (53)$$

wherein X_1 is as described above and R^{15a} is a lower alkyl group.

These reactions are generally called Friedel-Crafts reactions and performed in a suitable solvent in the presence of a Lewis acid.

Lewis acids usable herein include any Lewis acids typically used in such Friedel-Crafts reactions, and examples are aluminium chloride, zinc chloride, iron chloride, tin(IV) chloride, boron tribromide, boron trifluoride, concentrated sulfuric acid, etc.

Examples of usable solvents are carbon disulfide, nitrobenzene, chlorobenzene, and like aromatic hydrocarbons; dichloromethane, dichloroethane, carbon tetrachloride, tetrachloroethane, and like halogenated hydrocarbons; nitroethane, nitromethane, and like aliphatic nitro compounds; mixed solvents of such solvents; etc.

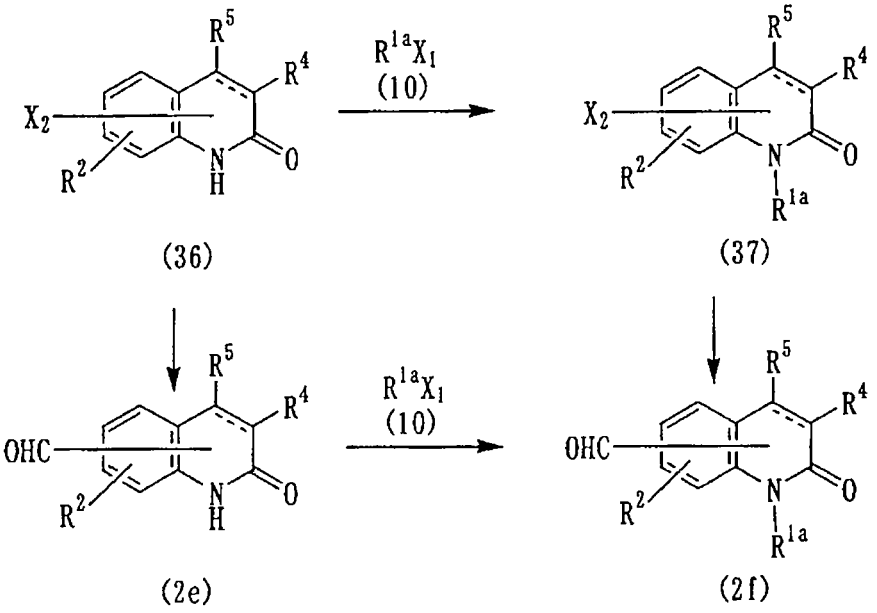
Lewis acid is usually used in an amount of 1 to 6 mol per mol of compounds (34) or (35).

Compound (53) is usually used in an amount of at least 1 mol, and preferably 1 to 5 mol, per mol of Compound (34) or (35).

The reactions are usually carried out at about 0 to about 150°C, and preferably about 0 to about 100°C. The reactions are usually finished in about 0.5 to about 25 hours.

The reaction of Compound (34) with Compound (10) and the reaction of Compound (2c) with Compound (10) are carried out under the same conditions as described in connection with the reaction of Compound (1e) with Compound (7) shown in Reaction Scheme 3 above.

Reaction Scheme 19



wherein R^{1a}, R^2, R^4, R^5, X_1, X_2, and the bond between the 3- and 4-positions of the carbostyril skeleton are as defined above.

The reaction for producing Compound (2e) from Compound (36) and the reaction for producing Compound (2f) from Compound (37) are carried out by reacting Compound (36) with carbon monoxide gas, and Compound (37) with carbon monoxide gas, respectively, in a suitable solvent in the presence of a catalyst and an acid alkali metal salt.

Examples of solvents and catalysts usable in these

reactions include those that are usable in the reaction of Compound (1dd) with Compound (22) shown in Reaction Scheme 15 above.

Examples of acid alkali metal salts are sodium formate, potassium formate, sodium acetate, potassium acetate, etc. Acid alkali metal salt is usually used in an amount of at least 1 mol, and preferably 1 to 5 mol, per mol of Compound (36) or (37).

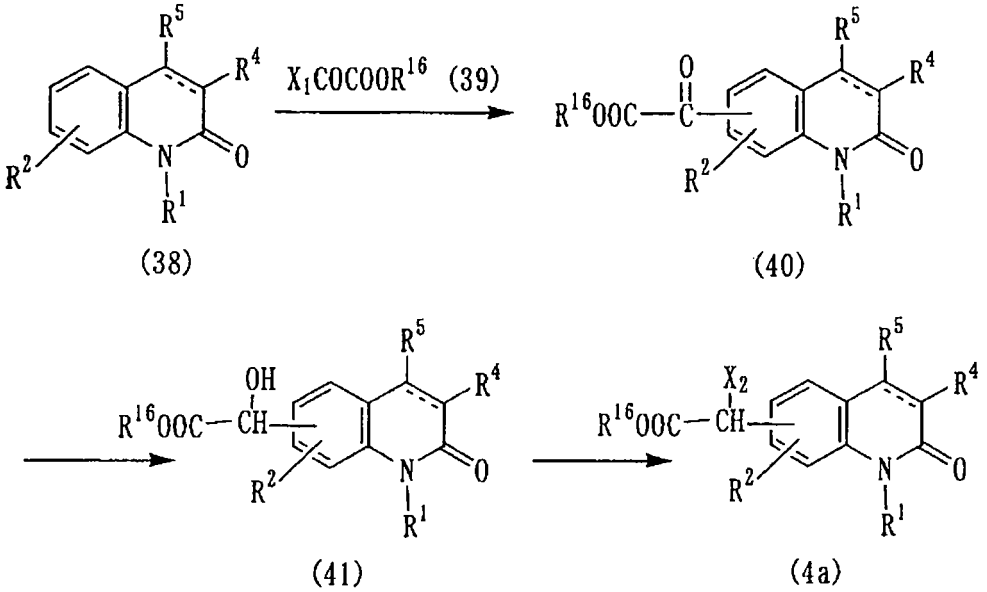
Catalyst is usually used in an amount of 0.01 to 1 mol per mol of Compound (36) or (37).

Carbon monoxide gas is usually used in a large excess relative to Compound (36) or (37).

The reactions are usually carried out at about room temperature to about 200° C, and preferably about room temperature to about 150° C. The reactions are usually finished in about 0.5 to about 10 hours.

The reaction of Compound (36) with Compound (10) and the reaction of Compound (2e) with Compound (10) are carried out under the same conditions as described in connection with the reaction of Compound (1e) with Compound (7) shown in Reaction Scheme 3 above.

Reaction Scheme 20



wherein R^1, R^2, R^4, R^5, X_1, R^{16}, X_2, and the bond between the 3- and

4-positions of the carbostyril skeleton are as defined above.

The reaction of Compound (38) with Compound (39) is carried out under the same conditions as described in connection with the reaction of Compound (34) with Compound (53) shown in Reaction Scheme 18 above.

The reaction for producing Compound (41) from Compound (40) is carried out by reducing Compound (40) under the same conditions as described in connection with the reaction for producing Compound (1b) from Compound (1a) using a hydride reducing agent, shown in Reaction Scheme 1 above.

The reaction for producing Compound (4a) from Compound (41) is carried out by reacting Compound (41) with a halogenating agent either in a suitable solvent or without a solvent.

Examples of halogenating agents are hydrochloric acid, hydrobromic acid, and like mineral acids, *N,N*-diethyl-1,2,2-trichlorovinylazide, phosphorus pentachloride, phosphorus pentabromide, phosphorus oxychloride, thionyl chloride, and mixtures of sulfonyl halide compounds (mesyl chloride, tosyl chloride, and the like) with basic compounds, etc.

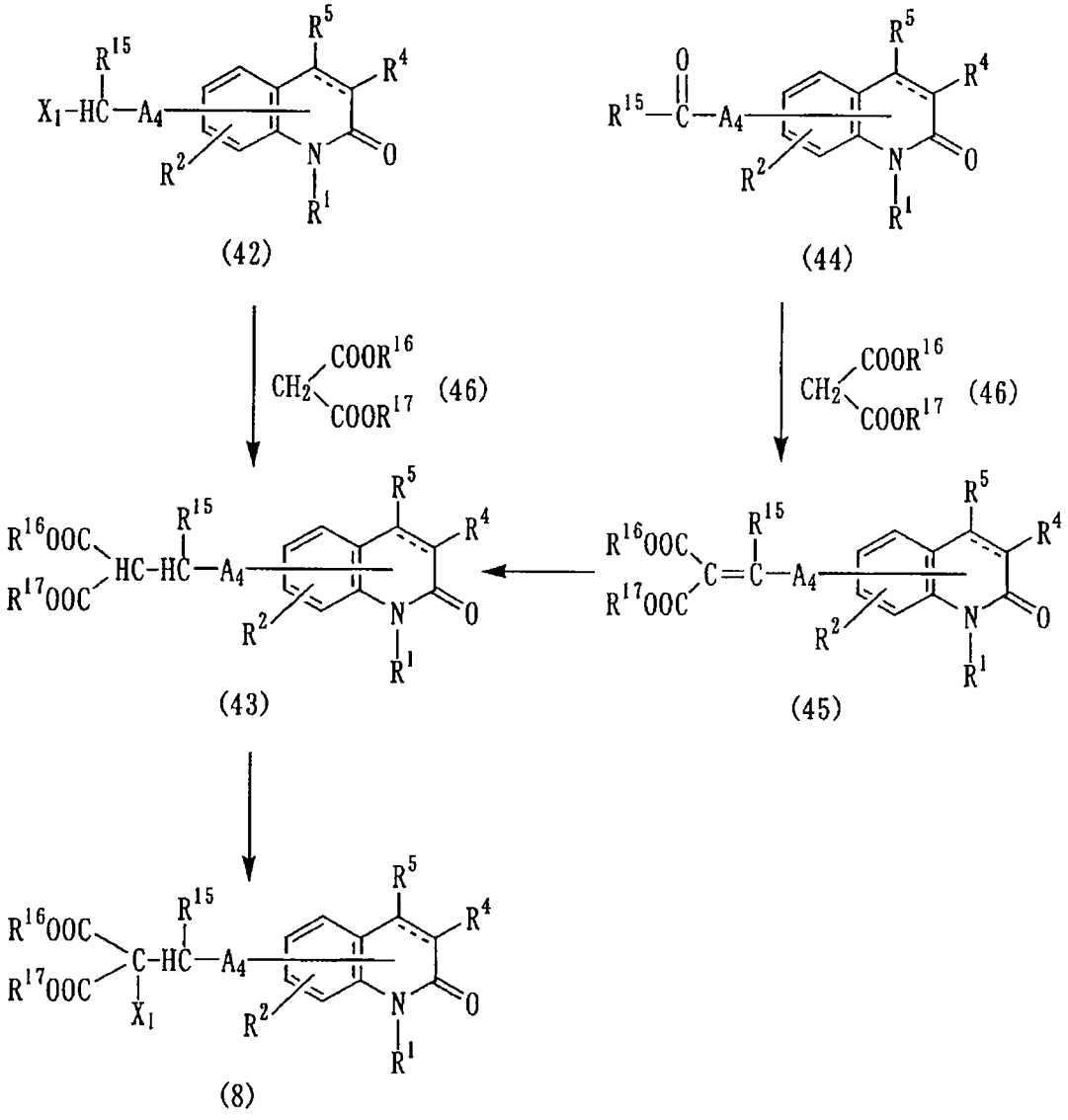
Basic compounds usable herein are those that are usable in the reaction of Compound (2) with Compound (3) shown in Reaction Scheme 1 above.

Examples of usable solvents are dioxane, tetrahydrofuran, diethyl ether, and like ethers; chloroform, methylene chloride, carbon tetrachloride, and like halogenated hydrocarbons; etc.

When a mixture of sulfonyl halide compound and basic compound is used as a halogenating agent, sulfonyl halide compound is usually used in an amount of at least 1 mol, and preferably 1 to 2 mol, per mol of Compound (41). Basic compound is usually used in a catalytic amount, and preferably a catalytic to equimolar amount, relative to Compound (41). When other halogenating agents are used, the halogenating agent is usually used in an amount of at least 1 mol, and preferably 1 to 10 mol, per mol of Compound (41).

The reaction advantageously proceeds usually at room temperature to 150°C, and preferably room temperature to 100°C. The reaction is usually finished in about 1 to about 10 hours.

Reaction Scheme 21



wherein R_1, R_2, R_4, R_5, X_1, R^{15}, R^{16}, R^{17}, A_4, and the bond between the 3- and 4-positions of the carbostyril skeleton are as defined above.

The reaction of Compound (42) with Compound (46) is carried out under the same conditions as described in connection with the reaction of Compound (1e) with Compound (7) shown in Reaction Scheme 3 above.

The reaction for producing Compound (8) from Compound (43) is carried out in a suitable solvent in the presence of a halogenating agent either in the presence or absence of a basic compound.

Examples of halogenating agents usable herein are Br_2, Cl_2, and like halogen molecules, iodine chloride, sulfuryl chloride, copper compounds such as copper(I) bromide, *N*-bromosuccinimide and like *N*-halosuccinimides, etc.

Examples of usable solvents are diethyl ether, tetrahydrofuran, dioxane, 2-methoxyethanol, monoglyme, diglyme, and like ethers; dichloromethane, dichloroethane, chloroform, carbon tetrachloride, and like halogenated hydrocarbons; acetic acid, propionic acid, and like aliphatic acids; carbon disulfide; etc.

Examples of basic compounds include those that are usable in the reaction of Compound (2) with Compound (3) shown in Reaction Scheme 1 presented above.

Halogenating agent is usually used in an amount of 1 to 10 mol, and preferably 1 to 5 mol, per mol of Compound (43).

Basic compound is usually used in an amount of 1 to 10 mol, and preferably 1 to 5 mol, per mol of Compound (43).

The reaction is usually carried out at about 0 to about 200° C, and preferably about 0 to about 100° C. The reaction is usually finished in about 5 minutes to about 20 hours.

The reaction of Compound (44) with Compound (46) is carried out in a suitable solvent in the presence of a basic compound.

Examples of basic compounds usable herein are sodium hydroxide, potassium hydroxide, calcium hydroxide, sodium carbonate, potassium carbonate, and like inorganic basic compounds; sodium acetate and like aliphatic acid alkali metal salts; piperidine, triethylamine, trimethylamine, pyridine, dimethylaniline, *N*-ethyldiisopropylamine, dimethylaminopyridine, *N*-methylmorpholine, DBN, DBU, DABCO, and like organic bases; etc. Such basic compounds may be used singly or as a combination of

two or more such compounds.

Any inert solvents are usable insofar as they do not adversely affect the reaction, for example, water, aromatic hydrocarbons such as benzene, toluene and xylene, ethers such as diethyl ether, tetrahydrofuran, dioxane, monoglyme and diglyme, halogenated hydrocarbons such as dichloromethane, dichloroethane, chloroform and carbon tetrachloride, lower alcohols such as methanol, ethanol, isopropanol, butanol, *tert*-butanol and ethylene glycol, aliphatic acids such as acetic acid, esters such as ethyl acetate and methyl acetate, ketones such as acetone and methyl ethyl ketone, acetonitrile, pyridine, dimethyl sulfoxide, *N,N*-dimethylformamide, hexamethylphosphoric triamide, mixtures of such solvents, etc.

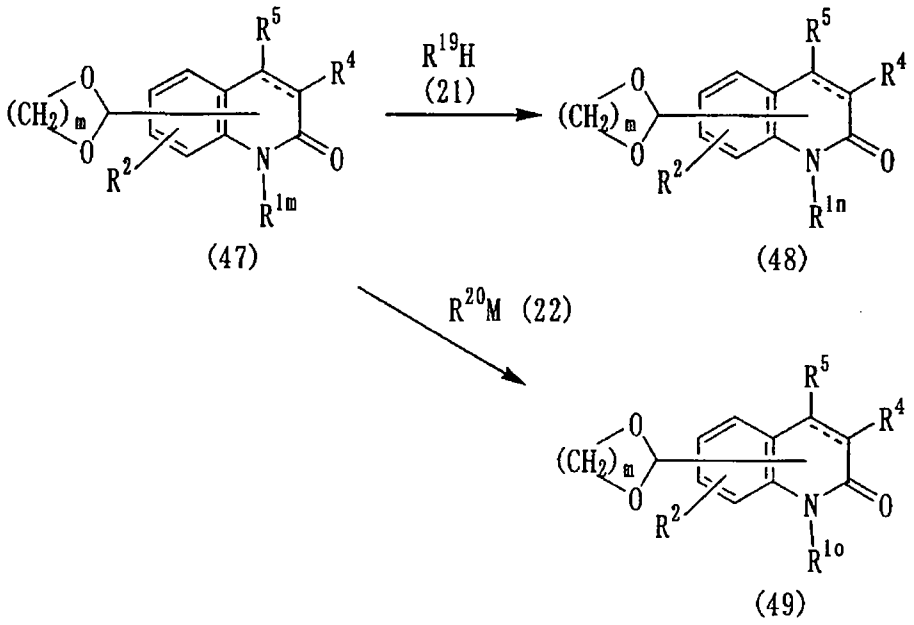
Basic compound is usually used in an amount of about 0.1 to about 5 mol per mol of Compound (45).

Compound (46) is usually used in an amount of at least 1 mol, and preferably about 1 to about 5 mol, per mol of Compound (45).

The reaction temperature is usually about room temperature to about 200° C, and preferably about 50 to about 150° C. The reaction is usually finished in about 5 minutes to about 30 hours.

The reaction for producing Compound (43) from Compound (46) is carried out by reducing Compound (46) under the same conditions as described in connection with the reaction for producing Compound (1b) from Compound (1a) shown in Reaction Scheme 1 in which a catalytic hydrogenation reducing agent is used.

Reaction Scheme 22



wherein R^{1m}, R^{1n}, R^{1o}, R^2, R^4, R^5, M, m, and the bond between the 3- and 4-positions of the carbostyril skeleton are as defined above.

The reaction of Compound (47) with Compound (21) is carried out under the same conditions as described in connection with the reaction of Compound (1dd) with Compound (21) shown in Reaction Scheme 15 above.

The reaction of Compound (47) with Compound (22) is carried out under the same conditions as described in connection with the reaction of Compound (1dd) with Compound (21) shown in Reaction Scheme 15 above.

By reacting Compound (23) with starting Compounds (24), (34), (36), (38), (42) and (47) in which R^2 is a hydroxyl group, the corresponding compounds in which R^2 is a group as defined in (2-2), (2-4), (2-5), and (2-7) to (2-32) can be produced. These reactions are carried out under the same conditions as described in connection with the reaction of Compound (1gg) with Compound (23) shown in Reaction Scheme 16 above.

By reacting Compound (10) with starting Compounds (38) and (42) in which R^1 is a hydrogen atom, the corresponding compounds in which R^1 is a group as defined in (1-2) to (1-29) can be produced. These reactions are carried out under the same

conditions as described in connection with the reaction of Compound (1h) with Compound (10) shown in Reaction Scheme 5 above.

Each of the objective compounds obtained according to the above reaction schemes can be isolated and purified from the reaction mixture by, for example, after cooling the reaction mixture, performing an isolation procedure such as filtration, concentration, extraction, etc., to separate a crude reaction product, and then subjecting the crude reaction product to a usual purification procedure such as column chromatography, recrystallization, etc.

The carbostyril compound of Formula (1) according to the present invention includes stereoisomers and optical isomers, and solvents such as hydrate, etc.

Among the compounds of the present invention, those having a basic group or groups can easily form salts with common pharmaceutically acceptable acids. Examples of such acids include hydrochloric acid, hydrobromic acid, nitric acid, sulfuric acid, phosphoric acid and other inorganic acid, methansulfonic acid, *p*-toluenesulfonic acid, acetic acid, citric acid, tartric acid, maleic acid, fumaric acid, malic acid, lactic acid and other organic acid, etc.

Among the compounds of the present invention, those having an acidic group or groups can easily form salts by reacting with pharmaceutically acceptable basic compounds. Examples of such basic compounds include sodium hydroxide, potassium hydroxide, calcium hydroxide, sodium carbonate, potassium carbonate, sodium hydrogencarbonate, potassium hydrogencarbonate, etc.

The following is an explanation of pharmaceutical preparations comprising the compound of the present invention as an active ingredient.

Such pharmaceutical preparations are obtained by formulating the compound of the present invention into usual pharmaceutical preparations, using usually employed diluents or

excipients such as fillers, extenders, binders, wetting agents, disintegrants, surfactants, lubricants, etc.

The form of such pharmaceutical preparations can be selected from various forms according to the purpose of therapy. Typical examples include tablets, pills, powders, solutions, suspensions, emulsions, granules, capsules, suppositories, injections (solutions, suspensions, etc.) and the like.

To form tablets, any of various known carriers can be used, including, for example, lactose, white sugar, sodium chloride, glucose, urea, starch, calcium carbonate, kaolin, crystalline cellulose and other excipients; water, ethanol, propanol, simple syrup, glucose solutions, starch solutions, gelatin solutions, carboxymethylcellulose, shellac, methylcellulose, potassium phosphate, polyvinylpyrrolidone and other binders; dry starch, sodium alginate, agar powder, laminaran powder, sodium hydrogencarbonate, calcium carbonate, fatty acid esters of polyoxyethylenesorbitan, sodium laurylsulfate, stearic acid monoglyceride, starch, lactose and other disintegrants; white sugar, stearin, cacao butter, hydrogenated oils and other disintegration inhibitors; quaternary ammonium base, sodium lauryl sulfate and other absorption promoters; glycerin, starch and other wetting agents; starch, lactose, kaolin, bentonite, colloidal silicic acid and other adsorbents; purified talc, stearates, boric acid powder, polyethylene glycol and other lubricants; etc.

Such tablets may be coated with usual coating materials as required, to prepare, for example, sugar-coated tablets, gelatin-coated tablets, enteric-coated tablets, film-coated tablets, double- or multi-layered tablets, etc.

To form pills, any of various known carriers can be used, including, for example, glucose, lactose, starch, cacao butter, hydrogenated vegetable oils, kaolin, talc and other excipients; gum arabic powder, tragacanth powder, gelatin, ethanol and other binders; laminaran, agar and other disintegrants; etc.

To form suppositories, any of various known carriers can be used, including, for example, polyethylene glycol, cacao butter, higher alcohols, esters of higher alcohols, gelatin, semisynthetic glycerides, etc.

To form an injection, a solution, emulsion or suspension is sterilized and preferably made isotonic with blood. Any of various known widely used diluents can be employed to prepare the solution, emulsion or suspension. Examples of such diluents include water, ethanol, propylene glycol, ethoxylated isostearyl alcohol, polyoxylated isostearyl alcohol, fatty acid esters of polyoxyethylene sorbitan, etc. In this case, the pharmaceutical preparation may contain sodium chloride, glucose or glycerin in an amount sufficient to prepare an isotonic solution, and may contain usual solubilizers, buffers, analgesic agents, etc., and further, if necessary, coloring agents, preservatives, flavors, sweetening agents, etc., and/or other medicines.

The proportion of the compound of the present invention in the pharmaceutical preparation is not limited and can be suitably selected from a wide range. It is usually preferable that the pharmaceutical preparation contain the compound of the present invention in a proportion of 1 to 70 wt.%.

The route of administration of the pharmaceutical preparation according to the present invention is not limited, and the preparation is administered by a route suitable for the form of the preparation, patient's age and sex, conditions of the disease, and other conditions. For example, tablets, pills, solutions, suspensions, emulsions, granules and capsules are administered orally. Injections are intravenously administered singly or as mixed with usual injection transfusions such as glucose solutions, amino acid solutions or the like, or singly administered intramuscularly, intracutaneously, subcutaneously or intraperitoneally, as required. Suppositories are administered intrarectally.

The dosage of the pharmaceutical preparation is

suitably selected according to the method of use, patient's age and sex, severity of the disease, and other conditions, and is usually about 0.001 to about 100 mg/kg body weight/day, and preferably 0.001 to 50 mg/kg body weight/day, in single or divided doses.

Since the dosage varies depending on various conditions, a dosage smaller than the above range may be sufficient or a dosage larger than the above range may be required.

The carbostyril derivative of the present invention induces TFF production, such as TFF2 production, and thus is useful as an active ingredient of a TFF inducer (up-regulator), particularly TFF2 inducer.

The compound of the present invention can be used, based on its TFF production inducing activity, as an agent for preventing or treating various diseases, for example, mucosal injury, in human and veterinary medicines. Specific examples of diseases for which preventive or therapeutic effects can be obtained based on TFF production inducing activity, particularly TFF2 production inducing activity, include acute and chronic alimentary tract diseases of various origins (e.g., drug-induced ulcers, peptic gastric ulcers, ulcerative colitis, Crohn's disease, drug-induced enteritis, ischemic colitis, irritable bowel syndrome, ulcers developed after endoscopic demucosation, acute gastritis, chronic gastritis, reflux esophagitis, esophageal ulcer, Barrett esophagus, gastrointestinal mucositis (such as gastrointestinal mucositis caused by chemotherapy, radiotherapy, etc), hemorrhoidal diseases, etc.); oral diseases (e.g., stomatitis (such as stomatitis caused by chemotherapy or radiotherapy, aphthous stomatitis, etc), Sjögren syndrome, xerostomia, etc.); upper respiratory tract diseases (e.g., rhinitis, pharyngitis, etc.); respiratory tract diseases (e.g., bronchial asthma, chronic obstructive lung diseases, etc.); eye diseases (e.g., dry eye, keratoconjunctivitis, etc.); cancers; wounds; etc.

The compound of the present invention has few side

effects and is highly safe.

The carbostyril compounds of Formula (1) and salts thereof encompassed by the present invention can be administered in combination with TFF peptides (TFF1, TFF2, TFF3, etc), other type of compounds having an inducing activity of TFF production, and/or other drugs (such as, anti-inflammatory agents, anti-ulcer drugs, etc).

The patents, patent applications and publications cited herein are incorporated by reference.

BRIEF DESCRIPTION OF DRAWINGS

Fig. 1 shows a comparison between the nucleotide sequence of the PCR product cloned to the plasmid pCR-Blunt-TFF2pro (Sequence Number 1 in Sequence Listing) and the counterpart of the hTFF2 promoter region reported in a gene bank (GenBank accession AB038162).

BEST MODE FOR CARRYING OUT THE INVENTION

The following Examples are intended to illustrate the present invention in further detail.

Reference Example 1

Synthesis of 8-methoxy-1-methyl-2-oxo-1,2-dihydroquinoline-5-carboxaldehyde

8-Methoxy-1-methyl-1H-quinolin-2-one (21.14 g, 0.11 mol) and paraformaldehyde (10.6 g) were suspended in concentrated hydrochloric acid (105 ml), and 4 ml of concentrated sulfuric acid was added, followed by stirring at 70 to 80°C for 2.5 hours. After cooling to room temperature, ice water was added to the reaction mixture, and extraction with dichloromethane was performed. The organic layer was washed with a saturated sodium chloride solution and dried over anhydrous sodium sulfate. The solvent was then distilled off under reduced pressure. The residue was dissolved in 400 ml of chloroform, and hexamethylenetetramine (4.25 g, 0.03 mol) was added, followed by

heating under reflux for 2.5 hours. After cooling to room temperature, the solvent was distilled off under reduced pressure. 50% acetic acid (110 ml) was added to the residue, and stirring was carried out at 100°C for 2 hours. After cooling to room temperature, water was added, and the insoluble matter was collected by filtration and dried to thereby obtain 13.81 g (yield: 57%) of 8-methoxy-1-methyl-2-oxo-1,2-dihydroquinoline-5-carboxaldehyde as a light yellow powder.

^{1}H-NMR(DMSO-d_6) dppm:

3.80 (3H,s), 4.01 (3H,s), 6.79 (1H,d,J=9.9Hz), 7.45 (1H,d,J=8.4Hz), 7.86 (1H,d,J=8.4Hz), 9.05 (1H,d,J=9.9Hz), 10.14(1H,s)

Reference Example 2

Synthesis of diethyl 2-(8-methoxy-1-methyl-2-oxo-1,2-dihydroquinolin-5-ylmethylene)malonate

8-Methoxy-1-methyl-2-oxo-1,2-dihydroquinoline-5-carboxaldehyde (18.9 g), diethyl malonate (26.5 ml) and piperidine (2.7 ml) were added to pyridine (90 ml), and the resulting mixture was stirred at 90 to 100°C for 6 hours. After cooling to room temperature, the reaction mixture was added to cold concentrated hydrochloric acid, and the precipitated solid was collected by filtration, washed with water and dried to thereby obtain 16.62 g (yield: 53%) of diethyl 2-(8-methoxy-1-methyl-2-oxo-1,2-dihydroquinolin-5-ylmethylene)malonate as a yellow powder.

^{1}H-NMR(DMSO-d_6) dppm:

1.10 (3H,t,J=7.2Hz), 1.28 (3H,t,J=7.2Hz), 3.80 (3H,s), 3.92 (3H,s), 4.05-4.3 (4H,m), 6.69 (1H,d,J=9.8Hz), 7.18 (1H,d,J=8.5Hz), 7.30 (1H,d,J=8.5Hz), 7.84 (1H,d,J=9.8Hz), 8.14(1H,s)

Reference Example 3

Synthesis of diethyl 2-(8-methoxy-1-methyl-2-oxo-1,2-dihydroquinolin-5-ylmethyl)malonate

Diethyl 2-(8-methoxy-1-methyl-2-oxo-1,2-

dihydroquinolin-5-ylmethylene)malonate (16.62 g) and 10% palladium carbon (1.6 g) were added to 300 ml of ethanol, followed by catalytic hydrogenation at room temperature and atmospheric pressure for 6 hours. The catalyst was filtered off, and the filtrate was concentrated under reduced pressure. The residue was purified by silica gel column chromatography (ethyl acetate:n-hexane = 1:1) to thereby obtain 13.59 g (yield: 81%) of diethyl 2-(8-methoxy-1-methyl-2-oxo-1,2-dihydroquinolin-5-ylmethyl)malonate as a light yellow oil.

^{1}H-NMR($CDCl_3$) dppm:

1.15-1.3 (6H,m), 3.45 (2H,d,J=7.6Hz), 3.60 (1H,t,J=7.6Hz), 3.89 (3H,s), 3.95 (3H,s), 4.1-4.25 (4H,m), 6.75 (1H,d,J=9.8Hz), 6.96 (1H,d,J=8.3Hz), 7.04 (1H,d,J=8.3Hz), 7.86 (1H,d,J=9.8Hz)

Reference Example 4

Synthesis of diethyl 2-chloro-2-(8-methoxy-1-methyl-2-oxo-1,2-dihydroquinolin-5-ylmethyl)malonate

Sodium hydride (60% in oil) (1.0 g) was added under ice cooling to a tetrahydrofuran (THF) solution (140 ml) of 13.59 g of diethyl 2-(8-methoxy-1-methyl-2-oxo-1,2-dihydroquinolin-5-ylmethyl)malonate, and stirring was carried out until the generation of hydrogen stopped. N-chlorosuccinimide (5.6 g) was added, followed by stirring for 1 hour. The reaction mixture was added to cold hydrochloric acid, and extraction with dichloromethane was performed. After drying over anhydrous sodium sulfate, the dry product was concentrated under reduced pressure, diisopropyl ether was added to the residue, and the precipitated solid was collected by filtration and dried to thereby obtain 12.77 g (yield: 86%) of diethyl 2-chloro-2-(8-methoxy-1-methyl-2-oxo-1,2-dihydroquinolin-5-ylmethyl)malonate as a light yellow powder.

^{1}H-NMR($CDCl_3$) dppm:

1.28 (3H,t,J=7.2Hz), 3.86(2H,s), 3.89(3H,s), 3.92(3H,s), 4.2-4.3 (4H,m), 6.71 (1H,d,J=9.8Hz), 6.98 (1H,d,J=8.4Hz), 7.10 (1H,d,J=8.4Hz), 7.93 (1H,d,J=9.8Hz)

Reference Example 5

Synthesis of 2-chloro-3-(8-methoxy-1-methyl-2-oxo-1,2-dihydroquinolin-5-yl)propionic acid

Diethyl 2-chloro-2-(8-methoxy-1-methyl-2-oxo-1,2-dihydroquinolin-5-ylmethyl)malonate (5.1 g) was added to a mixture of 20 ml of acetic acid and 15 ml of 6N hydrochloric acid, followed by heating under reflux for 9 hours. After cooling to room temperature, water was added to the reaction mixture, followed by cooling with ice. The precipitated solid was collected by filtration, washed with water and dried to thereby obtain 3.1 g of 2-chloro-3-(8-methoxy-1-methyl-2-oxo-1,2-dihydroquinolin-5-yl)propionic acid as a light yellow powder.

^{1}H-NMR(DMSO-d_6) dppm:

3.45-3.65 (2H,m), 3.77 (3H,s), 3.86 (3H,s), 4.5-4.65 (1H,m), 6.62 (1H,d,J=9.8Hz), 7.14 (1H,d,J=8.3Hz), 7.21 (1H,d,J=8.3Hz), 8.03 (1H,d,J=9.8Hz), 13.4 (1H,brs)

Reference Example 6

Synthesis of diethyl 2-[2-(8-methoxy-1-methyl-2-oxo-1,2-dihydroquinolin-5-yl)ethyl]malonate

Sodium hydride (60% in oil) (0.5 g) was added under ice cooling to a tetrahydrofuran (THF) solution (30 ml) of diethyl malonate (2.2 ml), and stirring was carried out until the generation of hydrogen stopped. 5-(2-iodoethyl)-8-methoxy-1-methyl-2-oxo-1,2-dihydroquinoline (1.54 g) was added, followed by stirring at room temperature overnight. The reaction mixture was added to cold hydrochloric acid, and extraction with dichloromethane was performed. After drying over anhydrous sodium sulfate, the dry product was concentrated under reduced pressure, and the residue was purified by silica gel column chromatography (dichloromethane:methanol = 50:1 → 40:1). The purified product was under reduced pressure to thereby obtain 1.73 g (yield: quantitative) of diethyl 2-[2-(8-methoxy-1-methyl-2-oxo-1,2-dihydroquinolin-5-yl)ethyl]malonate as a yellow oil.

^{1}H-NMR($CDCl_3$) dppm:
1.2-1.4 (6H,m), 2.1-2.25 (2H,m), 2.8-3.0 (2H,m), 3.3-3.5(1H,m), 3.88 (3H,s), 3.93 (3H,s), 4.1-4.4 (4H,m), 6.75 (1H,d,J=9.7Hz), 6.9-7.1 (2H,m), 7.92 (1H,d,J=9.7Hz)

Reference Example 7

Synthesis of diethyl of 2-chloro-2-[2-(8-methoxy-1-methyl-2-oxo-1,2-dihydroquinolin-5-yl)ethyl]malonate

Sodium hydride (60% in oil) (0.21 g) was added under ice cooling to a THF solution (30 ml) of 1.79 g of diethyl 2-[2-(8-methoxy-1-methyl-2-oxo-1,2-dihydroquinolin-5-yl)ethyl]malonate, and stirring was carried out until the generation of hydrogen stopped. N-chlorosuccinimide (0.7 g) was added, followed by stirring for 1.5 hours. The reaction mixture was added to cold hydrochloric acid, and extraction with dichloromethane was performed. The extract was dried over anhydrous sodium sulfate, and concentrated under reduced pressure to thereby obtain 2.38 g (yield: quantitative) of diethyl 2-chloro-2-[2-(8-methoxy-1-methyl-2-oxo-1,2-dihydroquinolin-5-yl)ethyl]malonate as a yellow oil.

^{1}H-NMR($CDCl_3$) dppm:
1.31 (6H,t,J=7.1Hz), 2.47 (2H,t,J=8.7Hz), 2.98 (2H,t,J=8.7Hz), 3.88 (3H,s), 3.93 (3H,s), 6.75 (1H,d,J=9.7Hz), 6.9-7.1 (2H,m), 7.87 (1H,d,J=9.7Hz)

Reference Example 8

Synthesis of 2-chloro-4-(8-methoxy-1-methyl-2-oxo-1,2-dihydroquinolin-5-yl)butyric acid

Diethyl 2-chloro-2-[2-(8-methoxy-1-methyl-2-oxo-1,2-dihydroquinolin-5-yl)ethyl]malonate (2.38 g) was added to a mixture of acetic acid (10 ml) and 6N hydrochloric acid (15 ml), and the resulting mixture was heated under reflux overnight. After cooling to room temperature, water and a small quantity of ethanol was added to the reaction mixture, followed by ice cooling. The precipitated solid was collected by filtration,

washed with water and dried to thereby obtain 0.99 g (yield: 55%) of 2-chloro-4-(8-methoxy-1-methyl-2-oxo-1,2-dihydroquinolin-5-yl)butyric acid as a gray powder.

^{1}H-NMR(DMSO-d_6) dppm:

1.9-2.3 (2H,m), 2.8-3.1 (2H,m), 3.77 (3H,s), 3.85 (3H,s), 4.4-4.6 (1H,m), 6.61 (1H,d,J=9.7Hz), 7.05 (1H,d,J=7.1Hz), 7.18 (1H,d,J=7.1Hz), 7.98 (1H,d,J=9.7Hz), 13.4 (1H,brs)

Reference Example 9

Synthesis of diethyl 2-[3-(8-methoxy-1-methyl-2-oxo-1,2-dihydroquinolin-5-yl)propyl]malonate

Sodium hydride (60% in oil) (0.39 g) was added under ice cooling to a THF solution (30 ml) of diethyl malonate (1.85 ml), and stirring was carried out until the generation of hydrogen stopped. 5-(3-Iodopropyl)-8-methoxy-1-methyl-2-oxo-1,2-dihydroquinoline (2.89 g) was added, followed by stirring at room temperature for 4.5 hours. The reaction mixture was added to cold hydrochloric acid, and extraction with dichloromethane was performed. After drying over anhydrous sodium sulfate, the dry product was concentrated under reduced pressure, and the residue was purified by silica gel column chromatography (dichloromethane:methanol = 20:1). The purified product was concentrated under reduced pressure to thereby obtain 2.94 g (yield: 93%) of diethyl 2-[3-(8-methoxy-1-methyl-2-oxo-1,2-dihydroquinolin-5-yl)propyl]malonate as a yellow oil.

^{1}H-NMR($CDCl_3$) dppm:

1.27 (6H,t,J=7.1Hz), 1.6-1.8 (2H,m), 1.95-2.1 (2H,m), 2.87 (2H,t,J=7.7Hz), 3.56 (1H,t,J=7.5Hz), 3.89(3H,s), 3.95(3H,s), 4.1-4.4 (4H,m), 6.73 (1H,d,J=9.8Hz), 7.00 (2H,s), 7.84(1H,d,J=9.8Hz)

Reference Example 10

Synthesis of diethyl 2-chloro-2-[3-(8-methoxy-1-methyl-2-oxo-1,2-dihydroquinolin-5-yl)propyl]malonate

Sodium hydride (60% in oil) (0.33 g) was added under ice cooling to a THF solution (30 ml) of diethyl 2-[3-(8-methoxy-

1-methyl-2-oxo-1,2-dihydroquinolin-5-yl)propyl]malonate (2.94 g), and stirring was carried out until the generation of hydrogen stopped. N-chlorosuccinimide (1.2 g) was added, followed by stirring for 2 hours. The reaction mixture was added to cold hydrochloric acid, and extraction with dichloromethane was performed. The extract was dried over anhydrous sodium sulfate, and concentrated under reduced pressure to thereby obtain 4.02 g (yield: quantitative) of diethyl 2-chloro-2-[3-(8-methoxy-1-methyl-2-oxo-1,2-dihydroquinolin-5-yl)propyl]malonate as a yellow oil.

^{1}H-NMR($CDCl_3$) dppm:

1.26 (6H,t,J=7.1Hz), 1.6-1.9 (2H,m), 2.31 (2H,t,J=8.0Hz), 2.88 (2H,t,J=7.7Hz), 3.88 (3H,s), 3.94 (3H,s), 6.72(1H,d,J=9.8Hz), 6.99 (2H,s), 7.79(1H,d,J=9.8Hz)

Reference Example 11

Synthesis of 2-chloro-5-(8-methoxy-1-methyl-2-oxo-1,2-dihydroquinolin-5-yl)valeric acid

Diethyl 2-chloro-2-[3-(8-methoxy-1-methyl-2-oxo-1,2-dihydroquinolin-5-yl)propyl]malonate (4.02 g) was added to a mixture of acetic acid (15 ml) and 6N hydrochloric acid (20 ml), followed by heating under reflux for 24 hours. After cooling to room temperature, water was added to the reaction mixture, followed by cooling with ice. The precipitated solid was collected by filtration, washed with water and dried to thereby obtain 2.30 g (yield: 75%) of 2-chloro-5-(8-methoxy-1-methyl-2-oxo-1,2-dihydroquinolin-5-yl)valeric acid as a light yellow powder.

^{1}H-NMR(DMSO-d_6) dppm:

1.6-2.2 (4H,m), 2.7-3.1(2H,m), 3.77(3H,s), 3.84(3H,s), 4.5-4.65 (1H,m), 6.59 (1H,d,J=9.7Hz), 7.05 (1H,d,J=8.1Hz), 7.17 (1H,d,J=8.1Hz), 7.99 (1H,d,J=9.7Hz), 13.2 (1H,brs)

Reference Example 12

Synthesis of 8-methoxy-2-oxo-1,2,3,4-tetrahydroquinoline-5-

carboxaldehyde

8-Methoxy-3,4-dihydro-1H-quinolin-2-one (5 g) was dissolved in dichloromethane (100 ml), and dichloromethyl methyl ether (6.4 ml) was added at room temperature, followed by cooling in an ice water bath. Titanium tetrachloride (85 ml) was added dropwise at a temperature not higher than 10°C, and the resulting mixture was stirred at room temperature overnight. The reaction mixture was poured into ice water, and the aqueous layer was subjected to extraction with dichloromethane. The organic layer was dried over sodium sulfate, filtered, and concentrated under reduced pressure. Diethyl ether was added to the residue and the produced solid was collected by filtration and dried to thereby obtain 5.2 g (yield: 90%) of 8-methoxy-2-oxo-1,2,3,4-tetrahydroquinoline-5-carboxaldehyde.

^{1}H-NMR($CDCl_3$) dppm:
2.63 (2H,t,J=7.4Hz), 3.54 (2H,t,J=7.4Hz), 3.97(3H,s), 6.92 (1H,d,J=8.5Hz), 7.50 (1H,d,J=8.5Hz), 7.84 (1H,brs), 10.02 (1H,s)

Reference Example 13

Synthesis of 8-methoxy-1-ethyl-2-oxo-1,2,3,4-tetrahydroquinoline-5-carboxaldehyde

8-Methoxy-2-oxo-1,2,3,4-tetrahydroquinoline-5-carboxaldehyde (2.0 g) was dissolved in DMF (20 ml), and 0.43 g of sodium hydride (60% in oil) was added under ice cooling. After the addition, stirring was carried out at room temperature until the generation of hydrogen stopped. The resulting mixture was cooled in an ice water bath again, 1.2 ml of ethyl iodide was added dropwise, and stirring was carried out at room temperature for 8 hours. The reaction mixture was poured into iced aqueous hydrochloric acid, extraction with methylene chloride was performed, and the organic layer was dried over sodium sulfate, filtered, and concentrated under reduced pressure. The residue was purified by silica gel column chromatography to thereby obtain 2.1 g (yield: 91%) of 8-methoxy-1-ethyl-2-oxo-1,2,3,4-tetrahydroquinoline-5-carboxaldehyde.

^{1}H-NMR($CDCl_3$) dppm:

1.15 (3H,t,J=7.1Hz), 2.51 (2H,t,J=7.0Hz), 3.36 (2H,t,J=7.0Hz), 3.97 (3H,s), 4.01 (2H,t,J=7.4Hz), 6.98 (1H,d,J=8.6Hz), 7.60 (1H,d,J=8.6Hz), 10.06 (1H,s)

Reference Example 14

Synthesis of 8-methoxy-1-methyl-3,4-dihydro-1H-quinolin-2-one

8-Methoxy-3,4-dihydro-1H-quinolin-2-one (15 g) was dissolved in DMF (150 ml), and 3.6 g of sodium hydride (60% in oil) was added under ice cooling. After the addition, stirring was carried out at room temperature until the generation of hydrogen stopped. The resulting mixture was cooled with ice water again, and 5.8 ml of methyl iodide was added dropwise, followed by stirring at room temperature overnight. The solvent was distilled off under reduced pressure, and the residue was purified by silica gel column chromatography to thereby obtain 16.7 g (yield: 96%) of 8-methoxy-1-methyl-3,4-dihydro-1H-quinolin-2-one.

^{1}H-NMR($CDCl_3$) dppm:

2.5-2.6 (2H,m), 2.8-2.9(2H,m), 3.39(3H,s), 3.85(3H,s), 6.75-6.9 (2H,m), 7.0-7.05 (1H,m)

Reference Example 15

Synthesis of 8-methoxy-1-methyl-2-oxo-1,2,3,4-tetrahydroquinoline-5-carboxaldehyde

8-Methoxy-1-methyl-3,4-dihydro-1H-quinolin-2-one (1.5 g) was dissolved in dichloromethane (15 ml), and dichloromethyl methyl ether (0.86 ml) was added at room temperature, followed by cooling with ice water. Titanium tetrachloride (10.5 ml) was added dropwise, and the resulting mixture was stirred at room temperature overnight. Further, dichloromethyl methyl ether (1.29 ml) and titanium tetrachloride (15.8 ml) were added, and stirring was carried out at room temperature for 5 hours. The reaction mixture was poured into ice water, and the aqueous layer was subjected to extraction with dichloromethane. The organic layer

was dried over sodium sulfate, filtered, and concentrated under reduced pressure. Hexane was added to the residue, and the produced insoluble matter was collected by filtration and dried to thereby obtain 1.37 g (yield: 80%) of 8-methoxy-1-methyl-2-oxo-1,2,3,4-tetrahydroquinoline-5-carboxaldehyde.

^{1}H-NMR($CDCl_3$) dppm:

2.5-2.55 (2H,m), 3.3-3.45 (2H,m), 3.96 (3H,s), 6.99 (1H,d,J=8.6Hz), 7.60 (1H,d,J=8.6Hz), 10.06(1H,s)

Reference Example 16

Synthesis of 1-(4-biphenylmethyl)-6-bromo-3,4-dihydro-1H-quinolin-2-one

Sodium hydride (60% in oil) (0.49 g) was added at 0°C to a DMF solution (20 ml) of 6-bromo-3,4-dihydro-1H-quinolin-2-one (2.54 g), followed by stirring for 30 minutes. 4-Bromomethylbiphenyl (3.05 g) was added, and the resulting mixture was stirred at room temperature overnight. Water was added to the reaction mixture, extraction with ethyl acetate was performed, and the extract was dried over anhydrous sodium sulfate, and concentrated under reduced pressure. The residue was purified by silica gel column chromatography (ethyl acetate:n-hexane = 1:6 → 1:2). The purified product was recrystallized from a chloroform-diisopropyl ether mixed solvent to thereby obtain 4.06 g (yield: 92%) of 1-(4-biphenylmethyl)-6-bromo-3,4-dihydro-1H-quinolin-2-one as a white powder.

^{1}H-NMR(DMSO-d_6) dppm:

2.65-2.78 (2H,m), 2.89-3.03 (2H,m), 5.17(2H,s), 6.90 (1H,d,J=8.7 Hz), 7.23-7.39 (4H,m), 7.39-7.50 (3H,m), 7.50-7.71 (4H,m)

Reference Example 17

Synthesis of 1-(4-biphenylmethyl)-2-oxo-1,2,3,4-tetrahydroquinoline-6-carboxaldehyde

A DMF solution (30 ml) of 1-(4-biphenylmethyl)-6-bromo-3,4-dihydro-1H-quinolin-2-one (2.80 g), sodium formate (0.171 g) and bistriphenylphosphine palladium chloride (0.25 g) was stirred

under a carbon monoxide atmosphere at 100°C for 4 hours. Water was added to the reaction mixture, extraction with ethyl acetate was performed, and the extract was dried over anhydrous sodium sulfate, and concentrated under reduced pressure. The residue was purified by silica gel column chromatography (ethyl acetate:n-hexane = 1:4 → 1:2). The purified product was recrystallized from a chloroform-diethyl ether mixed solvent to thereby obtain 1.95 g (yield: 78%) of 1-(4-biphenylmethyl)-2-oxo-1,2,3,4-tetrahydroquinoline-6-carboxaldehyde as a white powder.

^{1}H-NMR(DMSO-d_6) dppm:
2.78 (2H,t,J=8.0Hz), 3.07(2H,t,J=8.0Hz), 5.24(2H,s), 7.15 (1H,d,J=8.4Hz), 7.25-7.49(5H,m), 7.55-7.82 (6H,m), 9.84(1H,s)

Reference Example 18

Synthesis of 1-(4-chlorobenzyl)-2-oxo-1,2-dihydroquinoline-4-carboxaldehyde

Sodium hydride (60% in oil) (1.3 g) was added at 0°C to a DMF solution (50 ml) of 2-oxo-1,2-dihydroquinoline-4-carboxaldehyde (5.13 g), followed by stirring for 30 minutes. 4-chlorobenzylbromide (7.0 g) was added, and the resulting mixture was stirred at room temperature overnight. Water was added to the reaction mixture, extraction with ethyl acetate was performed, and the extract was dried over anhydrous sodium sulfate, and concentrated under reduced pressure. The residue was purified by silica gel column chromatography (ethyl acetate:n-hexane = 1:10 → 1:4). The purified product was recrystallized from a chloroform-diisopropyl ether-n-hexane mixed solvent to thereby obtain 4.13 g (yield: 47%) of 1-(4-chlorobenzyl)-2-oxo-1,2-dihydroquinoline-4-carboxaldehyde as a white powder.

^{1}H-NMR(DMSO-d_6) dppm:
5.55 (2H,s), 7.24 (2H,d,J=8.5Hz), 7.28-7.39 (4H,m), 7.45 (1H,d,J=8.4Hz), 7.50-7.64 (1H,m), 8.68 (1H,dd,J=1.3,8.1Hz), 10.24(1H,s)

Reference Example 19

Synthesis of 1-(4-chlorobenzyl)-2-oxo-1,2-dihydroquinoline-3-carboxaldehyde

Sodium hydride (60% in oil) (1.3 g) was added at 0°C to a DMF solution (50 ml) of 2-oxo-1,2-dihydroquinoline-3-carboxaldehyde (5.13 g), followed by stirring for 30 minutes. 4-chlorobenzyl bromide (7.0 g) was added, and the resulting mixture was stirred at room temperature overnight. Water was added to the reaction mixture, extraction with ethyl acetate was performed, and the extract was dried over anhydrous sodium sulfate, and concentrated under reduced pressure. The residue was purified by silica gel column chromatography (ethyl acetate:n-hexane = 1:10 → 1:4). The purified product was recrystallized from a chloroform-diisopropyl ether mixed solvent to thereby obtain 6.57 g (yield: 72%) of 1-(4-chlorobenzyl)-2-oxo-1,2-dihydroquinoline-3-carboxaldehyde as a white powder.

^{1}H-NMR(DMSO-d_6) dppm:

5.56 (2H,s), 7.21-7.39 (5H,m), 7.44 (1H,d,J=8.6Hz), 7.61-7.72 (1H,m), 8.02 (1H,dd,J=1.4,7.8Hz), 8.59 (1H,s), 10.31(1H,s)

Reference Example 20

Synthesis of 5-trifluoromethanesulfonyloxy-3,4-dihydro-1H-quinolin-2-one

Pyridine (30 ml) and trifluoromethanesulfonic anhydride (25 g) were added with stirring at 0°C to an anhydrous dichloromethane solution (200 ml) of 5-hydroxy-3,4-dihydro-1H-quinolin-2-one (15.9 g), followed by stirring for 2 hours. The resulting mixture was concentrated under reduced pressure, water was added to the residue, and extraction with dichloromethane was performed. The extract was washed with water, an aqueous potassium hydrogensulfate solution and water in this order, and dried over anhydrous sodium sulfate. After concentration under reduced pressure, the residue was recrystallized from an ethyl acetate-diisopropyl ether mixed solvent to thereby obtain 28 g (yield: 97%) of 5-trifluoromethanesulfonyloxy-3,4-dihydro-1H-quinolin-2-one as a light brown powder.

^{1}H-NMR($CDCl_3$) dppm:
2.67 (2H,dd,J=6.3Hz,J=8.8Hz), 3.07 (2H,t,J=7.2Hz), 6.80-6.90(1H,m), 6.90-7.02(1H,m), 7.16-7.32 (1H,m), 8.95(1H,brs)

Reference Example 21

Synthesis of 5-cyano-3,4-dihydro-1H-quinolin-2-one

5-Trifluoromethanesulfonyloxy-3,4-dihydro-1H-quinolin-2-one (1.5 g), zinc cyanide (1.3 g) and tetrakis(triphenylphosphine) palladium (0.59 g) were suspended in DMF (20 ml), and the suspension was stirred at 100°C for 2 hours. The insoluble matter was filtered off, and ethyl acetate was added to the filtrate, followed by washing with water. The resulting mixture was dried over anhydrous magnesium sulfate, and concentrated under reduced pressure, and the residue was recrystallized from an ethyl acetate-diethyl ether mixed solvent to thereby obtain 0.71 g (yield: 81%) of 5-cyano-3,4-dihydro-1H-quinolin-2-one as a light brown powder.

^{1}H-NMR(DMSO-d_6) dppm:
2.45-2.60 (2H,m), 3.05(2H,t,J=7.2Hz),7.08-7.18(1H,m),7.28-7.40 (2H,m),10.37 (1H,brs)

Reference Example 22

Synthesis of 2-oxo-1,2,3,4-tetrahydroquinoline-5-carboxaldehyde

5-Cyano-3,4-dihydro-1H-quinolin-2-one (100 mg) and Raney nickel (100 mg) were suspended in formic acid (10 ml), and the suspension was heated under reflux for 2 hours. An additional 100 mg of Raney nickel was added, followed by heating under reflux for 1 hour. The reaction mixture was filtered to remove the insoluble matter, and the filtrate was concentrated. Ethyl acetate and water were added to the residue, and after stirring, the mixture was filtered through Celite. The filtrate was separated into layers, and the organic layer was washed with water and dried over anhydrous sodium sulfate. After concentration under reduced pressure, the residue was recrystallized from an ethyl acetate-n-hexane mixed solvent to

thereby obtain 77 mg (yield: 76%) of 2-oxo-1,2,3,4-tetrahydroquinoline-5-carboxaldehyde as a light brown powder.
^{1}H-NMR(DMSO-d_6) dppm:
2.39-2.51 (2H,m), 3.35 (2H,t,J=7.4Hz), 7.10-7.17 (1H,m), 7.31-7.41 (1H,m), 7.44-7.50 (1H,m), 10.18 (1H,s), 10.26(1H,brs)

Reference Example 23

Synthesis of 1-(4-biphenylmethyl)-2-oxo-1,2,3,4-tetrahydroquinoline-5-carboxaldehyde

Sodium hydride (60% in oil) (0.25 g) was added at 0°C to a DMF solution (10 ml) of 2-oxo-1,2,3,4-tetrahydroquinoline-5-carboxaldehyde (1.0 g), followed by stirring for 30 minutes. 4-bromomethylbiphenyl (1.69 g) was added, and the resulting mixture was stirred at room temperature for 1 hour. Water was added to the reaction mixture, and extraction with ethyl acetate was performed. The extract was washed with a saturated sodium chloride solution, dried over anhydrous magnesium sulfate, and concentrated under reduced pressure. The residue was purified by silica gel column chromatography (ethyl acetate:n-hexane = 1:4 → 1:2). The purified product was recrystallized from a chloroform-diisopropyl ether mixed solvent to thereby obtain 1.11 g (yield: 56%) of 1-(4-biphenylmethyl)-2-oxo-1,2,3,4-tetrahydroquinoline-5-carboxaldehyde as a colorless plate crystals.
^{1}H-NMR(DMSO-d_6) dppm:
2.65-2.78 (2H,m), 3.45 (2H,t,J=7.6Hz), 5.24 (2H,s), 7.21-7.49 (7H,m), 7.49-7.57 (1H,m), 7.57-7.70 (4H,m), 10.24(1H,s)

Reference Example 24

Synthesis of 5-(1,3-dioxolan-2-yl)-8-methoxy-3,4-dihydro-1H-quinolin-2-one

8-Methoxy-2-oxo-1,2,3,4-tetrahydroquinoline-5-carboxaldehyde (42 g) was suspended in toluene (400 ml), and ethylene glycol (33.7 ml) and p-toluenesulfonic acid monohydrate (0.78 g) were added, and the resulting mixture was heated under reflux in a Dean-Stark apparatus for 4.5 hours. The reaction

mixture was cooled, and 10 ml of an aqueous solution containing 1.72 g of sodium bicarbonate was added. Stirring was carried out for some time, and the produced solid was collected by filtration. The solid was washed with water and toluene and dried at 60°C to thereby obtain 35.5 g (yield: 70%) of 5-(1,3-dioxolan-2-yl)-8-methoxy-3,4-dihydro-1H-quinolin-2-one as white crystals.

^{1}H-NMR(DMSO-d_6) dppm:

2.33-2.44 (2H,m), 2.85-2.98 (2H,m), 3.79 (3H,s), 3.86-4.08 (4H,m), 5.78 (1H,s), 6.86 (1H,d,J=8.5Hz), 7.07 (1H,d,J=8.5Hz), 8.97 (1H,s)

Reference Example 25

Synthesis of 1-(6-chloropyridin-3-ylmethyl)-5-(1,3-dioxolan-2-yl)-8-methoxy-3,4-dihydro-1H-quinolin-2-one

Sodium hydride (55% in oil) (2.1 g) was added in small portions under ice cooling to a DMF solution (70 ml) of 5-(1,3-dioxolan-2-yl)-8-methoxy-3,4-dihydro-1H-quinolin-2-one (10 g), and stirring was carried out at room temperature until the generation of hydrogen stopped. The resulting mixture was cooled with ice again, and a DMF solution (30 ml) of 2-chloro-5-chloromethyl pyridine (9.74 g) was added dropwise. After stirring at room temperature for 4 hours, the reaction mixture was poured into ice water, and the produced insoluble matter was collected by filtration. The solid was washed with water and diethyl ether and dried to thereby obtain 11.84 g (yield: 79%) of 1-(6-chloropyridin-3-ylmethyl)-5-(1,3-dioxolan-2-yl)-8-methoxy-3,4-dihydro-1H-quinolin-2-one as a light yellow solid.

^{1}H-NMR(DMSO-d_6) dppm:

2.47-2.53 (2H,m), 2.88-2.94 (2H,m), 3.63 (3H,s), 3.91-4.04 (4H,m), 5.08 (2H,s), 5.80 (1H,s), 6.88 (1H,d,J=8.6Hz), 7.19(1H,d,J=8.6Hz), 7.38 (1H,d,J=8.3Hz), 7.60 (1H,dd,J_1=2.3Hz,J_2=8.3Hz), 8.19 (1H,d,J=2.3Hz)

Reference Example 26

Synthesis of 5-(1,3-dioxolan-2-yl)-8-methoxy-1-[6-(N-methyl-N-

phenylamino)pyridin-3-ylmethyl]-3,4-dihydro-1H-quinolin-2-one

1-(6-Chloropyridin-3-ylmethyl)-5-[1,3]dioxolan-2-yl-8-methoxy-3,4-dihydro-1H-quinolin-2-one (0.4 g), tris(dibenzylideneacetone)dipalladium (48.8 mg), 4,5-bis(diphenylphosphino)-9,9-dimethylxanthene (92.6 mg) and sodium tert-butoxide (0.15 g) were suspended in toluene (10.6 ml). N-methylaniline (0.17 g) was added, and the resulting mixture was heated under reflux in an argon atmosphere for 13 hours. After concentration under reduced pressure, the residue was purified by silica gel column chromatography (ethyl acetate:n-hexane = 1:1 → dichloromethane:methanol = 20:1). The purified product was concentrated under reduced pressure to thereby obtain 0.45 g (yield: 95%) of 5-(1,3-dioxolan-2-yl)-8-methoxy-1-[6-(N-methyl-N-phenylamino)pyridin-3-ylmethyl]-3,4-dihydro-1H-quinolin-2-one as an amorphous solid.

^{1}H-NMR($CDCl_3$) dppm:

2.52-2.58 (2H,m), 2.74-2.80 (2H,m), 3.40 (3H,s), 3.83(3H,s), 3.98-4.12 (4H,m), 5.22 (2H,s), 5.81 (1H,s), 6.39 (1H,d,J=8.7Hz), 6.76 (1H,d, J=8.7Hz), 7.13-7.26 (4H,m), 7.33-7.39 (3H,m), 7.99 (1H,d,J=2.0Hz)

Reference Example 27

Synthesis of 8-methoxy-1-[6-(N-methyl-N-phenylamino)pyridin-3-ylmethyl]-2-oxo-1,2,3,4-tetrahydroquinoline-5-carboxaldehyde

Pyridinium p-toluene sulfonate (PPTS) (0.54 g) was added to a mixed solution of 5-(1,3-dioxolan-2-yl)-8-methoxy-1-[6-(N-methyl-N-phenylamino)pyridin-3-ylmethyl]-3,4-dihydro-1H-quinolin-2-one (0.95 g) in acetone (19 ml) and water (9.5 ml), followed by heating under reflux for 2 hours. An aqueous sodium hydrogencarbonate solution was added to the reaction mixture, and extraction with ethyl acetate was performed. The extract was washed twice with water, washed with a saturated sodium chloride solution, dried over sodium sulfate, filtered, and concentrated under reduced pressure. The residue was purified by silica gel column chromatography (ethyl acetate:n-hexane = 1:1). The

purified product was concentrated under reduced pressure to thereby obtain 0.69 g (yield: 81%) of 8-methoxy-1-[6-(N-methyl-N-phenylamino)pyridin-3-ylmethyl]-2-oxo-1,2,3,4-tetrahydroquinoline-5-carboxaldehyde as a light yellow amorphous solid.

^{1}H-NMR($CDCl_3$) dppm:

2.53-2.59 (2H,m), 3.28-3.34 (2H,m), 3.39 (3H,s), 3.95 (3H,s), 5.23(2H,s), 6.37 (1H,d,J=8.8Hz), 6.90 (1H,d,J=8.6Hz), 7.09 (1H,dd,J_1=2.4Hz,J_2=8.8Hz),7.16-7.21 (3H,m), 7.33-7.39 (2H,m), 7.54 (1H,d,J=8.6Hz), 7.94 (1H,d,J=2.4Hz), 10.00 (1H,s)

Reference Example 28

Synthesis of 5-(1,3-dioxolan-2-yl)-8-methoxy-1-(6-thiophen-3-ylpyridin-3-ylmethyl)-3,4-dihydro-1H-quinolin-2-one

1-(6-Chloropyridin-3-ylmethyl)-5-(1,3-dioxolan-2-yl)-8-methoxy-3,4-dihydro-1H-quinolin-2-one (0.4 g), tetrakis(triphenylphosphine) palladium (0.12 g) and a 2N aqueous solution of sodium carbonate (2.5 ml) were suspended in 8 ml of 1,2-dimethoxyethane, and 0.20 g of 3-thiopheneboronic acid was added, followed by heating under reflux in an argon atmosphere for 4 hours. Water was added to the reaction mixture, and extraction with ethyl acetate was performed. The extract was washed twice with water, washed with a saturated sodium chloride solution, dried over sodium sulfate, filtered, and concentrated under reduced pressure. The residue was purified by silica gel column chromatography (ethyl acetate:n-hexane = 1:1). The purified product was concentrated under reduced pressure to thereby obtain 0.45 g (yield: 95%) of 5-(1,3-dioxolan-2-yl)-8-methoxy-1-(6-thiophen-3-ylpyridin-3-ylmethyl)-3,4-dihydro-1H-quinolin-2-one as a light brown amorphous solid.

^{1}H-NMR(DMSO-d_6) dppm:

2.49-2.51 (2H,m), 2.89-2.91 (2H,m), 3.71 (3H,s), 3.91-4.04 (4H,m), 5.19 (2H,s), 5.79 (1H,s), 6.87 (1H,d,J=8.8Hz), 7.16 (1H,d,J=8.8Hz), 7.51-7.74 (4H,m), 8.09-8.10 (1H,m), 8.32 (1H,d,J=2.0Hz)

Reference Example 29

Synthesis of 8-methoxy-1-(6-thiophen-3-ylpyridin-3-ylmethyl)-2-oxo-1,2,3,4-tetrahydroquinoline-5-carboxaldehyde

Pyridinium p-toluenesulfonate (PPTS) (0.24 g) was added to a mixed solution of 5-(1,3-dioxolan-2-yl)-8-methoxy-1-(6-thiophen-3-ylpyridin-3-ylmethyl)-3,4-dihydro-1H-quinolin-2-one (0.4 g) in acetone (8 ml) and water (4 ml), followed by heating under reflux 1.5 hours. The resulting mixture was concentrated under reduced pressure, subjected to extraction with dichloromethane, washed with water, washed with a saturated sodium chloride solution, dried over sodium sulfate, filtrated, and concentrated under reduced pressure to thereby obtain 0.4 g (yield: quantitative) of 8-methoxy-1-(6-thiophen-3-ylpyridin-3-ylmethyl)-2-oxo-1,2,3,4-tetrahydroquinoline-5-carboxaldehyde as a light brown amorphous solid.

^{1}H-NMR(DMSO-d_6) dppm:

2.51-2.58 (2H,m), 3.34-3.41 (2H,m), 3.81 (3H,s), 5.19 (2H,s), 7.09 (1H,d, J=8.8Hz), 7.54-7.74 (5H,m), 8.09-8.10 (1H,m), 8.35 (1H,d,J=1.8Hz), 10.03 (1H,s)

Reference Example 30

Synthesis of 5-(1,3-dioxolan-2-yl)-1-phenyl-3,4-dihydro-1H-quinolin-2-one

5-(1,3-Dioxolan-2-yl)-3,4-dihydro-1H-quinolin-2-one (2.30 g, 10.5 mmol), iodobenzene (3.5 ml, 31.5 mmol), copper(I) iodide (400 mg, 2.10 mmol), trans-1,2-diaminocyclohexane (0.129 ml, 1.05 mmol) and cesium carbonate (6.84 g, 21.0 mmol) were stirred in 30 ml of 1,4-dioxane under reflux for three days. After cooling, the insoluble matter was filtered off through a Celite pad. Ethyl acetate and water were added to the filtrate, and the resulting mixture was washed (twice with water and once with a saturated sodium chloride solution), dried ($MgSO_4$), and concentrated under reduced pressure. The residue was purified by silica gel column chromatography (ethyl acetate:n-hexane = 1:3 →

1:1) to thereby obtain 2.91 g (yield: 92%) of 5-(1,3-dioxolan-2-yl)-1-phenyl-3,4-dihydro-1H-quinolin-2-one as a white solid.
^{1}H-NMR($CDCl_3$) dppm:
2.75-2.90 (2H,m), 3.11-3.27 (2H,m), 3.98-4.25 (4H,m), 5.99 (1H,s), 6.39 (1H,d,J=7.6Hz), 7.05 (1H,t,J=8.0Hz), 7.16-7.30 (3H,m), 7.35-7.56 (3H,m)

Reference Example 31
Synthesis of 1-phenyl-2-oxo-1,2,3,4-tetrahydroquinoline-5-carboxaldehyde

2N Hydrochloric acid (5 ml) was added to a solution of 5-(1,3-dioxolan-2-yl)-1-phenyl-3,4-dihydro-1H-quinolin-2-one (2.60 g) in THF (30 ml), followed by stirring at room temperature overnight. After distilling off THF under reduced pressure, ethyl acetate-water was added, and the resulting mixture was washed (twice with water and once with a saturated sodium chloride solution), dried ($MgSO_4$), and concentrated under reduced pressure. The obtained solid was recrystallized from chloroform-diethyl ether to thereby obtain 1.93 g (yield: 87%) of 1-phenyl-2-oxo-1,2,3,4- tetrahydroquinoline-5-carboxaldehyde as a beige powder.
^{1}H-NMR($CDCl_3$) dppm:
2.75-2.89 (2H,m), 3.53-3.68 (2H,m), 6.65 (1H,dd,J=0.9Hz,J=8.2Hz), 7.15-7.20 (3H,m), 7.39-7.61 (4H,m), 10.24 (1H,s)

Reference Example 32
Synthesis of 5-methoxy-2-oxo-1,2,3,4-tetrahydroquinoline-8-carboxaldehyde

5-Methoxy-3,4-dihydro-1H-quinolin-2-one (5.00 g, 26 mmol) was dissolved in dichloromethane (100 ml), and dichloromethyl methyl ether (7.65 ml, 85 mmol) was added at 0ºC. Titanium tetrachloride (12.4 ml, 113 mmol) was added dropwise at a temperature not higher than 10ºC. Stirring was carried out at room temperature for 2 hours, and the reaction mixture was poured into ice water and separated into layers. The aqueous layer was subjected to extraction with dichloromethane. The organic layers

were combined and washed twice with water, washed with a saturated sodium chloride solution, dried over sodium sulfate, filtered, and concentrated under reduced pressure. The residue was dissolved in dichloromethane, diethyl ether was added, and the produced insoluble matter was collected by filtration and dried to thereby obtain 5.32 g (yield: 92%) of 5-methoxy-2-oxo-1,2,3,4-tetrahydroquinoline-8-carboxaldehyde as a light brown powder.

^{1}H-NMR($CDCl_3$) dppm:

2.55-2.67 (2H,m), 2.90-3.04 (2H,m), 3.94 (3H,s), 6.69 (1H,d,J=8.6Hz), 7.53 (1H,d,J=8.6Hz), 9.79 (1H,s), 10.60 (1H,brs)

Reference Example 33

Synthesis of 5-methoxy-8-methyl-3,4-dihydro-1H-quinolin-2-one

5-Methoxy-2-oxo-1,2,3,4-tetrahydroquinoline-8-carboxaldehyde (1.00 g) and 10% palladium carbon (100 mg) were added to a mixed solvent of acetic acid (10 ml) and ethanol (10 ml), followed by catalytic reduction at 50ºC for 1 hour. The catalyst was filtered off, and the filtrate was concentrated under reduced pressure. The residue was subjected to extraction with ethyl acetate, and the extract was washed twice with water, washed with a saturated sodium chloride solution, dried over sodium sulfate, filtered, and concentrated under reduced pressure. The residue was recrystallized from an ethyl acetate-diethyl ether mixed solvent to thereby obtain 826 mg (yield: 89%) of 5-methoxy-8-methyl-3,4-dihydro-1H-quinolin-2-one as a white powder.

^{1}H-NMR($CDCl_3$) dppm:

2.04 (3H,s), 2.54-2.65 (2H,m), 2.89-3.02 (2H,m), 3.81 (3H,s), 6.51 (1H,d, J=8.4Hz), 6.97 (1H,d,J=8.4Hz), 7.37 (1H,brs)

Reference Example 34

Synthesis of 5-hydroxy-8-methyl-3,4-dihydro-1H-quinolin-2-one

A 2N dichloromethane solution (52 ml) of boron tribromide was added dropwise at -20ºC to a dichloromethane solution (100 ml) of 5-methoxy-8-methyl-3,4-dihydro-1H-quinolin-

2-one (10.0 g). After stirring for 1 hour, the reaction mixture was poured into ice water and separated into layers. The organic layer was washed twice with water, washed with a saturated sodium chloride solution, dried over sodium sulfate, filtered, and concentrated under reduced pressure. The residue was recrystallized from an ethyl acetate-diethyl ether mixed solvent to thereby obtain 9.4 g (yield: quantitative) of 5-hydroxy-8-methyl-3,4-dihydro-1H-quinolin-2-one as a white powder.

^{1}H-NMR($CDCl_3$) dppm:

2.14 (3H,s), 2.60-2.65 (2H,m), 2.94-2.99 (2H,m), 5.50 (1H,brs), 6.45 (1H,d,J=8.2Hz), 6.88 (1H,d,J=8.2Hz), 7.40 (1H,brs)

Reference Example 35

Synthesis of 8-methyl-5-trifluoromethanesulfonyloxy-3,4-dihydro-1H-quinolin-2-one

Pyridine (6.2 ml) and trifluoromethanesulfonic anhydride (10.3 ml) were added with stirring at 0ºC to an anhydrous dichloromethane solution (30 ml) of 5-hydroxy-8-methyl-3,4-dihydro-1H-quinolin-2-one (9.0 g), followed by stirring for 1 hour. The resulting mixture was concentrated under reduced pressure, water was added to the residue, and extraction with dichloromethane was performed. The extract was washed with water, an aqueous potassium hydrogensulfate solution and water in this order, and dried over anhydrous sodium sulfate. After concentration under reduced pressure, the residue was recrystallized from an ethyl acetate-diisopropyl ether mixed solvent to thereby obtain 28 g (yield: 97%) of 8-methyl-5-trifluoromethanesulfonyloxy-3,4-dihydro-1H-quinolin-2-one as a light brown powder.

^{1}H-NMR($CDCl_3$) dppm:

2.26 (3H,s), 2.60-2.73 (2H,m), 2.99-3.12 (2H,m), 6.89 (1H,d,J=8.5Hz), 7.11 (1H,d,J=8.5Hz), 7.67 (1H,brs)

Reference Example 36

Synthesis of 5-cyano-8-methyl-3,4-dihydro-1H-quinolin-2-one

8-Methyl-5-trifluoromethanesulfonyloxy-3,4-dihydro-1H-quinolin-2-one (4.0 g), zinc cyanide (3.34 g) and tetrakis(triphenylphosphine) palladium (0.299 g) were suspended in DMF (40 ml), and the suspension was stirred at 100ºC for 4 hours. The insoluble matter was filtered off, and ethyl acetate was added to the filtrate, followed by washing with water. After drying over anhydrous magnesium sulfate, the dry product was concentrated, and the residue was recrystallized from a DMF-ethanol mixed solvent to thereby obtain 2.1 g (yield: 87%) of 5-cyano-8-methyl-3,4-dihydro-1H-quinolin-2-one as a light brown powder.

^{1}H-NMR($CDCl_3$) dppm:

2.31 (3H,s), 2.64-2.75 (2H,m), 3.15-3.27 (2H,m), 7.14 (1H,d,J=7.9Hz), 7.24 (1H,d,J=7.9Hz), 7.67(1H,brs)

Reference Example 37

Synthesis of 8-methyl-2-oxo-1,2,3,4-tetrahydroquinoline-5-carboxaldehyde

5-Cyano-8-methyl-3,4-dihydro-1H-quinolin-2-one (2.0 g) and Raney nickel (10 g) were suspended in formic acid (40 ml), and the suspension was heated under reflux for 6 hours. The reaction mixture was filtered to remove the insoluble matter, and the filtrate was concentrated. Ethyl acetate and water were added to the residue, and after stirring, the mixture was filtered through Celite. The filtrate was separated into layers, and the organic layer was washed with water and dried over anhydrous sodium sulfate. After concentration under reduced pressure, the residue was recrystallized from an ethyl acetate-diethyl ether mixed solvent to thereby obtain 1.29 g (yield: 62%) of 8-methyl-2-oxo-1,2,3,4-tetrahydroquinoline-5-carboxaldehyde as a light brown powder.

^{1}H-NMR(DMSO-d_6) dppm:

2.30 (3H,s), 2.37-2.50 (2H,m), 3.28-3.43 (2H,m), 7.26 (1H,d,J=7.8Hz), 7.44 (1H,d,J=7.8Hz), 9.56 (1H,s), 10.15 (1H,s)

Reference Example 38

Synthesis of 5-methoxy-8-phenyl-3,4-dihydro-1H-quinolin-2-one

8-Bromo-5-methoxy-3,4-dihydro-1H-quinolin-2-one (10.0 g), tetrakis(triphenylphosphine) palladium (0.45 g) and potassium carbonate (5.4 g) were suspended in dioxane (100 ml), and phenylboronic acid (5.24 g) was added, followed by heating under reflux in an argon atmosphere for 2 hours. The reaction mixture was concentrated under reduced pressure, water was added to the residue, and the resulting mixture was subjected to extraction with ethyl acetate. The extract was washed twice with water, washed with a saturated sodium chloride solution, dried over magnesium sulfate, filtered, and concentrated under reduced pressure. The residue was recrystallized from an ethyl acetate-n-hexane mixed solvent to thereby obtain 8.3 g (yield: 84%) of 5-methoxy-8-phenyl-3,4-dihydro-1H-quinolin-2-one as a light yellow powder.

^{1}H-NMR($CDCl_3$) dppm:

2.57-2.64 (2H,m), 2.97-3.04 (3H,m), 3.88 (2H,s), 6.66 (1H,d,J=8.5Hz), 7.09 (1H,d,J=8.5Hz), 7.27-7.52 (6H,m)

Reference Example 39

Synthesis of 1-(biphenyl-4-ylmethyl)-5-methoxy-8-phenyl-3,4-dihydro-1H-quinolin-2-one

Sodium hydride (60% in oil) (0.87 g) was added at 0°C to a DMF solution (50 ml) of 5-methoxy-8-phenyl-3,4-dihydro-1H-quinolin-2-one (5.0 g), followed by stirring for 30 minutes. 4-Bromomethylbiphenyl (5.37 g) was added, and the resulting mixture was stirred at room temperature for 1 hour. Water was added to the reaction mixture, and extraction with ethyl acetate was performed. The extract was washed with a saturated sodium chloride solution, dried over anhydrous magnesium sulfate, and concentrated under reduced pressure. The residue was purified by silica gel column chromatography (ethyl acetate:n-hexane = 1:10 → 1:5). The purified product was recrystallized from an ethyl acetate-n-hexane-diethyl ether mixed solvent to thereby obtain

6.8 g (yield: 82%) of 1-(biphenyl-4-ylmethyl)-5-methoxy-8-phenyl-3,4-dihydro-1H-quinolin-2-one as a white powder.

^{1}H-NMR($CDCl_3$) dppm:

2.64-2.70 (2H,m), 2.84-2.96 (2H,m), 3.86 (3H,s), 4.49 (2H,s), 6.73 (1H,d, J=8.6Hz), 6.91 (2H,d,J=8.1Hz), 7.13 (1H,d,J=8.6Hz), 7.24-7.55 (12H,m)

Reference Example 40

Synthesis of 1-(biphenyl-4-ylmethyl)-5-hydroxy-8-phenyl-3,4-dihydro-1H-quinolin-2-one

A dichloromethane solution (12 ml) of 2N boron tribromide was added dropwise at -20° C to a dichloromethane solution (50 ml) of 1-(biphenyl-4-ylmethyl)-5-methoxy-8-phenyl-3,4-dihydro-1H-quinolin-2-one (5.00 g). After stirring for 4 hours, the reaction mixture was poured into ice water and separated into layers. The organic layer was washed twice with water, washed with a saturated sodium chloride solution, dried over sodium sulfate, filtered, and concentrated under reduced pressure. The residue was recrystallized from a dichloromethane-diisopropyl ether mixed solvent to thereby obtain 5.01 g (yield: quantitative) of 1-(biphenyl-4-ylmethyl)-5-hydroxy-8-phenyl-3,4-dihydro-1H-quinolin-2-one as a white powder.

^{1}H-NMR($CDCl_3$) dppm:

2.66-2.74 (2H,m), 2.84-2.90 (2H,m), 4.48 (2H,s), 5.84 (1H,brs), 6.61 (1H,d, J=8.4Hz), 6.92 (2H,d,J=8.2Hz), 7.01 (1H,d,J=8.4Hz), 7.22-7.54 (12H,m)

Reference Example 41

Synthesis of 1-(biphenyl-4-ylmethyl)-8-phenyl-5-trifluoromethanesulfonyloxy-3,4-dihydro-1H-quinolin-2-one

Pyridine (1.12 ml) and trifluoromethanesulfonic anhydride (1.99 ml) were added with stirring at 0° C to an anhydrous dichloromethane solution (40 ml) of 1-(biphenyl-4-ylmethyl)-5-hydroxy-8-phenyl-3,4-dihydro-1H-quinolin-2-one (4.0 g), followed by stirring for 1 hour. The resulting mixture was

concentrated under reduced pressure, water was added to the residue, and extraction with dichloromethane was performed. The extract was washed with water, an aqueous potassium hydrogensulfate solution and water in this order, dried over anhydrous sodium sulfate, and concentrated under reduced pressure to thereby obtain 5.45 g (yield: quantitative) of 1-(biphenyl-4-ylmethyl)-8-phenyl-5-trifluoromethanesulfonyloxy-3,4-dihydro-1H-quinolin-2-one as a white amorphous solid.

^{1}H-NMR($CDCl_3$) dppm:

2.67-2.81 (2H,m), 2.90-3.03 (2H,m), 4.48 (2H,s), 6.85 (2H,d,J=8.2Hz), 7.05-7.15 (1H,m), 7.20-7.58 (13H,m)

Reference Example 42

Synthesis of 1-(biphenyl-4-ylmethyl)-5-cyano-8-phenyl-3,4-dihydro-1H-quinolin-2-one

1-(Biphenyl-4-ylmethyl)-8-phenyl-5-trifluoromethanesulfonyloxy-3,4-dihydro-1H-quinolin-2-one (5.2 g), zinc cyanide (2.50 g) and tetrakis(triphenylphosphine) palladium (0.224 g) were suspended in DMF (50 ml), followed by stirring at 100°C for 4 hours. The insoluble matter was filtered off, and ethyl acetate was added to the filtrate, and the resulting mixture was washed with water. After drying over anhydrous magnesium sulfate, the dry product was concentrated to thereby obtain 2.1 g (yield: 90%) of 1-(biphenyl-4-ylmethyl)-5-cyano-8-phenyl-3,4-dihydro-1H-quinolin-2-one as a white amorphous solid.

^{1}H-NMR($CDCl_3$) dppm:

2.75-2.82 (2H,m), 3.09-3.15 (2H,m), 4.48(2H,s), 6.85 (2H,d,J=8.3Hz), 7.20-7.57 (14H,m)

Reference Example 43

Synthesis of 1-(biphenyl-4-ylmethyl)-8-phenyl-2-oxo-1,2,3,4-tetrahydroquinoline-5-carboxaldehyde

1-(Biphenyl-4-ylmethyl)-5-cyano-8-phenyl-3,4-dihydro-1H-quinolin-2-one (3.0 g) and Raney nickel (15 g) were suspended in formic acid (60 ml), and the suspension was heated under

reflux for 11 hours. The reaction mixture was filtered to remove the insoluble matter, and the filtrate was concentrated. Ethyl acetate and water were added to the residue, and after stirring, the mixture was filtered through Celite. The filtrate was separated into layers, and the organic layer was washed with water, dried over anhydrous sodium sulfate, and concentrated under reduced pressure. The residue was purified by silica gel column chromatography (ethyl acetate:n-hexane = 1:10 → 1:3). The purified product was concentrated to thereby obtain 0.44 g (yield: 15%) of 1-(biphenyl-4-ylmethyl)-8-phenyl-2-oxo-1,2,3,4-tetrahydroquinoline-5-carboxaldehyde as a white amorphous solid.

^{1}H-NMR($CDCl_3$) dppm:

2.69-2.75 (2H,m), 2.37-2.43 (2H,m), 4.48 (2H,s), 6.87 (2H,d,J=8.3Hz), 7.25-7.55 (13H,m), 7.61 (1H,d,J=8.0Hz), 10.20 (1H,s)

Reference Example 44

Synthesis of 1-benzyl-8-methoxy-2-oxo-1,2,3,4-tetrahydroquinoline-5-carboxaldehyde

Sodium hydride (60% in oil) (1.07 g) was added at 0°C to a DMF solution (50 ml) of 8-methoxy-2-oxo-1,2,3,4-tetrahydroquinoline-5-carboxaldehyde (5.0 g), followed by stirring for 30 minutes. Benzyl bromide (3.47 ml) was added, and the resulting mixture was stirred at room temperature for 1 hour. Water was added to the reaction mixture, and extraction with ethyl acetate was performed. The extract was washed with a saturated sodium chloride solution, dried over anhydrous magnesium sulfate, and concentrated under reduced pressure. The residue was recrystallized from an ethyl acetate-n-hexane mixed solvent to thereby obtain 6.6 g (yield: 92%) of 1-benzyl-8-methoxy-2-oxo-1,2,3,4-tetrahydroquinoline-5-carboxaldehyde as a white powder.

^{1}H-NMR($CDCl_3$) dppm:

2.60 (2H,t,J=7.0Hz), 3.38 (2H,t,J=7.0Hz), 3.82 (3H,s), 5.29 (2H,s), 6.82 (1H,d,J=8.6Hz), 7.0-7.3 (5H,m), 7.5 (1H,d,J=8.6Hz),

10.00(1H,s)

Reference Example 45

Synthesis of 1-benzyl-8-hydroxy-2-oxo-1,2,3,4-tetrahydroquinoline-5-carboxaldehyde

1-Benzyl-8-methoxy-2-oxo-1,2,3,4-tetrahydroquinoline-5-carboxaldehyde (3.0 g) and sodium 4-methylbenzenethiolate (3.27 g) were added to DMSO (30 ml), followed by stirring at 100°C for 40 minutes. Water and an aqueous solution of potassium hydrogensulfate were added to the reaction mixture, and extraction with ethyl acetate was performed. The extract was washed with a saturated sodium chloride solution, dried over anhydrous magnesium sulfate, and concentrated under reduced pressure. The residue was recrystallized from an ethyl acetate-n-hexane mixed solvent to thereby obtain 6.6 g (yield: 92%) of 1-benzyl-8-methoxy-2-oxo-1,2,3,4-tetrahydroquinoline-5-carboxaldehyde as a light brown powder.

^{1}H-NMR(DMSO-d_6) dppm:

2.42-2.59 (2H,m), 3.19-3.40 (2H,m), 5.31 (2H,s), 6.85 (1H,d,J=8.5Hz), 7.05-7.27 (5H,m), 7.43 (1H,d,J=8.5Hz), 9.94 (1H,s), 11.12 (1H,s)

Reference Example 46

Synthesis of 1-(4-carbomethoxybenzyl)-8-methoxy-2-oxo-1,2,3,4-tetrahydroquinoline-5-carboxaldehyde

Sodium hydride (60% in oil) (2.87 g) was added at 0°C to a DMF solution (100 ml) of 8-methoxy-2-oxo-1,2,3,4-tetrahydroquinoline-5-carboxaldehyde (13.4 g), followed by stirring for 30 minutes. Methyl 4-bromomethyl benzoate (18.0 g) was added, and the resulting mixture was stirred at room temperature overnight. Water was added to the reaction mixture, and extraction with ethyl acetate was performed. The extract was washed with a saturated sodium chloride solution, dried over anhydrous magnesium sulfate, and concentrated under reduced pressure. The residue was purified by silica gel column

chromatography (ethyl acetate:n-hexane = 1:4 → 1:2). The purified product was recrystallized from a chloroform-diisopropyl ether mixed solvent to thereby obtain 14.43 g (yield: 62%) of 1-(4-carbomethoxybenzyl)-8-methoxy-2-oxo-1,2,3,4-tetrahydroquinoline-5-carboxaldehyde as a white powder.

^{1}H-NMR(DMSO-d_6) dppm:

2.50-2.61 (2H,m), 3.29-3.41 (2H,m), 3.71 (3H,s), 3.79 (3H,s), 5.18(2H,s), 7.06 (1H,d,J=8.7Hz), 7.25 (2H,d,J=8.2Hz), 7.60 (1H,d,J=8.7Hz), 7.81 (2H,d,J=8.2Hz), 10.02(1H,s)

Using appropriate starting materials and following the procedure of Reference Example 41, the compounds of Reference Examples 47 to 50 were synthesized.

Reference Example 47

8-Chloro-5-trifluoromethanesulfonyloxy-3,4-dihydro-1H-quinolin-2-one

^{1}H-NMR($CDCl_3$) dppm:

2.63-2.75 (2H,m), 3.02-3.15 (2H,m), 6.94 (1H,d,J=8.9Hz), 7.34 (1H,d,J=8.9Hz), 7.85(1H,brs)

Reference Example 48

6-Trifluoromethanesulfonyloxy-3,4-dihydro-1H-quinolin-2-one

^{1}H-NMR($CDCl_3$) dppm:

2.60-2.73 (2H,m), 3.01 (2H,t,J=8.0Hz), 6.81-6.92 (1H,m), 7.00-7.12 (2H,m), 9.09 (1H,brs)

Reference Example 49

7-Trifluoromethanesulfonyloxy-3,4-dihydro-1H-quinolin-2-one

^{1}H-NMR($CDCl_3$) dppm:

2.60-2.71 (2H,m), 3.00 (2H,t,J=8.0Hz), 6.70-6.77 (1H,m), 6.84-6.95 (1H,m), 7.16-7.30 (1H,m), 8.80 (1H,brs)

Reference Example 50

8-Trifluoromethanesulfonyloxy-3,4-dihydro-1H-quinolin-2-one

^{1}H-NMR($CDCl_3$) dppm:

2.63-2.75 (2H,m), 3.05 (2H,t,J=7.9Hz), 7.03 (1H,t,J=7.9Hz), 7.12-7.28 (2H,m), 7.78(1H,brs)

Reference Example 51

Synthesis of 6-oxo-5,6-dihydrophenanthridine-2-carbonitrile

2-(4,4-Dimethyl-[1,3,2]dioxaboronan-2-yl)-benzoic acid ethyl ester (19.84 g), 2-iodo-4-cyanoaniline (18.47 g), tetrakis(triphenylphosphine) palladium (8.75 g) and potassium phosphate (35.36 g) were added to dioxane (360 ml), and the resulting mixture was heated under reflux overnight. The reaction solvent was cooled, and the produced solid was collected by filtration, washed with water and dried to thereby obtain 17.3 g (yield: quantitative) of the title compound as a yellow solid.

^{1}H-NMR(DMSO-d_6) dppm:

7.47 (1H,d,J=8.5Hz), 7.6-8.0 (3H,m), 8.1-8.2 (1H,m), 8.3-8.4 (1H,m), 8.98 (1H,s), 12.05(1H,brs)

Reference Example 52

Synthesis of 5-benzyl-6-oxo-5,6-dihydrophenanthridine-2-carbonitrile

6-Oxo-5,6-dihydrophenanthridine-2-carbonitrile (1 g) was suspended in DMF (20 ml), 60% sodium hydride (0.2 g) was added under ice cooling, and stirring was carried out until the generation of hydrogen stopped. Benzyl bromide (0.59 ml) was added, followed by stirring at room temperature for 1 hour. Water was added, and the produced solid was collected by filtration and purified by silica gel chromatography (dichloromethane:n-hexane =1:1) to thereby obtain 0.68 g (yield: 48%) of the title compound as colorless crystals.

^{1}H-NMR(DMSO-d_6) dppm:

5.57 (2H,s), 7.1-7.5 (6H,m), 7.6-7.95 (3H,m), 8.27 (1H,d,J=8.3Hz), 8.58 (1H,d,J=1.8Hz), 8.63(1H,dd,J=8.3Hz,J=1.8Hz)

Using appropriate starting materials and following the procedure of Reference Example 52, the compounds of Reference

Examples 53 to 54 were synthesized.

Reference Example 53

5-Ethyl-6-oxo-5,6-dihydrophenanthridine-2-carbonitrile

^{1}H-NMR(DMSO-d_6) dppm:

1.43 (3H,t,J=7.1Hz), 4.47 (2H,t,J=7.1Hz), 7.35-7.9 (4H,m), 8.27 (1H,d,J=8.3Hz), 8.5-8.65 (2H,m)

Reference Example 54

5-(1-Biphenyl-4-ylmethyl)-6-oxo-5,6-dihydrophenanthridine-2-carbonitrile

^{1}H-NMR(DMSO-d_6) dppm:

5.57 (2H,s), 7.1-7.5 (6H,m), 7.6-7.95 (3H,m), 8.27 (1H,d,J=8.3Hz), 8.58 (1H,d,J=1.8Hz), 8.63 (1H,dd,J=8.3Hz,J=1.8Hz)

Reference Example 55

Synthesis of 5-benzyl-6-oxo-5,6-dihydrophenanthridine-2-carboxaldehyde

5-Benzyl-6-oxo-5,6-dihydrophenanthridine-2-carbonitrile (1.24 g) and Raney nickel (0.8 g) were suspended in 75% formic acid (25 ml). The suspension was heated under reflux for 1 hour and 40 minutes, and filtered while hot. The filtrate was concentrated and purified by silica gel chromatography (methylene chloride:methanol = 50:1) to thereby obtain 1.08 g (yield: 80%) of the title compound as a colorless crystals.

^{1}H-NMR(DMSO-d_6) dppm:

5.69 (2H,s), 7.15-7.35 (6H,m), 7.5-8.05 (3H,m), 8.47(1H,d,J=7.9Hz), 8.70 (1H,d,J=8.1Hz), 8.63 (1H,d,J=1.4Hz), 10.08 (1H,s)

Using appropriate starting materials and following the procedure of Reference Example 55, the compound of Reference Example 56 was synthesized.

Reference Example 56

5-Ethyl-6-oxo-5,6-dihydrophenanthridine-2-carboxaldehyde

^{1}H-NMR(DMSO-d_6) dppm:
1.45 (3H,t,J=7.1Hz), 4.50 (2H,t,J=7.1Hz), 7.15-7.35 (6H,m), 7.5-8.15 (4H,m), 8.39 (1H,d,J=8.1Hz), 8.56 (1H,dd,J=8.1Hz,J=1.3Hz), 8.81 (1H,d,J=1.8Hz), 10.11 (1H,s)

Using appropriate starting materials and following the procedure of Reference Example 13, the compounds of Reference Examples 104 to 130, 133, 134 and 137 to 141 were synthesized.

Using appropriate starting materials and following the procedure of Reference Example 19, the compounds of Reference Examples 147 and 148 were synthesized.

Using appropriate starting materials and following the procedure of Reference Example 21, the compounds of Reference Examples 57 to 63 were synthesized.

Using appropriate starting materials and following the procedure of Reference Example 23, the compounds of Reference Examples 144 to 145 and 152 to 156 were synthesized.

Using appropriate starting materials and following the procedure of Reference Example 24, the compounds of Reference Examples 70, 71 and 81 were synthesized.

Using appropriate starting materials and following the procedure of Reference Example 25, the compounds of Reference Examples 64 to 69, 72, 79, 80, 82 and 83 were synthesized.

Using appropriate starting materials and following the procedure of Reference Example 26, the compounds of Reference Examples 75 to 77 were synthesized.

Using appropriate starting materials and following the procedure of Reference Example 28, the compounds of Reference Examples 74 and 78 were synthesized.

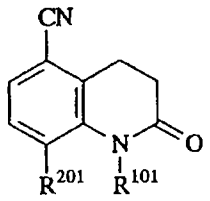
Using appropriate starting materials and following the procedure of Reference Example 29, the compounds of Reference Examples 98, 99, 100 to 103, 131, 135, 136 and 146 were synthesized.

Using appropriate starting materials and following the procedure of Reference Example 31, the compounds of Reference

Examples 84 to 97 and 142 were synthesized.

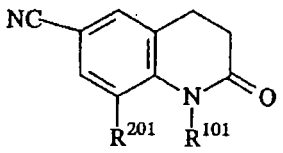
Using appropriate starting materials and following the procedure of Reference Example 37, the compounds of Reference Examples 149 to 151 were synthesized.

Table 1



Ref. Ex.	R^{101}	R^{201}	^{1}HNMR dppm
57	-H	$-OCH_3$	$CDCl_3$:2.65-2.72 (2H, m), 3.15-3.22 (2H, m), 3.94 (3H, s), 6.86 (1H, d, J = 8.6 Hz), 7.32 (1H, d, J = 8.6 Hz), 7.82 (1H, brs)."
58	-H	-Cl	$CDCl_3$:2.82-2.68 (2H, m), 3.20-3.32 (2H, m), 7.27 (1H, d, J = 8.4 Hz), 7.38 (1H, d, J = 8.4 Hz), 7.85 (1H, brs).

Table 2



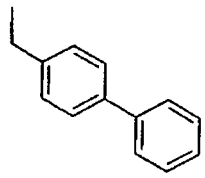
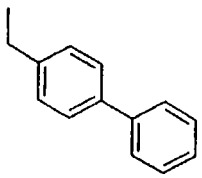
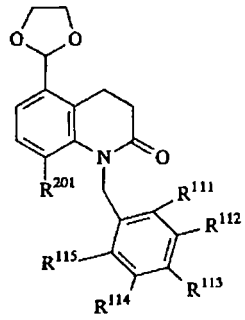
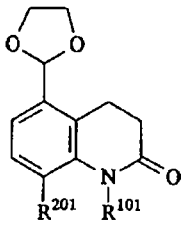
Ref. Ex.	R^{101}	R^{201}	^{1}HNMR dppm
59	-H	-H	DMSO-d_6:2.41-2.55 (2H, m), 2.91 (2H, t, J = 7.9 Hz), 6.96 (1H, d, J = 8.2 Hz), 7.55-7.67 (2H, m), 10.49 (1H, brs).
60	-H	$-CH_3$	$CDCl_3$::2.67 (3H, s), 2.61-2.72 (2H, m), 2.94-3.08 (2H, m), 7.30-7.39 (2H, m), 7.66 (1H, brs).
61	-H	$-OCH_3$	$CDCl_3$:2.62-2.69 (2H, m), 2.96-3.03 (2H, m), 3.91 (3H, s), 7.01 (1H, s), 7.13 (1H, s), 7.86 (1H, brs).
62		$-OCH_3$	$CDCl_3$:2.65-2.71 (2H, m), 2.85-2.92 (2H, m), 3.78 (3H, s), 5.38 (2H, s), 6.98 (1H, d, J = 1.5 Hz), 7.10 (1H, d, J = 1.5 Hz), 7.15 (2H, d, J = 8.1 Hz), 7.30-7.36 (1H, m), 7.36-7.49 (4H, m), 7.49-7.59 (2H, m).
63		$-CH_3$	$CDCl_3$:2.40 (3H, s), 2.57-2.70 (2H, m), 2.77-2.90 (2H,m), 5.17 (2H, s), 7.13 (2H, d, J = 8.3 Hz), 7.29-7.37 (3H, m), 7.37-7.50 (4H, m), 7.50-7.90 (2H, m).

Table 3



Ref.Ex.	R^{111}	R^{112}	R^{113}	R^{114}	R^{115}	R^{201}	^{1}HNMR dppm
64	-H	-H	-Br	-H	-H	-H	$CDCl_3$:2.70-2.83 (2H, m), 3.01-3.16 (2H, m), 3.97-4.22 (4H, m), 5.12 (2H, s), 5.95 (1H, s), 6.85 (1H, dd, J = 0.8, 8.1 Hz), 7.02-7.19 (3H, m), 7.22-7.31 (1H, m), 7.38-7.50 (2H, m).
65	-H	-H	-Cl	-H	-H	-H	$CDCl_3$:2.68-2.82 (2H, m), 3.02-3.17 (2H, m), 3.97-4.20 (4H, m), 5.14 (2H, s), 5.95 (1H, s), 6.84 (1H, dd, J = 0.8, 8.1 Hz), 7.05-7.18 (3H, m), 7.20-7.33 (3H, m).
66	-H	-H	$-CH_3$	-H	-H	-H	$CDCl_3$:2.30 (3H, s), 2.68-2.82 (2H, m), 3.01-3.16 (2H, m), 3.97-4.20 (4H, m), 5.14 (2H, s), 5.95 (1H, s), 6.91 (1H, dd, J = 0.8, 8.1 Hz), 7.04-7.17 (5H,m), 7.24 (1H, dd, J = 0.8, 8.1).
67	-H	-H	$-OC_6H_5$	-H	-H	$-OCH_3$	$CDCl_3$:2.55-2.66 (2H ,m), 2.87-2.99 (2H, m), 3.74 (3H, s), 3.96-4.18 (4H, m), 5.25 (2H, s), 5.84 (1H, s), 6.75 (1H, d, J = 8.7 Hz), 6.84 (2H, d, J = 8.6 Hz), 6.94 (2H, dd, J = 1.1, 8.7 Hz), 7.03-7.22 (3H, m), 7.22-7.36 (3H, m).
68	-H	-H	$-CO_2CH_3$	-H	-H	-H	$CDCl_3$:2.75-2.81 (2H, m), 3.09-3.15 (2H, m), 3.89 (3H, s), 4.04-4.17 (4H, m), 5.23 (2H,s), 5.96 (1H, s), 6.80 (1H, d, J=7.9Hz), 7.11 (1H, t, J=7.9Hz), 7.25-7.28 (3H, m), 7.98 (2H, d, J=8.3Hz)
69	-H	-H	$-NO_2$	-H	-H	-H	$CDCl_3$:2.76-2.82 (2H, m), 3.10-3.16 (2H, m), 4.05-4.15 (4H, m), 5.27 (2H,s), 5.96 (1H, s), 6.76 (1H, d, J=8.0Hz), 7.14 (1H, t, J=8.0Hz), 7.29 (1H, d, J=8.0Hz), 7.37 (2H, d, J=8.8Hz), 8.18 (2H, d, J=8.8Hz)

Table 4



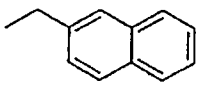
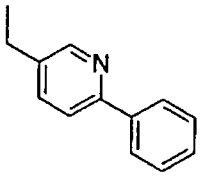
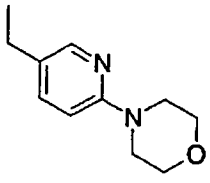
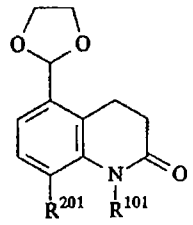
Ref. Ex.	R^{101}	R^{201}	^{1}HNMR dppm
70	-H	$-OCH_3$	DMSO-d_6:2.33-2.44 (2H, m), 2.85-2.98 (2H, m), 3.79 (3H, s), 3.86-4.08 (4H, m), 5.78 (1H, s), 6.86 (1H, d, J = 8.5 Hz), 7.07 (1H, d, J = 8.5 Hz), 8.97 (1H, s).
71	-H	-H	$CDCl_3$:2.56-2.70 (2H, m), 3.01-3.18 (2H, m), 3.97-4.22 (4H, m), 5.93 (1H, s), 6.80 (1H, dd, J = 1.4, 7.6 Hz), 7.13-7.31 (2H, m), 8.52 (1H, s).
72		-H	$CDCl_3$:2.77-2.89 (2H, m), 3.07-3.21 (2H, m), 3.98-4.19 (4H, m), 5.34 (2H, s), 5.96 (1H, s), 6.89-6.97 (1H, m), 7.02-7.12 (1H, m), 7.19-7.29 (1H, m), 7.31-7.40 (1H, m), 7.40-7.53 (2H, m), 7.61 (1H, s), 7.69-7.88 (3H, m).
73	$-C_6H_5$	-H	$CDCl_3$:2.75-2.90 (2H, m), 3.11-3.27 (2H, m), 3.98-4.25 (4H, m), 5.99 (1H, s), 6.39 (1H, d, J = 7.6 Hz), 7.05 (1H, t, J = 8.0 Hz), 7.16-7.30 (3H, m), 7.35-7.56 (3H, m).
74		$-OCH_3$	DMSO-d_6: 2.49-2.55 (2H, m), 2.89-2.91 (2H, m), 3.70 (3H, s), 3.91-4.04 (4H, m), 5.20 (2H,s), 5.80 (1H, s), 6.89 (1H, d, J=8.7Hz), 7.18 (1H, d, J=8.7Hz), 7.42-7.67 (4H, m), 7.84 (1H, d, J=8.3Hz), 8.09-8.10 (1H, m), 8.42 (1H, d, J=1.8Hz)
75		$-OCH_3$	DMSO-d_6: 2.49-2.52 (2H, m), 2.77-2.80 (2H, m), 3.24-3.26 (4H, m), 3.61-3.63 (4H, m), 3.80 (3H, s), 3.90-4.02 (4H, m), 5.12 (2H, s), 6.65 (1H, d, J=8.5Hz), 6.88 (1H, d, J=8.5Hz), 7.15 (1H, d, J=8.5Hz), 7.25-7.28 (1H, m), 7.85 (1H, d, J=2.3Hz)

Table 5



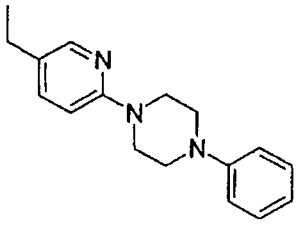
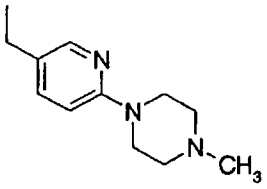
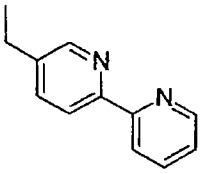
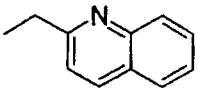
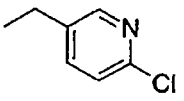
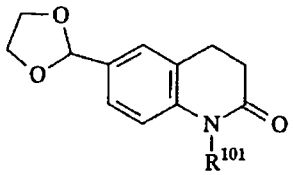
Ref. Ex.	R^{101}	R^{201}	^{1}H-NMR dppm
76		$-OCH_3$	$CDCl_3$:2.57-2.60 (2H, m), 2.86-2.89 (2H, m), 3.24-3.28 (4H, m), 3.59-3.63 (4H, m), 3.83 (3H, s), 3.99-4.13 (4H, m), 5.23 (2H,s), 5.81 (1H, s), 6.54 (1H, d, J=8.7Hz), 6.76 (1H, d, J=8.7Hz), 6.85-6.90 (1H, m), 6.96 (1H, d, J=8.4Hz), 7.22-7.34 (4H, m), 7.98 (1H, d, J=2.2Hz)
77		$-OCH_3$	$CDCl_3$:2.32 (3H, s), 2.46-2.50 (4H, m), 2.54-2.59 (2H, m), 2.85-2.90 (2H, m), 3.45-3.49 (4H, m), 3.82 (3H, s), 3.99-4.12 (4H, m), 5.22 (2H,s), 5.80 (1H, s), 6.49 (1H, d, J=8.7Hz), 6.75 (1H, d, J=8.7Hz), 7.24 (1H, d, J=8.7Hz), 7.30 (1H, d, J=2.3Hz), 7.95 (1H, d, J=2.3Hz)
78		$-OCH_3$	$CDCl_3$:2.62-2.66 (2H, m), 2.95-2.99 (2H, m), 3.71 (3H, s), 3.99-4.14 (4H, m), 5.31 (2H,s), 5.84 (1H, s), 6.74 (1H, d, J=8.7Hz), 7.23-7.29 (2H, m), 7.46-7.82 (2H, m), 8.22-8.33 (2H, m), 8.47-8.48 (1H, m), 8.63-8.65 (1H, m)
79		$-OCH_3$	$CDCl_3$:2.69-2.74 (2H, m), 3.11-3.16 (2H, m), 3.45 (3H, s), 4.03-4.17 (4H, m), 5.36 (2H,s), 5.91 (1H, s), 6.72 (1H, d, J=8.6Hz), 7.25-7.31 (2H, m), 7.44-7.50 (1H, m), 7.64-7.69 (1H, m), 7.76 (1H, d, J=8.1Hz), 8.02 (2H, t, J=9.3Hz)
80		-H	$CDCl_3$:2.72-2.78 (2H, m), 3.06-3.12 (2H, m), 4.02-4.17 (4H, m), 5.17 (2H,s), 5.94 (1H, s), 6.84 (1H, d, J=8.1Hz), 7.13-7.31 (2H, m), 7.49 (1H, dd, J1=2.5Hz, J2=8.2Hz), 8.32 (1H, d, J=2.5Hz)

Table 6



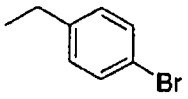
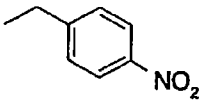
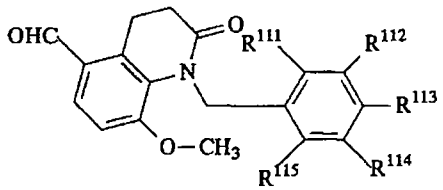
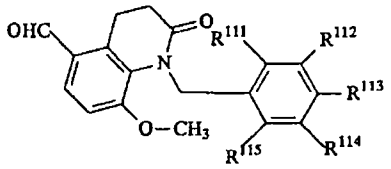
Ref. Ex.	R^{101}	^{1}HNMR dppm
81	-H	DMSO-d_6:2.35-2.51 (2H, m), 2.86 (2H, t, J = 7.9 Hz), 3.84-4.08 (4H, m), 5.61 (1H, s), 6.83 (1H, d, J = 8.0 Hz), 7.12-7.25 (2H, m), 10.12 (1H, s).
82		$CDCl_3$:2.71-2.82 (2H, m), 2.91-3.06 (2H, m), 3.94-4.18 (4H, m), 5.12 (2H, s), 5.71 (1H, s), 6.81 (1H, d, J = 8.3 Hz), 7.07 (2H, d, J = 8.5 Hz), 7.15-7.27 (1H, m), 7.31 (1H, d, J = 1.7 Hz), 7.35-7.46 (2H, m).
83		$CDCl_3$:2.73-2.87 (2H, m), 2.94-3.10 (2H, m), 3.97-4.20 (4H, m), 5.26 (2H, s), 5.71 (1H, s), 6.74 (1H, d, J = 8.4 Hz), 7.22 (1H, dd, J = 1.9, 8.4 Hz), 7.30-7.41 (3H, m), 8.16 (2H, d, J = 8.7 Hz).

Table 7



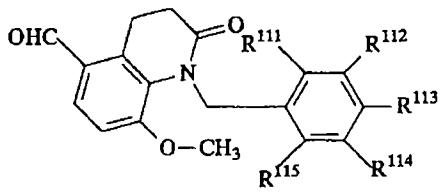
Ref. Ex.	R^{111}	R^{112}	R^{113}	R^{114}	R^{115}	^{1}HNMR dppm
84	-H	-H	$-C_6H_5$	-H	-H	$CDCl_3$: 2.62(2H, t, J=7.0Hz), 3.41(2H, t, J=7.0Hz), 3.86(3H, s), 5.33(2H, s), 6.86(1H, d, J=8.6Hz), 7.15(1H, d, J=8.6Hz), 7.25-7.6(5H, m), 10.00(1H, s)
85	-H	-H	$-C(CH_3)_3$	-H	-H	$CDCl_3$: 1.23(9H, s), 2.55-2.65(2H, m), 3.3-3.4(2H, m), 3.86(3H, s), 5.27(2H, s), 6.86(1H, d, J=8.6Hz), 7.00(2H, d, J=7.3Hz), 7.19(2H, d, J=7.3Hz), 7.52(1H, d, J=8.6Hz), 10.02(1H, s)
86	-H	-H	-H	$-C_6H_5$	-H	$CDCl_3$: 2.63(2H, t, J=7.0Hz), 3.42(2H, t, J=7.0Hz), 3.84(3H, s), 5.36(2H, s), 6.85(1H, d, J=8.6Hz), 7.06(1H, d, J=7.4Hz), 7.2-7.65(7H, m), 10.02(1H, s)
87	-H	-H	-H	-H	$-C_6H_5$	$CDCl_3$: 2.52(2H, t, J=7.0Hz), 3.18(2H, t, J=7.0Hz), 3.45(3H, s), 5.34(2H, s), 6.67(1H, d, J=8.6Hz), 7.06(1H, d, J=7.4Hz), 7.1-7.5(10H, m), 9.98(1H, s)
88	-H	-H	$-NO_2$	-H	-H	DMSO-d_6:2.52-2.65 (2H, m), 2.34-2.46 (2H, m), 3.66 (3H, s), 5.16 (2H, s), 7.09 (1H, d, J = 8.7 Hz), 7.41 (2H, d, J = 8.6 Hz), 7.63 (1H, d, J = 8.7 Hz), 8.11 (2H, d, J = 8.6 Hz), 10.04 (1H, s).
89	-H	-H	$-CO_2H$	-H	-H	DMSO-d_6:2.4-2.64 (2H, m), 3.20-3.50 (2H, m), 3.73 (3H, s), 5.19 (2H, s), 7.06 (1H, d, J = 8.7 Hz), 7.22 (2H, d, J = 8.6 Hz), 7.60 (1H, d, J = 8.6 Hz), 7.78 (2H, d, J = 8.0 Hz), 10.01(1H, s), 12.80 (1H, brs).

Table 8



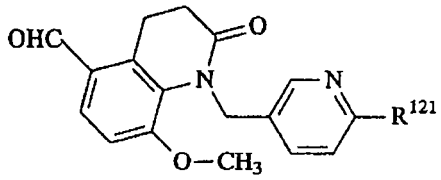
Ref. Ex.	R^{111}	R^{112}	R^{113}	R^{114}	R^{115}	^{1}HNMRdppm :
90	-H	-H	$-OCH_3$	-H	-H	DMSO-d_6:2.40-2.59 (2H, m), 3.17-3.38 (2H, m), 3.63 (3H, s), 3.87 (3H, s), 5.16 (2H, s), 6.73 (2H, d, J = 8.5 Hz), 6.99 (2H, d, J = 8.5 Hz), 7.06 (1H, d, J = 8.7 Hz), 7.58 (1H, d, J = 8.7 Hz), 9.98 (1H, s).
91	-H	-H	-Cl	-H	-H	$CDCl_3$:2.60 (2H, t, J= 7.0 Hz), 3.39 (2H, t, J = 7.0 Hz), 3.82 (3H, s), 5.23 (2H, s), 6.86 (1H, d, J = 8.6 Hz), 6.98-7.06 (2H, m), 7.13-7.21 (2H, m), 7.54 (1H, d, J = 8.6 Hz), 10.02 (1H, s).
92	-H	-H	-Br	-H	-H	DMSO-d_6:2.42-2.60 (2H, m), 3.22-3.39 (2H, m), 3.77 (3H, s), 5.12 (2H, s), 7.00-7.15 (3H, m), 7.38 (2H, d, J = 8.2 Hz), 7.60 (1H, d, J = 8.7 Hz), 10.00 (1H, s).
93	-H	-H	$-OCH_2C_6H_5$	-H	-H	$CDCl_3$:2.53-2.63 (2H, m), 3.29-3.40 (2H, m), 3.87 (3H, s), 4.96 (2H, s), 5.25 (2H, s), 6.78 (2H, dd, J = 2.1, 6.7 Hz), 6.85 (1H, d, J = 8.6 Hz), 7.00 (2H, d, J = 8.7 Hz), 7.25-7.42 (5H, m), 7.51 (1H, d, J = 8.6 Hz), 10.00 (1H, s).
94	-H	-H	-F	-H	-H	DMSO-d_6:2.44-2.58 (2H, m), 3.23-3.38 (2H, m), 3.80 (3H, s), 5.16 (2H, s), 6.94-7.19 (5H, m), 7.59 (1H, d, J = 8.7 Hz), 10.00 (1H, s).
95	-H	-H	-CN	-H	-H	DMSO-d_6:2.50-2.64 (2H, m), 3.32-3.45 (2H, m), 3.66 (3H, s), 5.13 (2H, s), 7.08 (1H, d, J = 8.7 Hz), 7.32 (2H, d, J = 8.2 Hz), 7.63 (1H, d, J = 8.7 Hz), 7.69 (2H, d, J = 8.2 Hz), 10.04 (1H, s).
96	-H	-H	$-CH_3$	-H	-H	$CDCl_3$:2.23 (3H, s), 2.55-2.62 (2H, m), 3.32-3.39(2H, m), 3.86 (3H, s), 5.28 (2H, s), 6.84 (1H, d, J = 8.6 Hz), 6.90-7.11 (4H, m), 7.51 (1H, d, J = 8.6 Hz), 10.00 (1H, s).

Table 9



Ref. Ex.	R^{111}	R^{112}	R^{113}	R^{114}	R^{115}	^{1}H-NMR dppm
97	-H	-H	$-OC_6H_5$	-H	-H	$CDCl_3$:2.60 (2H, t, J = 7.0 Hz), 3.37 (2H, t, J = 7.0 Hz), 3.86 (3H, s), 5.27 (2H, s), 6.75-6.97 (5H, m), 7.00-7.12 (3H, m), 7.22-7.37 (2H, m), 7.54 (1H, d, J = 8.6 Hz), 10.02 (1H, s).
98	-H	-H	$-CO_2CH_3$	-H	-H	$CDCl_3$: 2.77-2.83 (2H, m), 3.51-3.57 (2H, m), 3.90 (3H, s), 5.26 (2H,s), 7.03 (1H, d, J=8.2Hz), 7.26-7.32 (3H, m), 7.50 (2H, dd, J1=0.9Hz, J2=7.7Hz), 10.21 (1H, s)

Table 10



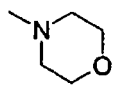
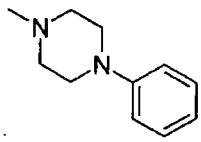
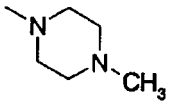
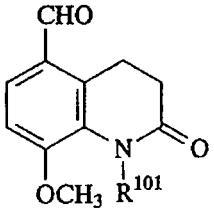
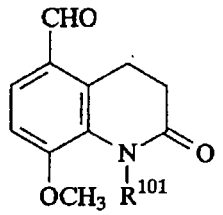
Ref. Ex.	R^{121}	^{1}HNMR dppm :
99	$-C_6H_5$	DMSO-d_6: 2.52-2.59 (2H, m), 3.18-3.25 (2H, m), 3.81 (3H, s), 5.21 (2H, s), 7.11 (1H, d, J=8.8Hz), 7.39-7.66 (5H, m), 7.83 (1H, d, J=8.0Hz), 8.01-8.03 (1H, m), 8.44-8.45 (1H, m), 10.04 (1H, s)
100	-2-PYRIDYL	$CDCl_3$: 2.61-2.67 (2H, m), 3.39-3.45 (2H, m), 3.83 (3H, s), 5.34 (2H,s), 6.85 (1H, d, J=8.6Hz), 7.25-7.30 (1H, m), 7.46-7.82 (3H, m), 8.24 (1H, d, J=8.2Hz), 8.30 (1H, J=8.0Hz), 8.45 (1H, d, J=1.8Hz), 8.64 (1H, d, 4.7Hz), 10.01 (1H, s)
101		DMSO-d_6: 2.47-2.52 (2H, m), 3.23-3.33 (6H, m), 3.61-3.65 (4H, m), 3.90 (3H, s), 5.12 (2H, s), 6.67 (1H, d, J=8.8Hz), 7.11 (1H, d, J=8.7Hz), 7.29 (1H, dd, J1=2.2Hz, J2=8.8Hz), 7.61 (1H, d, 8.7Hz), 7.87 (1H, d, J=2.2Hz), 10.00 (1H, s)
102		$CDCl_3$: 2.55-2.60 (2H, m), 3.23-3.27 (4H, m), 3.30-3.36 (2H, m), 3.58-3.62 (4H, m), 3.94 (3H, s), 5.24 (2H, s), 6.54 (1H, d, J=8.8Hz), 6.85-6.97 (4H, m), 7.24-7.31 (3H, m), 7.53 (1H, d, J=8.6Hz), 7.93 (1H, d, J=2.2Hz), 9.99 (1H, s)
103		$CDCl_3$: 2.31 (3H, s), 2.45-2.49 (4H, m), 2.54-2.60 (2H, m), 3.29-3.35 (2H, m), 3.44-3.48 (4H, m), 3.94 (3H, s), 3.99-4.12 (4H, m), 5.22 (2H,s), 6.48 (1H, d, J=8.7Hz), 6.88 (1H, d, J=8.6Hz), 7.23-7.28 (1H, m), 7.52 (1H, d, J=8.6Hz), 7.90 (1H, d, J=2.2Hz), 9.99 (1H, s)

Table 11



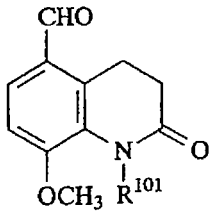
Ref. Ex.	R^{101}	^{1}HNMR dppm :
104	$-(CH_2)_2C(CH_3)_2OCH_2OCH_3$	$CDCl_3$: 1.20(6H, s), 1.89 (2H, t, J=7.1Hz), 2.45 (3H, s), 3.27 (3H, s), 4.18 (2H, t, J=7.1Hz), 4.62 (2H, s), 7.35 (2H, d, J=8.3Hz), 7.80 (2H, d, J=8.3Hz)
105	$-(CH_2)_3CF_3$	$CDCl_3$: 1.8-2.2(4H, m), 2.5-2.6(2H, m), 3.3-3.45(2H, m), 3.9-4.05(2H, m), 3.97(3H,s), 7.00(1H, d, J=8.6Hz), 7.61(1H, d, J=8.6Hz), 10.06(1H, s)
106	$-C_4H_9$	$CDCl_3$: 0.85(3H, t, J=7.5Hz), 1.2-1.35(2H, m), 1.4-1.5(2H, m), 2.51(2H, t, J=7.0Hz), 3.35(2H, t, J=7.0Hz), 3.96(3H, s), 4.04(2H, t, J=7.4Hz), 6.98(1H, d, J=8.6Hz), 7.60(1H, d, J=8.6Hz), 10.06(1H, s)
107	$-C_2H_5$	$CDCl_3$: 1.15(3H, t, J=7.1Hz), 2.51(2H, t, J=7.0Hz), 3.36(2H, t, J=7.0Hz), 3.97(3H, s), 4.01(2H, t, J=7.4Hz), 6.98(1H, d, J=8.6Hz), 7.60(1H, d, J=8.6Hz), 10.06(1H, s)
108	$-C_3H_7$	$CDCl_3$: 0.81(3H, t, J=7.4Hz), 1.4-1.6(2H, m), 2.52(2H, t, J=6.8Hz), 3.36(2H, t, J=6.8Hz), 3.96(3H, s), 4.00(2H, t, J=7.4Hz), 6.97(1H, t, J=8.6Hz), 7.59(1H, t, J=8.6Hz), 10.06(1H, s)
109	$-C_5H_{11}$	$CDCl_3$: 0.83(3H, t, J=7.2Hz), 1.1-1.3(4H, m), 1.4-1.5(2H, m), 2.52(2H, t, J=6.8Hz), 3.36(2H, t, J=6.8Hz), 3.96(3H, s), 4.02(2H, t, J=7.4Hz), 6.97(1H, t, J=8.6Hz), 7.59(1H, t, J=8.6Hz), 10.06(1H, s)
110	$-CH(CH_3)_2$	$CDCl_3$: 1.53(6H, d, J=6.8Hz), 2.4-2.5(2H, m), 3.35-3.45(2H, m), 3.85-4.0(1H, m), 3.97(3H, s), 6.97(1H, t, J=8.6Hz), 7.59(1H, t, J=8.6Hz), 10.06(1H, s)
111	$-CH_2CH(CH_3)_2$	$CDCl_3$: 0.76(6H, d, J=6.6Hz), 1.4-1.7(1H, m), 2.5-2.6(2H, m), 3.3-3.45(2H, m), 3.96(3H, s), 4.04(1H, d, J=7.4Hz), 6.97(1H, t, J=8.6Hz), 7.60(1H, t, J=8.6Hz), 10.07(1H, s)
112	$-CH_2CO_2C(CH_3)_3$	$CDCl_3$: 1.42(9H, s), 2.55-2.65(2H, m), 3.4-3.55(2H, m), 3.81(3H, s), 4.60(2H, s), 6.97(1H, d, J=8.6Hz), 7.59(1H, d, J=8.6Hz), 10.07(1H, s)

Table 12



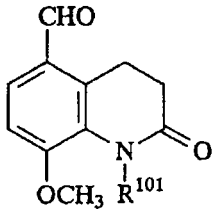
Ref. Ex.	R^{101}	^{1}H-NMR dppm
113	$-(CH_2)_2C_6H_5$	$CDCl_3$: 2.44(2H, t, J=7.0Hz), 2.82(2H, t, J=7.5Hz), 3.02(2H, t, J=7.0Hz), 4.01(3H, s), 4.32(2H, t, J=7.5Hz), 6.95-7.1(3H, m), 7.1-7.25(3H, m), 7.60(1H, d, J=8.6Hz), 10.03(1H, s)
114	$-(CH_2)_3C_6H_5$	$CDCl_3$: 1.75-1.95(2H, m), 2.5-2.65(4H, m), 3.36(2H, t, J=7.0Hz), 3.79(3H, s), 4.05(2H, t, J=7.4Hz), 6.93(1H, d, J=8.6Hz), 7.05-7.35(5H, m), 7.58(1H, d, J=8.6Hz), 10.05(1H, s)
115	$-CH_2$-cyclo-C_3H_5	$CDCl_3$: 0.1-0.4(4H, m), 0.8-0.9(1H, m), 2.53(2H, t, J=7.0Hz), 3.39(2H, t, J=7.0Hz), 3.97(3H, s), 4.01(2H, t, J=7.3Hz), 6.97(1H, d, J=8.6Hz), 7.61(1H, d, J=8.6Hz), 10.08(1H, s)
116	$-CH_2CH_2OCH_3$	$CDCl_3$: 2.54(2H, t, J=7.0Hz), 3.23(3H, s), 3.36(2H, t, J=7.0Hz), 3.47(2H, t, J=6.0Hz), 3.96(3H, s), 4.25(2H, t, J=6.0Hz), 6.96(1H, d, J=8.6Hz), 7.61(1H, d, J=8.6Hz), 10.07(1H, s)
117	$-(CH_2)_2OC_6H_5$	$CDCl_3$: 2.54(2H, t, J=7.0Hz), 3.34(2H, t, J=7.0Hz), 3.93(3H, s), 4.16(2H, t, J=6.0Hz), 4.42(2H, t, J=6.0Hz), 6.72(1H, dd, J1=8.8Hz, J2=0.95Hz), 6.85-7.05(2H, m), 7.15-7.3(2H, m), 7.60(1H, d, J=8.6Hz), 10.05(1H, s)
118	$-CH_2$-cyclo-C_6H_{11}	$CDCl_3$: 0.8-1.75(11H, m), 2.5-2.6(2H, m), 3.3-3.45(2H, m), 3.96(3H, s), 4.06(2H, t, J=7.2Hz), 6.97(1H, d, J=8.6Hz), 7.60(1H, d, J=8.6Hz), 10.07(1H, s)
119	$-(CH_2)_4C_6H_5$	$CDCl_3$: 1.45-1.6(4H, m), 2.45-2.6(4H, m), 3.34(2H, t, J=7.0Hz), 3.85(3H, s), 4.02(2H, t, J=6.6Hz), 6.93(1H, d, J=8.6Hz), 7.05-7.35(5H, m), 7.58(1H, d, J=8.6Hz), 10.05(1H, s)

Table 13



Ref. Ex.	R^{101}	^{1}H-NMR dppm
120	$-(CH_2)_5C_6H_5$	$CDCl_3$: 1.15-1.3(2H, m), 1.42-1.61(4H, m), 2.4-2.6(4H, m), 3.28(2H, t, J=7.0Hz), 3.92(3H, s), 4.02(2H, t, J=7.4Hz), 6.96(1H, d, J=8.6Hz), 7.1-7.3(5H, m), 7.59(1H, d, J=8.6Hz), 10.05(1H, s)
121	$-CH(C_6H_5)_2$	$CDCl_3$: 2.52(2H, t, J=7.0Hz), 3.33(2H, t, J=7.0Hz), 3.48(3H, s), 6.30(1H, s), 6.81(1H, d, J=8.6Hz), 7.15-7.35(10H, m), 7.57(1H, d, J=8.6Hz), 10.00(1H, s)
122	$-(CH_2)_3CO_2C_2H_5$	$CDCl_3$:1.24 (3H, t, J =7.1 Hz), 1.79-1.94 (2H, m), 2.24 (2H, t, J = 7. Hz), 2.45-2.57 (2H, m), 3.36 (2H, t, J = 7.0 Hz), 3.97 (3H, s), 4.00-4.16 (4H, m), 6.99 (1H, d, J = 8.6 Hz), 7.60 (1H, d, J = 8.6 Hz), 10.06 (1H, s).
123	$-CH_2CH_2CN$	DMSO-d_6:2.37-2.49 (2H, m), 2.76 (2H, t, J = 6.8 Hz), 3.21-3.44 (2H, m), 3.96 (3H, s), 4.08 (2H, t, J = 6.8 Hz), 7.24 (1H, d, J = 8.7 Hz), 7.72 (1H, d, J = 8.7 Hz), 10.06 (1H, s).
124	$-C_6H_5$	$CDCl_3$:2.65-2.79 (2H, m), 3.41 (3H, s), 3.54 (2H, t, J - 7.0 Hz), 6.86 (1H, d, J = 8.6 Hz), 7.08-7.44 (5H, m), 7.61 (1H, d, J = 8.6 Hz), 10.09 (1H, s).
125	$-CH_2CH=CH_2$	$CDCl_3$: 2.52-2.57(2H, m), 3.36-3.41(2H, m), 3.94(3H, s), 4.66(2H, dt, J = 6.0 and 1.3 Hz), 5.02-5.15(2H, m), 5.64-5.77(1H, m), 6.96(1H, d, J = 8.6 Hz), 7.59(1H, d, J = 8.6 Hz), 10.05(1H, s)
126	$-C_8H_{17}$	$CDCl_3$: 0.85(3H, t, J = 6.7 Hz), 1.20-1.38(10H, m), 1.38-1.53(2H, m), 2.49-2.54(2H, m), 3.33-3.40(2H, m), 3.96(3H, s), 5.83(2H, t, J = 7.5 Hz), 6.98(1H, d, J = 8.6 Hz), 7.60(1H, d, J = 8.6 Hz), 10.06(1H, s)

Table 14



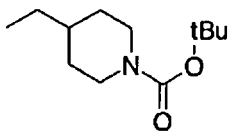
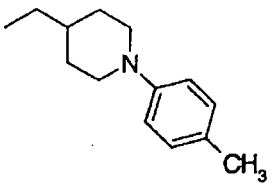
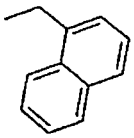
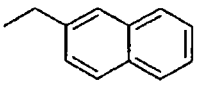
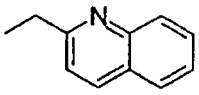
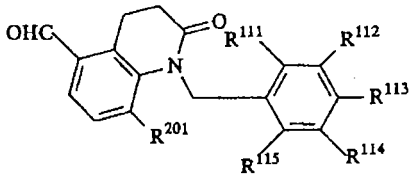
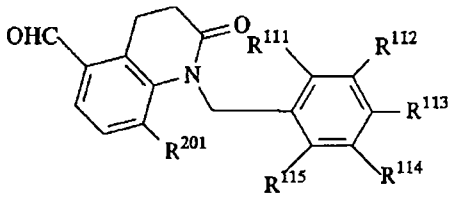
Ref. Ex.	R^{101}	^{1}H-NMR dppm
127		$CDCl_3$:0.9-1.2(2H, m), 1.42(9H, s), 1.25-1.85(3H, m), 2.4-2.7(4H, m), 3.2-3.6(2H, m), 3.8-4.2(4H, m), 3.96(3H, s), 6.99(1H, d, J=6.6Hz), 7.61(1H, d, J=6.6Hz), 10.06(1H, s)
128		$CDCl_3$:1.2-1.75(5H, m), 2.24(3H, s), 2.4-2.6(4H, m), 3.3-3.6(4H, m), 3.97(3H, s), 4.0-4.2(2H, m), 6.78(2H, d, J=8.5Hz), 6.95-7.1(3H, m), 7.61(1H, d, J=7.6Hz), 10.07(1H, s)
129		$CDCl_3$:2.65(2H, t, J=7.0Hz), 3.30(2H, t, J=7.0Hz), 3.76(3H, s), 5.78(2H, s), 6.78(1H, d, J=8.6Hz), 7.2-7.35(2H, m), 7.4-7.55(3H, m), 7.66(1H, d, J=8.1Hz), 7.79(1H, d, J=7.9Hz), 8.00(1H, d, J=8.5Hz), 9.93(1H, s)
130		$CDCl_3$:2.64(2H, t, J=7.0Hz), 3.42(2H, t, J=7.0Hz), 3.85(3H, s), 5.47(2H, s), 6.81(1H, d, J=8.6Hz), 7.19(1H, dd, J1=8.5Hz, J2=1.6Hz), 7.35-7.8(7H, m),9.98(1H, s)
131		$CDCl_3$:2.68-2.74 (2H, m), 3.57-3.63 (2H, m), 3.62 (3H, s), 5.42 (2H,s), 6.85 (1H, d, J=8.6Hz), 7.28 (1H, d, J=8.5Hz), 7.47 (1H, ddd, J1=1.1Hz, J2=7.5Hz, J3=8.2Hz), 7.54 (1H, d, J=8.6Hz), 7.66 (1H, ddd, J1=1.1Hz, J2=7.5Hz, J3=8.5Hz), 7.76 (1H, dd, J1=1.1Hz, J2=8.2Hz), 7.96 (1H, d, J=8.5Hz), 8.04 (1H, d, J=8.5Hz)

Table 15



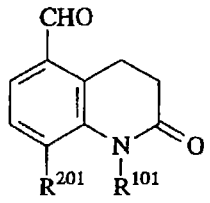
Ref. Ex.	R^{111}	R^{112}	R^{113}	R^{114}	R^{115}	R^{201}	^{1}H-NMR dppm
132	-H	-H	$-C_6H_5$	-H	-H	-OH	$CDCl_3$:2.64(2H, t, J=7.0Hz), 3.41(2H, t, J=7.0Hz), 5.37(2H, s), 6.30(1H, br s), 6.80(1H, d, J=8.6Hz), 7.2-7.6(10H, m), 10.00(1H, s)
133	-H	-H	$-C_6H_5$	-H	-H	$-OC_4H_9$	$CDCl_3$:0.94(3H, t, J=7.4Hz), 1.35-1.5(2H, m), 1.65-1.8(2H, m), 2.62(2H, t, J=7.0Hz), 3.41(2H, t, J=7.0Hz), 4.03(2H, t, J=6.6Hz), 5.35(2H, s), 6.89(1H, d, J=8.6Hz), 7.1-7.6(10H, m), 10.02(1H, s)
134	-H	-H	$-C_6H_5$	-H	-H	$-OCH_2CO_2C(CH_3)_3$	$CDCl_3$:1.53(9H, s), 2.64(2H, t, J=7.0Hz), 3.42(2H, t, J=7.0Hz), 4.48(2H, s), 5.47(2H, s), 6.71(1H, d, J=8.6Hz), 7.15-7.65(10H, m), 10.03(1H, s)
135	-H	-H	-Br	-H	-H	-H	$CDCl_3$:2.77 (2H, t, J = 7.4 Hz), 3.52 (2H, t, J = 7.5 Hz), 5.16 (2H, s), 7.03-7.14 (3H, m), 7.32 (1H, t, J = 8.0 Hz), 7.40-7.48 (2H, m), 7.50 (1H, dd, J = 0.8, 7.7 Hz), 10.20 (1H, s).
136	-H	-H	-Cl	-H	-H	-H	$CDCl_3$:2.70-2.82 (2H, m), 3.2 (2H, t, J= 7.6 Hz), 5.17 (2H, s), 7.07 (1H, dd, J = 1.0, 8.2 Hz), 7.10-7.20 (2H, m), 7.22-7.35 (3H, m), 7.49 (1H, d, J = 1.1, 7.7 Hz), 10.20 (1H, s).

Table 16



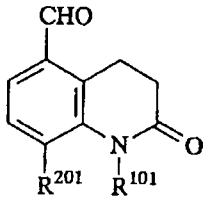
Ref. Ex.	R^{111}	R^{112}	R^{113}	R^{114}	R^{115}	R^{201}	^{1}H-NMR dppm
137	-H	-H	$-CH_3$	-H	-H	-H	$CDCl_3$:2.31 (3H, s), 2.70-2.85 (2H, m), 3.51 (2H, t, J = 7.7 Hz), 5.17 (2H, s), 7.03-7.19 (5H, m), 7.20-7.36 (1H, m), 7.47 (1H, d, J = 7.6 Hz), 10.20 (1H, s).
138	-H	-H	$-C_6H_5$	-H	-H	$-CH_3$	$CDCl_3$:2.46 (3H, s), 2.54-2.60 (2H, m), 3.27-3.34 (2H, m), 5.13 (2H, s), 7.14 (2H, d, J = 8.3 Hz), 7.20-7.60 (9H, m), 10.13 (1H, s).
139	-H	-H	$-C_6H_5$	-H	-H	-Cl	$CDCl_3$:2.58-2.64 (2H, m), 3.30-3.36 (2H, m), 5.44 (2H, s), 7.17 (2H, d, J = 8.2 Hz), 7.22-7.61 (9H, m), 10.12 (1H, s).
140	-H	-H	$-NO_2$	-H	-H	-H	$CDCl_3$:2.78-2.84 (2H, m), 3.53-3.59 (2H, m), 5.30 (2H,s), 6.98 (1H, d, J=8.2Hz), 7.26-7.32 (1H, m), 7.38 (2H, d, J=8.8Hz), 7.53 (1H, d, J=6.7Hz), 8.20 (2H, d, J=8.8Hz), 10.22 (1H, s)

Table 17



Ref. Ex.	R^{101}	R^{201}	^{1}H-NMR dppm
141	$-(CH_2)_4OSi(CH_3)_2C(CH_3)_3$	-H	$CDCl_3$:0.09(3H, s), 0.88(9H, s), 1.6-2.1(2H, m), 2.62(2H, t, J=7.2Hz), 3.42(2H, t, J=7.7Hz), 3.71(2H, t, J=5.7Hz), 4.06(2H, t, J=7.8Hz), 7.1-7.6(2H, m), 10.22(1H, s)
142	$-C_6H_5$	-H	$CDCl_3$:2.75-2.89 (2H, m), 3.53-3.68 (2H, m), 6.65 (1H, dd, J = 0.9, 8.2 Hz), 7.15-7.20 (3H, m), 7.39-7.61 (4H, m), 10.24 (1H, s).
143	-H	-Cl	$CDCl_3$:2.61-2.72 (2H, m), 3.50-3.64 (2H, m), 7.40-7.51 (2H, m), 7.88 (1H, brs), 10.15 (1H, s).

Table 18



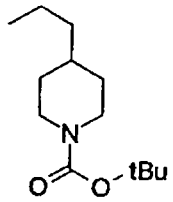
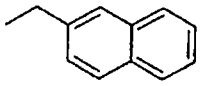
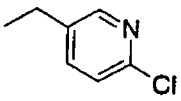
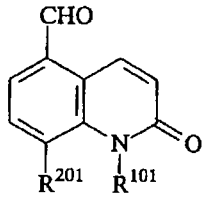
Ref. Ex.	R^{101}	R^{201}	^{1}H-NMR dppm
144		-H	$CDCl_3$:1.05-1.9(9H, m), 1.51(9H, s), 2.6-2.8(4H, m), 3.35-3.50(2H, m), 3.95-4.2(2H, m), 7.23(1H, dd, J1=8.0Hz, J2=1.0Hz), 7.46(1H, t, J=8Hz), 7.54(1H, dd, J1=8.0Hz, J2=1.0Hz), 10.23(1H, s)
145		-H	$CDCl_3$:2.84 (2H, t, J = 7.5 Hz), 3.56 (2H, t, J = 7.5 Hz), 5.37 (2H, s), 7.13-7.21 (1H, m), 7.21-7.29 (1H, m), 7.29-7.40 (1H, m), 7.40-7.50 (3H, m), 7.61 (1H, s), 7.70-7.78 (1H, m), 7.78-7.87 (2H, m), 10.19 (1H, s).
146		-H	$CDCl_3$:2.74-2.80 (2H, m), 3.49-3.55 (2H, m), 5.21 (2H,s), 7.07 (1H, d, J=8.1Hz), 7.26-7.38 (2H, m), 7.49-7.54 (2H, m), 8.33 (1H, d, J=2.5Hz), 10.20 (1H, s)

Table 19



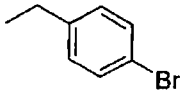
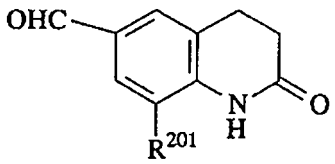
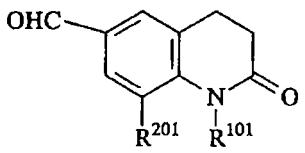
Ref. Ex.	R^{101}	R^{201}	^{1}H-NMR dppm
147	$-(CH_2)_2CH(CH_3)_2$	$-OCH_3$	$CDCl_3$: 0.99 (6H, d, J=6.2Hz), 1.5-1.8 (3H, m), 4.03 (3H, s), 4.57(2H, t, J=7.0Hz), 6.84 (1H, d, J=9.9Hz), 7.16 (1H, d, J=8.3Hz), 7.63 (1H, d, J=8.3Hz), 9.18(1H, d, J=9.9Hz), 10.09 (1H, s),
148		$-OCH_3$	$CDCl_3$:3.71 (3H, s), 5.77 (2H, brs), 6.89-7.00 (3H, m), 7.06 (1H, d, J = 8.4 Hz), 7.39 (2H, d, J = 8.4 Hz), 7.63 (1H, d, J = 8.4 Hz), 9.28 (1H, d, J = 9.9 Hz), 10.10 (1H, s).

Table 20



Ref. Ex.	R^{201}	^{1}H-NMR dppm
149	-H	DMSO-d_6:2.44-2.59 (2H, m), 2.96 (2H, t, J = 7.9 Hz), 7.00 (1H, d, J = 8.7 Hz), 7.65-7.78 (2H, m), 9.82 (1H, s), 10.50 (1H, brs).
150	$-CH_3$	$CDCl_3$:2.32 (3H, s), 2.65-2.72 (2H, m), 3.01-3.08 (2H, m), 7.54-7.65 (2H, m), 7.75 (1H, brs), 9.87 (1H, s).
151	$-OCH_3$	$CDCl_3$:2.65-2.72 (2H, m), 3.02-3.09 (2H, m), 3.95 (3H, m), 7.32 (2H, s), 7.94 (1H, brs), 9.86 (1H, s).

Table 21



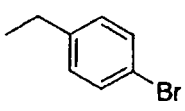
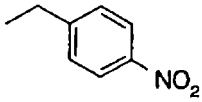
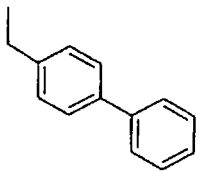
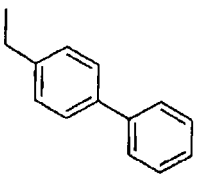
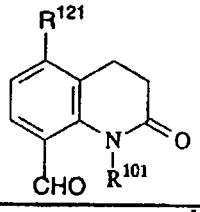
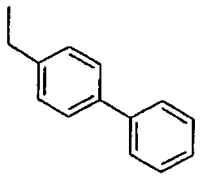
Ref. Ex.	R^{101}	R^{201}	^{1}H-NMR dppm
152		-H	DMSO-d_6:2.68-2.81 (2H, m), 2.96-3.10 (2H, m), 5.17 (2H, s), 7.08 (1H, d, J = 8.4 Hz), 7.19 (2H, d, J = 8.4 Hz), 7.43-7.52 (2H, m), 7.68 (1H, dd, J = 1.9, 8.4 Hz), 7.76 (1H, d, J = 1.9 Hz), 9.84 (1H, s).
153		-H	$CDCl_3$:2.82-2.93 (2H, m), 3.05-3.17 (2H, m), 5.31 (2H, s), 6.88 (1H, d, J = 8.4 Hz), 7.37 (2H, d, J = 8.8 Hz), 7.64 (1H, dd, J = 1.9, 8.4 Hz), 7.75 (1H, d, J = 1.9 Hz), 8.20 (2H, d, J = 8.7 Hz), 9.89 (1H, s).
154		$-OCH_3$	$CDCl_3$:2.67-2.74 (2H, m), 2.91-2.98 (2H, m), 3.83 (3H, s), 5.41 (2H, s), 7.18 (2H, d, J = 8.1 Hz), 7.23-7.35 (3H, m), 7.35-7.48 (4H, m), 7.48-7.57 (2H, m), 9.85 (1H, s).
155		$-CH_3$	$CDCl_3$:2.46 (3H, s), 2.62-2.68 (2H, m), 2.85-2.92 (2H, m), 5.20 (2H, s), 7.15 (2H, d, J = 8.1 Hz), 7.20-7.65 (9H, m), 9.88 (1H, s).

Table 22



Ref. Ex.	R^{101}	R^{121}	^{1}H-NMR dppm
156		-H	DMSO-d_6: 2.55-2.68 (2H, m), 2.85-2.98 (2H, m), 5.07 (2H, s), 7.10 (2H, d, J = 8.2 Hz), 7.27-7.70 (10 H, m), 10.05 (1H, s).
157	-H	-H	DMSO-d_6: 7.51-7.62 (2H, m), 2.99 (2H, t, J = 7.9 Hz), 7.17 (1H, t, J = 7.5 Hz), 7.54 (1H, d, J = 7.5 Hz), 7.74 (1H, d, J = 7.5 Hz), 10.00 (1H, s), 10.31 (1H, brs).

In the above Tables, Me represents methyl and tBu represents tert-butyl.

Reference Example 158

Synthesis of 5-(1,3-dioxolan-2-yl)-1-{4-[(N-methyl-N-phenylamino)methyl]benzyl}-3,4-dihydro-1H-quinolin-2-one

1-(4-Chloromethylbenzyl)-5-(1,3-dioxolan-2-yl)-3,4-dihydro-1H-quinolin-2-one (100 mg, 0.28 mmol), N-methylaniline (0.045 ml, 0.42 mmol) and potassium carbonate (57.9 mg, 0.42 mmol) were added to acetonitrile (1 ml), followed by heating under reflux for 4 hours. After cooling to room temperature, water was added to the reaction mixture, and extraction with dichloromethane was performed. The organic layer was washed with water and a saturated sodium chloride solution, and dried over anhydrous sodium sulfate. The dry product was concentrated under reduced pressure, and the residue was purified by preparative silica gel thin layer chromatography (n-hexane:ethyl acetate = 1:1). The purified product was concentrated to dryness under reduced pressure to thereby obtain 80 mg (yield: 67%) of 5-(1,3-dioxolan-2-yl)-1-

{4-[(N-methyl-N-phenylamino)methyl]benzyl}-3,4-dihydro-1H-quinolin-2-one as a light yellow amorphous solid.
^{1}H-NMR($CDCl_3$) dppm: 2.72-2.78 (2H,m), 2.98 (3H,s), 3.08-3.12 (2H,m), 4.06-4.16 (4H,m), 4.48 (2H,s), 5.15 (2H,s), 5.94 (1H,s), 6.67-6.74 (3H,m), 6.90 (1H,d,J=8.1Hz), 7.09-7.26 (8H,m)

Reference Example 159

Synthesis of 5-(1,3-dioxolan-2-yl)-1-(6-piperidinomethylpyridin-2-ylmethyl)-3,4-dihydro-1H-quinolin-2-one

1-(6-Chloromethylpyridin-2-ylmethyl)-5-(1,3-dioxolan-2-yl)-3,4-dihydro-1H-quinolin-2-one (1.0 g, 2.8 mmol) was added to piperidine (2 ml), followed by stirring in an argon atmosphere at 100°C for 2 hours. After cooling to room temperature, water and a small quantity of acetic acid were added to the reaction mixture, and extraction with ethyl acetate was performed twice. The organic layers were combined, washed twice with water and once with a saturated sodium chloride solution, and dried over anhydrous sodium sulfate. The dry product was concentrated under reduced pressure, and the residue was purified by silica gel column chromatography (dichloromethane:methanol = 20:1). The purified product was concentrated to dryness under reduced pressure to thereby obtain 0.73 g (yield: 64%) of 5-(1,3-dioxolan-2-yl)-1-(6-piperidinomethylpyridin-2-ylmethyl)-3,4-dihydro-1H-quinolin-2-one as a light yellow amorphous solid.
^{1}H-NMR($CDCl_3$) dppm: 1.44-1.49 (2H,m), 1.56-1.65 (4H,m), 2.42-2.46 (4H,m), 2.74-2.80 (2H,m), 3.09-3.15 (2H,m), 3.64 (2H,s), 4.01-4.17 (4H,m), 5.27 (2H,s), 5.95 (1H,s), 6.95-7.02 (2H,m), 7.11 (1H,t,J=7.9Hz), 7.23-7.31 (2H,m), 7.54 (1H,t,J=7.7Hz)

Reference Example 160

Synthesis of 5-(1,3-dioxolan-2-yl)-1-(4-phenylsulfanylbenzyl)-3,4-dihydro-1H-quinolin-2-one

1-(4-Chloromethylbenzyl)-5-(1,3-dioxolan-2-yl)-3,4-dihydro-1H-quinolin-2-one (1.0 g, 2.79 mmol), thiophenol (0.37 ml, 3.63 mmol) and 1,8-diazabicyclo[5.4.0]undecene-7 (DBU) (0.84 ml, 5.59 mmol) were added to THF (30 ml), followed by heating under reflux for 7 hours. After cooling to room temperature, the reaction mixture was concentrated under reduced pressure. The residue was purified by silica gel column chromatography (n-hexane:ethyl acetate = 1:1). The purified product was concentrated to dryness under reduced pressure to thereby obtain 1.13 g (yield: 94%) of 5-(1,3-dioxolan-2-yl)-1-(4-phenylsulfanylbenzyl)-3,4-dihydro-1H-quinolin-2-one as a white solid.

^{1}H-NMR($CDCl_3$) dppm: 2.73-2.79 (2H,m), 3.06-3.12 (2H,m), 4.01-4.17 (6H,m), 5.14 (2H,s), 5.95 (1H,s), 6.85-6.88 (1H,m), 7.09-7.17 (4H,m), 7.19-7.32 (7H,m)

Reference Example 161

Synthesis of 1-[2-(1-biphenyl-4-ylpiperidin-4-yl)ethyl]-2-oxo-1,2,3,4-tetrahydroquinoline-5-carboxaldehyde

Palladium acetate (34 mg, 0.15 mmol), tri-tert-butylphosphine tetrafluoroborate (66 mg, 0.23 mmol) and sodium tert-butoxide (218 mg, 2.27 mmol) were added to a toluene solution (10 ml) of 5-(1,3-dioxolan-2-yl)-1-(2-piperidin-4-ylethyl)-3,4-dihydro-1H-quinolin-2-one (500 mg, 1.52 mmol) and 4-bromobiphenyl (424 mg, 1.82 mmol), followed by stirring in an argon atmosphere at 100°C for 7.5 hours. After cooling to room temperature, water was added to the reaction mixture, and extraction with ethyl acetate was performed. The extract was dried over sodium sulfate and concentrated under reduced pressure, and the residue was purified by basic silica gel column chromatography (n-hexane:ethyl acetate = 2:1). The purified product was concentrated under reduced pressure, and the residue was dissolved in acetone (10 ml). p-Toluenesulfonic acid monohydrate (104 mg) and water (2 ml) were added, followed by

heating under reflux for 15 minutes. The resulting mixture was cooled to room temperature and concentrated under reduced pressure. The residue was rendered basic by adding an aqueous solution of potassium carbonate, and washed for 10 minutes in an ultrasonic washing machine. The produced insoluble matter was collected by filtration, washed with water and dried to thereby obtain 213 mg (yield: 32.1%) of 1-[2-(1-biphenyl-4-ylpiperidin-4-yl)ethyl]-2-oxo-1,2,3,4-tetrahydroquinoline-5-carboxaldehyde as a colorless solid. ^{1}H-NMR ($CDCl_3$) dppm: 1.2-2.3 (7H,m), 2.6-2.7 (2H,m), 3.0-3.25 (2H, m), 3.4-3.55 (2H,m), 3.65-3.8 (2H,m), 3.95-4.1 (2H,m), 7.18 (1H, d,J=8.0Hz), 7.25-7.7 (10H,m), 7.84 (1H,d,J=8.1Hz), 10.22 (1H,s)

Reference Example 162

Synthesis of 1-[3-(4-chlorophenylsulfanyl)propyl]-2-oxo-1,2,3,4-tetrahydroquinoline-5-carboxaldehyde

1-(3-Bromopropyl)-5-(1,3-dioxolan-2-yl)-3,4-dihydro-1H-quinolin-2-one (797 mg, 2.34 mmol), 4-chlorothiophenol (407 mg, 2.81 mmol) and potassium carbonate (421 mg, 3.05 mmol) were added to acetonitrile (16 ml), followed by heating under reflux for 5 hours. After cooling to room temperature, water was added to the reaction mixture, and extraction with ethyl acetate was performed. The extract was dried over sodium sulfate and concentrated under reduced pressure, and the residue was purified by silica gel column chromatography (n-hexane:ethyl acetate = 3:1 → 2:1). The purified product was concentrated under reduced pressure, and the residue was dissolved in acetone (16 ml). p-Toluenesulfonic acid monohydrate (53.5 mg) and water (3 ml) were added, followed by stirring at room temperature overnight. An aqueous solution of potassium carbonate was added to the reaction mixture, and extraction with dichloromethane was performed. The organic layer was washed with a saturated sodium chloride solution, dried over

anhydrous sodium sulfate, and concentrated under reduced pressure to thereby obtain 700 mg (yield: 83%) of 1-[3-(4-chlorophenylsulfanyl)propyl]-2-oxo-1,2,3,4-tetrahydroquinoline-5-carboxaldehyde as a colorless oil.
^{1}H-NMR($CDCl_3$) dppm: 1.9-2.05 (2H,m), 2.55-2.65 (2H,m), 2.9-3.05 (4H,m), 4.0-4.2 (6H,m), 5.94 (1H,s), 6.96 (1H,d,J=7.9Hz), 7.2-7.35 (6H, m)

Reference Example 163

Synthesis of 1-[3-(4-benzylpiperidin-1-yl)propyl]-2-oxo-1,2,3,4-tetrahydroquinoline-5-carboxaldehyde

1-(3-Bromopropyl)-5-(1,3-dioxolan-2-yl)-3,4-dihydro-1H-quinolin-2-one (790 mg, 2.32 mmol), 4-benzylpiperidine (0.49 ml, 2.79 mmol) and potassium carbonate (142 mg, 1.03 mmol) were added to acetonitrile (15 ml), followed by heating under reflux for 1.5 hours. After cooling to room temperature, the reaction mixture was filtered to remove the insoluble matter. The solid was washed with acetonitrile, and the filtrate and washing were combined and concentrated under reduced pressure. The residue was purified by silica gel column chromatography (n-hexane:ethyl acetate = 3:1 → ethyl acetate:methanol = 50:1). The purified product was concentrated under reduced pressure, and the residue was dissolved in acetone (15 ml). p-Toluenesulfonic acid monohydrate (368 mg) was added, and the resulting mixture was heated under reflux for 2 hours. An aqueous solution of potassium carbonate was added to the reaction mixture, followed by concentration under reduced pressure. Water was added to the residue, and extraction with dichloromethane was performed. The organic layer was washed with a saturated sodium chloride solution, dried over anhydrous sodium sulfate, and concentrated under reduced pressure to thereby obtain 672 mg (yield: quantitative) of 1-[3-(4-benzylpiperidin-1-yl)propyl]-2-oxo-1,2,3,4-tetrahydroquinoline-5-carboxaldehyde as a colorless oil.

^{1}H-NMR($CDCl_3$) dppm: 1.2-1.95 (9H,m), 2.35 (2H,t,J=7.0Hz), 2.4-2.7 (4H,m), 2.8-3.1 (4H,m), 3.9-4.2 (6H,m), 5.94 (1H,s), 7.1-7.4 (8H,m)

Using appropriate starting materials and following the procedure of Reference Example 24, the compounds of Reference Examples 178 and 185 shown below were synthesized.

Using appropriate starting materials and following the procedure of Reference Example 25, the compounds of Reference Examples 164, 165, 167 to 172, 176, 177, 179, 183 and 184 shown below were synthesized.

Using appropriate starting materials and following the procedure of Reference Example 26, the compounds of Reference Examples 186 to 190, 192, 193, 197, 198, 203 and 206 to 209 shown below were synthesized.

Using appropriate starting materials and following the procedure of Reference Example 27, the compounds of Reference Examples 166 and 180 to 182 shown below were synthesized.

Using appropriate starting materials and following the procedure of Reference Example 30, the compounds of Reference Examples 73, 196, 200, 201 and 210 shown below were synthesized.

Using appropriate starting materials and following the procedure of Reference Example 158, the compound of Reference Example 175 shown below was synthesized.

Using appropriate starting materials and following the procedure of Reference Example 159, the compounds of Reference Examples 173 and 174 shown below were synthesized.

Using appropriate starting materials and following the procedure of Reference Example 161, the compounds of Reference Examples 202, 204, 205 and 214 shown below were synthesized.

Using appropriate starting materials and following the procedure of Reference Example 162, the compounds of Reference Examples 191 and 195 shown below were synthesized.

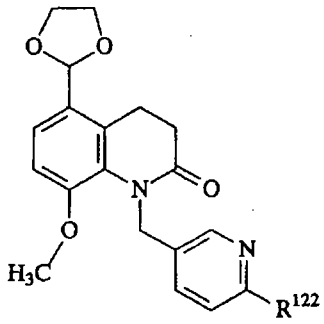
Using appropriate starting materials and following the procedure of Reference Example 163, the compounds of Reference Examples 194, 199 and 211 to 213 shown below were synthesized.

Using appropriate starting materials and following the procedure of Reference Example 32, the compounds of Reference Example 132 shown below was synthesized.

Using appropriate starting materials and following the procedure of Reference Example 41, the compounds of Reference Example 143 shown below was synthesized.

Using appropriate starting materials and following the procedure of Reference Example 22, the compounds of Reference Example 157 shown below was synthesized.

Table 23



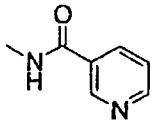
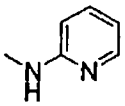
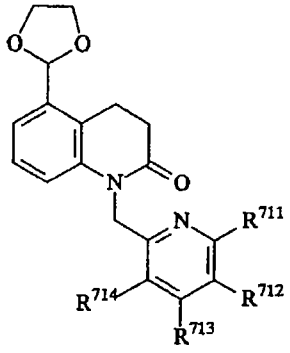
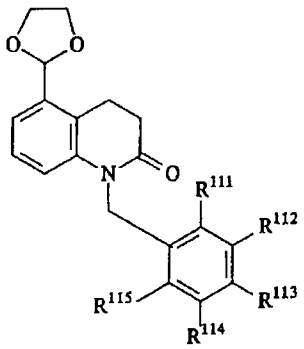
Ref. Ex.	R^{122}	NMR
164	$-NHC_6H_5$	^{1}H-NMR ($CDCl_3$) dppm : 2.55-2.61 (2H, m), 2.86-2.94 (2H, m), 3.82 (3H, s), 3.98-4.15 (4H, m), 5.22 (2H, s), 5.82 (1H, s), 6.42 (1H, s), 6.70-6.78 (2H, m), 7.27-7.30 (1H, m), 7.23-7.98 (6H, m), 7.99 (1H, s)
165	$-CF_3$	^{1}H-NMR ($CDCl_3$) dppm : 2.61-2.67 (2H, m), 2.98-3.03 (2H, m), 3.63 (3H, s), 4.00-4.16 (4H, m), 5.21 (2H, s), 5.85 (1H, s), 6.77 (1H, d, J=8.7Hz), 7.30 (1H, d, J=8.7Hz), 7.57 (1H, d, J=8.1Hz), 7.68 (1H, dd, J1=2.1Hz, J2=8.1Hz), 8.55 (1H, d, J=2.1Hz)
166	$-C_6H_4C_6H_5$(PARA)	^{1}H-NMR ($CDCl_3$) dppm : 2.61-2.66 (2H, m), 2.96-3.01 (2H, m), 3.74 (3H, s), 3.98-4.15 (4H, m), 5.30 (2H, s), 5.84 (1H, s), 6.76 (1H, d, J=8.7Hz), 7.27 (1H, d, J=8.7Hz), 7.34-7.70 (9H, m), 7.99-8.03 (2H, m), 8.50 (1H, d, J=1.6Hz)
167		^{1}H-NMR ($CDCl_3$) dppm : 2.60-2.65 (2H, m), 2.90-2.97 (2H, m), 3.78 (3H, s), 3.99-4.14 (4H, m), 5.24 (2H, s), 5.83 (1H, s), 6.77 (1H, d, J=8.7Hz), 7.40-7.48 (2H, m), 7.55-7.62 (1H, m), 8.13 (1H, d, J=1.7Hz), 8.18-8.25 (2H, m), 8.61 (1H, s), 8.78 (1H, dd, J1=1.7Hz, J2=4.8Hz), 9.13 (1H, d, J=2.1Hz)
168		^{1}H-NMR ($CDCl_3$) dppm : 2.55-2.62 (2H, m), 2.87-2.94 (2H, m), 3.80 (3H, s), 4.00-4.14 (4H, m), 5.25 (2H, s), 5.82 (1H, s), 6.50 (1H, ddd, J1=0.8Hz, J2=8.5Hz), 6.62-6.67 (1H, m), 6.76 (1H, d, J=8.7Hz), 6.78-6.84 (1H, m), 7.23 (1H, s), 7.38-7.48 (2H, m), 7.53-7.60 (1H, m), 8.05-8.08 (1H, m), 8.20-8.23 (1H, m),

Table 24



Ref. Ex.	R^{711}	R^{712}	R^{713}	R^{714}	NMR
169	$-CH_2Cl$	-H	-H	-H	^{1}H-NMR ($CDCl_3$) dppm : 2.74-2.80 (2H, m), 3.09-3.15 (2H, m), 4.02-4.17 (4H, m), 4.67 (2H, s), 5.27 (2H, s), 5.96 (1H, s), 7.00 (1H, d, J=7.8Hz), 7.07 (1H, d, J=7.8Hz), 7.15 (1H, t, J=7.8Hz), 7.27 (1H, d, J=7.8Hz), 7.35 (1H, d, J=7.8Hz), 7.63 (1H, t, J=7.8Hz)
170	-H	$-CH_3$	$-OCH_3$	$-CH_3$	^{1}H-NMR ($CDCl_3$) dppm : 2.19 (3H, s), 2.27 (3H, s), 2.73-2.79 (2H, m), 3.05-3.11 (2H, m), 3.78 (3H, s), 4.01-4.16 (4H, m), 5.19 (2H, s), 5.96 (1H, s), 6.85-6.89 (1H, m), 7.11 (1H, t, J=7.9Hz), 7.22-7.26 (1H, m), 8.10 (1H, s)

Table 25



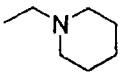
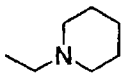
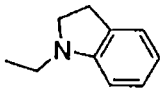
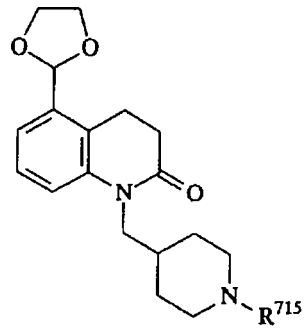
Ref. Ex.	R^{111}	R^{112}	R^{113}	R^{114}	R^{115}	NMR
171	-H	-H	$-CH_2Cl$	-H	-H	^{1}H-NMR ($CDCl_3$) dppm : 2.74-2.79 (2H, m), 3.08-3.13 (2H, m), 4.02-4.17 (4H, m), 4.58 (2H, s), 5.17 (2H, s), 5.95 (1H, s), 6.87 (1H, d, J=8.0Hz), 7.13 (1H, t, J=8.0Hz), 7.19 (2H, d, J=8.0Hz), 7.25-7.28 (1H, m), 7.33 (2H, d, J=8.0Hz)
172	-H	-H	-H	$-CH_2Cl$	-H	^{1}H-NMR ($CDCl_3$) dppm : 2.75-2.81 (2H, m), 3.08-3.14 (2H, m), 4.02-4.17 (4H, m), 4.55 (2H, s), 5.17 (2H, s), 5.96 (1H, s), 6.88 (1H, d, J=8.1Hz), 7.10-7.16 (2H, m), 7.23-7.33 (4H, m),
173	-H	-H	-H		-H	^{1}H-NMR ($CDCl_3$) dppm : 1.50-1.60 (6H, m), 2.30-2.34 (4H, m), 2.74-2.80 (2H, m), 3.07-3.13 (2H, m), 3.43 (2H, s), 4.01-4.16 (4H, m), 5.17 (2H, s), 5.95 (1H, s), 6.90 (1H, d, J=8.1Hz), 7.03-7.27 (6H, m)
174	-H	-H		-H	-H	^{1}H-NMR ($CDCl_3$) dppm : 1.41-1.47 (2H, m), 1.57-1.65 (4H, m), 2.40-2.44 (4H, m), 2.73-2.79 (2H, m), 3.07-3.13 (2H, m), 3.50 (2H, s), 4.00-4.17 (4H, m), 5.16 (2H, s), 5.95 (1H, s), 6.91 (1H, d, J=8.1Hz), 7.09-7.17 (3H, m), 7.24-7.29 (3H, m)
175	-H	-H		-H	-H	^{1}H-NMR ($CDCl_3$) dppm : 2.73-2.79 (2H, m), 2.92-2.98 (2H, m), 3.07-3.13 (2H, m), 3.24-3.30 (2H, m), 4.01-4.17 (4H, m), 4.20 (2H, s), 5.17 (2H, s), 5.95 (1H, s), 6.48 (1H, d, J=7.8Hz), 6.61-6.68 (1H, m), 6.90-7.18 (6H, m), 7.24-7.31 (3H, m)

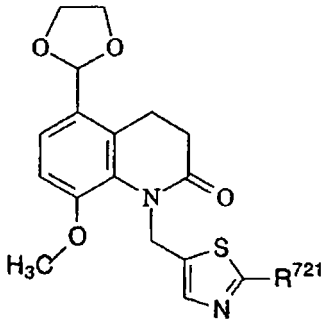
Table 26



Ref. Ex.	R^{715}	NMR
176	$-CO_2CH_2CH_2Si(CH_3)_3$	^{1}H-NMR ($CDCl_3$) dppm : 0.04 (9H,s), 0.98 (2H, d, J=8.3Hz), 1.2-1.4 (2H, m), 1.5-2.0 (2H, m), 2.5-2.8 (4H, m), 2.95-3.1 (2H, m), 3.75-4.3 (10H, m), 7.02 (1H, dd, J1=1.8Hz, J2=7.4Hz), 7.2-7.4 (2H, m)
177	$-CO_2C(CH_3)_3$	^{1}H-NMR ($CDCl_3$) δ ppm : 1.15-1.95 (5H, m), 1.44 (9H, s), 2.5-2.7 (4H, m), 2.95-3.1 (2H, m), 3.75-4.2 (8H, m), 5. 94 (1H, s), 7.0-7.1 (1H, m), 7.2-7.35 (2H, m)
178	-H	^{1}H-NMR ($CDCl_3$) dppm : 1.25-1.8 (5H, m), 2.45-3.3 (8H, m), 3.92 (2H, d, J=7.1Hz), 4.0-4.25 (4H, m), 5.94 (1H, s), 6.9-7.1 (1H, m), 7.2-7.4 (2H, m)

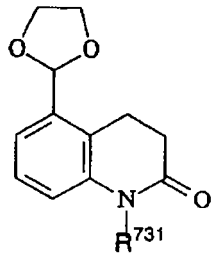
5

Table 27



Ref. Ex.	R^{721}	NMR
179	-Cl	^{1}H-NMR ($CDCl_3$) dppm : 2.54-2.60 (2H, m), 2.89-2.95 (2H, m), 3.88 (3H, s), 3.99-4.16 (4H, m), 5.23 (2H, s), 5.84 (1H, s), 6.86 (1H, d, J=8.7Hz), 7.32 (1H, d, J=8.7Hz), 7.39 (1H, s)
180	-C_6H_5	^{1}H-NMR ($CDCl_3$) dppm : 2.56-2.62 (2H, m), 2.89-2.95 (2H, m), 3.91 (3H, s), 3.97-4.14 (4H, m), 5.45 (2H, s), 5.82 (1H, s), 6.84 (1H, d, J=8.7Hz), 7.30 (1H, d, J=8.7Hz), 7.37-7.43 (3H, m), 7.61 (1H, s), 7.84-7.88 (2H, m)
181	-3-THIENYL	^{1}H-NMR ($CDCl_3$) dppm : 2.55-2.61 (2H, m), 2.89-2.95 (2H, m), 3.90 (3H, s), 4.00-4.14 (4H, m), 5.42 (2H, s), 5.82 (1H, s), 6.84 (1H, d, J=8.9Hz), 7.30 (1H, d, J=8.9Hz), 7.33-7.35 (1H, m), 7.47-7.49 (1H, m), 7.55 (1H, s), 7.74 (1H, dd, J1=1.0Hz, J2=2.8Hz)
182	-3-PYRIDYL	^{1}H-NMR ($CDCl_3$) dppm : 2.57-2.62 (2H, m), 2.91-2.96 (2H, m), 3.91 (3H, s), 4.01-4.20 (4H, m), 5.43 (2H, s), 5.83 (1H, s), 6.86 (1H, d, J=8.7Hz), 7.29-7.37 (2H, m), 7.69 (1H, s), 8.13-8.18 (1H, m), 8.60 (1H, dd, J1=1.6Hz, J2=4.8Hz), 9.08 (1H, d, J=2.0Hz)

Table 28



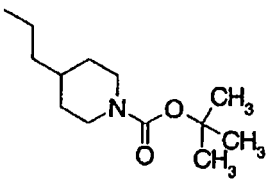
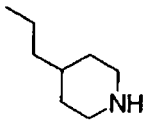
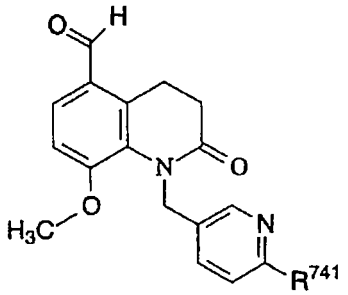
Ref. Ex.	R^{731}	NMR
183	$-(CH_2)_3Br$	^{1}H-NMR ($CDCl_3$) dppm : 2.15-2.3(2H, m), 2.5-2.7 (2H, m), 2.9-3.1 (2H, m), 3.44 (2H, t, J=6.5Hz), 4.0-4.25 (6H, m), 5.94 (1H, s), 7.0-7.1 (1H, m), 7.25-7.35 (2H, m)
184		^{1}H-NMR ($CDCl_3$) dppm : 1.1-1.2 (2H, m), 1.42 (9H, s), 1.4-1.6 (3H, m), 1.7-1.8 (2H, m), 2.55-2.8 (4H, m), 2.95-3.05 (2H, m), 3.9-4.2 (8H, m), 5.94 (1H, s), 6.95-7.05 (1H, m), 7.2-7.35 (2H, m)
185		^{1}H-NMR ($CDCl_3$) dppm : 1.1-1.65 (7H, m), 2.5-2.7 (4H, m), 2.9-3.2 (4H, m), 3.97 (2H, t, J=8.2Hz), 4.05-4.2 (4H, m), 5.94 (1H, s), 6.95~7.05 (1H, m), 7.2-7.4 (2H, m)

Table 29



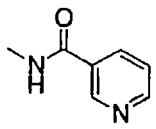
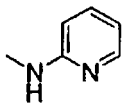
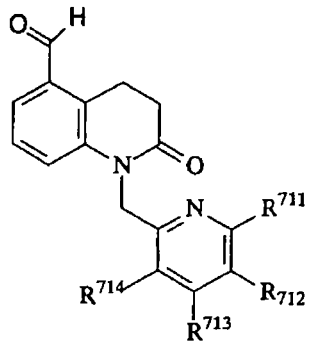
Ref. Ex.	R^{741}	NMR
186	$-NHC_6H_5$	^{1}H-NMR ($CDCl_3$) dppm : 2.55-2.62 (2H, m), 3.31-3.38 (2H, m), 3.93 (3H, s), 5.23 (2H, s), 6.42 (1H, s), 6.70 (1H, d, J=8.6Hz), 6.89 (1H, d, J=8.6Hz), 6.98-7.06 (1H, m), 7.23-7.33 (5H, m), 7.54 (1H, d, J=8.2Hz), 7.94 (1H, d, J=2.1Hz), 10.00 (1H, s)
187	$-CF_3$	^{1}H-NMR ($CDCl_3$) dppm : 2.61-2.67 (2H, m), 3.41-3.47 (2H, m), 3.75 (3H, s), 5.23 (2H, s), 6.92 (1H, d, J=8.6Hz), 7.58 (1H, d, J=8.0Hz), 7.59 (1H, d, J=8.6Hz), 7.68 (1H, dd, J1=2.0Hz, J2=8.0Hz), 8.54 (1H, d, J=2.0Hz), 10.04 (1H, s)
188	$-C_6H_4C_6H_5$(PARA)	^{1}H-NMR ($CDCl_3$) dppm : 2.61-2.67 (2H, m), 3.40-3.45 (2H, m), 3.86 (3H, s), 5.32 (2H, s), 6.89 (1H, d, J=8.7Hz), 7.33-7.39 (1H, m), 7.42-7.49 (2H, m), 7.52-7.56 (2H, m), 7.62-7.69 (5H, m), 7.99-8.02 (2H, m), 8.46 (1H, d, J=1.6Hz), 10.01 (1H, s)
189		^{1}H-NMR ($DMSO-d_6$) dppm : 2.59-2.65 (2H, m), 3.37-3.42 (2H, m), 3.87 (3H, s), 5.26 (2H, s), 6.91 (1H, d, J=8.6Hz), 7.44 (1H, dd, J1=4.9Hz, J2=7.9Hz), 7.52-7.58 (2H, m), 8.10 (1H, d, J=1.8Hz), 8.18-8.24 (2H, m), 8.59 (1H, s), 8.79 (1H, dd, J1=1.8Hz, J2=4.9Hz), 9.12 (1H, d, J=1.8Hz), 10.02 (1H, s)
190		^{1}H-NMR ($CDCl_3$) dppm : 2.57-2.62 (2H, m), 3.34-3.39 (2H, m), 3.92 (3H, s), 5.26 (2H, s), 6.79-6.85 (1H, m), 6.89 (1H, d, J=8.7Hz), 7.34-7.45 (4H, m), 7.51-7.60 (2H, m), 8.01 (1H, d, J=2.0Hz), 8.20-8.23 (1H, m), 10.00 (1H, s)

Table 30



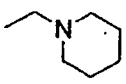
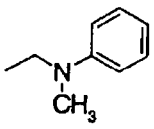
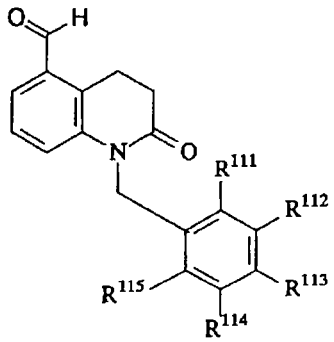
Ref. Ex.	R^{711}	R^{712}	R^{713}	R^{714}	NMR
191	$-CH_2SC_6H_5$	-H	-H	-H	^{1}H-NMR ($CDCl_3$) dppm : 2.72-2.78 (2H, m), 3.49-3.55 (2H, m), 4.24 (2H, s), 5.26 (2H, s), 7.04 (1H, d, J=7.7Hz), 7.15-7.33 (8H, m), 7.47-7.55 (2H, m), 10.20 (1H, s)
192	-H	$-CH_3$	$-OCH_3$	$-CH_3$	^{1}H-NMR ($CDCl_3$) dppm : 2.20 (3H, s), 2.27 (3H, s), 2.74-2.80 (2H, m), 3.47-3.53 (2H, m), 3.75 (3H, s), 5.22 (2H, s), 7.12 (1H, dd, J1=1.0Hz, J2=7.9Hz), 7.29 (1H, t, J=7.9Hz), 7.47 (1H, dd, J1=1.0Hz, J2=7.9Hz), 8.12 (1H, s), 10.21 (1H, s)
193		-H	-H	-H	^{1}H-NMR ($CDCl_3$) dppm : 1.44-1.50 (2H, m), 1.62-1.68 (4H, m), 2.50-2.54 (4H, m), 2.74-2.80 (2H, m), 3.51-3.57 (2H, m), 3.72 (2H, s), 5.30 (2H, s), 7.06 (1H, d, J=8.5Hz), 7.30 (2H, d, J=4.4Hz), 7.33 (1H, d, J=8.5Hz), 7.49 (1H, t, J=4.4Hz), 7.59 (1H, t, J=8.5Hz), 10.21 (1H, s)
194		-H	-H	-H	^{1}H-NMR ($CDCl_3$) dppm : 2.72-2.78 (2H, m), 3.09 (3H, s), 3.49-3.55 (2H, m), 4.63 (2H, s), 5.28 (2H, s), 6.67-6.73 (3H, m), 7.03 (1H, d, J=3.8Hz), 7.06 (1H, d, J=3.8Hz), 7.16-7.23 (2H, m), 7.30-7.33 (2H, m), 7.47-7.55 (2H, m), 10.22 (1H, s)

Table 31



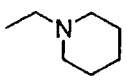
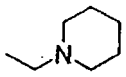
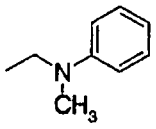
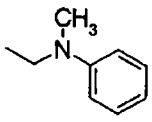
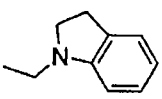
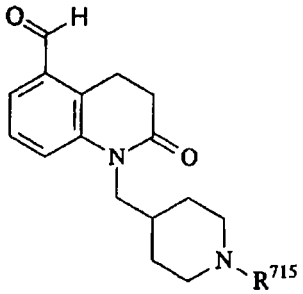
Ref. Ex.	R^{111}	R^{112}	R^{113}	R^{114}	R^{115}	NMR
195	-H	-H	-H	$-CH_2SC_6H_5$	-H	^{1}H-NMR ($CDCl_3$) dppm : 2.71-2.77 (2H, m), 3.47-3.53 (2H, m), 4.06 (2H, s), 5.15 (2H, s), 7.02-7.12 (3H, m), 7.14-7.32 (8H, m), 7.48 (1H, dd, J1=1.1Hz, J2=7.7Hz), 10.20 (1H, s)
196	-H	-H	$-CH_2SC_6H_5$	-H	-H	^{1}H-NMR ($CDCl_3$) dppm : 2.74-2.80 (2H, m), 3.49-3.55 (2H, m), 4.08 (2H, s), 5.18 (2H, s), 7.07-7.13 (3H, m), 7.16-7.33 (8H, m), 7.49 (1H, dd, J1=1.1Hz, J2=7.6Hz), 10.21 (1H, s)
197	-H	-H	-H		-H	^{1}H-NMR ($CDCl_3$) dppm : 1.39-1.45 (2H, m), 1.50-1.58 (4H, m), 2.30-2.34 (4H, m), 2.76-2.82 (2H, m), 3.45 (2H, s), 3.50-3.56 (2H, m), 5.22 (2H, s), 7.03-7.31 (6H, m), 7.47 (1H, d, J=7.6Hz), 10.20 (1H, s)
198	-H	-H		-H	-H	^{1}H-NMR ($CDCl_3$) dppm : 1.39-1.45 (2H, m), 1.50-1.62 (4H, m), 2.34-2.38 (4H, m), 2.75-2.81 (2H, m), 3.44 (2H, s), 3.49-3.55 (2H, m), 5.19 (2H, s), 7.14 (2H, d, J=8.1Hz), 7.25-7.33 (4H, m), 7.48 (1H, dd, J1=1.0Hz, J2=7.6Hz), 10.21 (1H, s)
199	-H	-H	-H		-H	^{1}H-NMR ($CDCl_3$) dppm : 2.64-2.70 (2H, m), 2.93 (3H, s), 3.37-3.43 (2H, m), 4.48 (2H, s), 5.18 (2H, s), 6.61-6.69 (3H, m), 6.95-7.30 (8H, m), 7.47 (1H, dd, J1=0.9Hz, J2=7.7Hz), 10.20 (1H, s)
200	-H	-H		-H	-H	^{1}H-NMR ($CDCl_3$) dppm : 2.73-2.79 (2H, m), 2.98 (3H, s), 3.48-3.54 (2H, m), 4.49 (2H, s), 5.18 (2H, s), 6.67-6.73 (3H, m), 7.11-7.33 (8H, m), 7.48 (1H, dd, J1=1.0Hz, J2=7.6Hz), 10.20 (1H, s)
201	-H	-H		-H	-H	^{1}H-NMR ($CDCl_3$) dppm : 2.75-2.81 (2H, m), 2.92-2.98 (2H, m), 3.25-3.31 (2H, m), 3.49-3.55 (2H, m), 4.21 (2H, s), 5.20 (2H, s), 6.47 (1H, d, J=7,7Hz), 6.63-6.69 (1H, m), 7.01-7.07 (1H, m), 7.11 (1H, dd, J1=1.0Hz, J2=5.6Hz), 7.17 (2H, d, J=8.2Hz), 7.26-7.34 (4H, m), 7.49 (1H, dd, J1=1.0Hz, J2=7.7Hz), 10.21 (1H, s)

Table 32



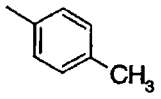
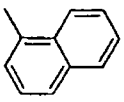
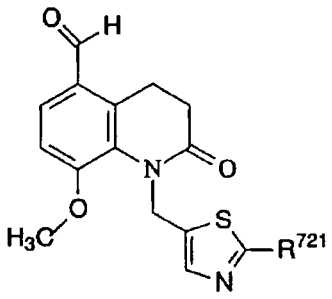
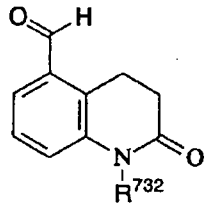
Ref. Ex.	R^{715}	NMR
202	$-C_6H_4C_6H_5$(PARA)	^{1}H-NMR ($CDCl_3$) dppm : 1.4-2.2 (5H, m), 2.5-3.0 (4H, m), 3.4-3.55 (2H, m), 3.65-3.8 (2H, m), 4.03 (1H, br s), 7.2-7.65 (12H, m), 10.23 (1H, s)
203	$-CO_2CH_2CH_2Si(CH_3)_3$	^{1}H-NMR ($CDCl_3$) dppm : 0.04 (9H,s), 0.97 (2H, d, J=8.3Hz), 1.2-2.0 (5H, m), 2.55-2.8 (4H, m), 3.3-3.6 (2H, m), 3.75-4.3 (6H, m), 7.2-7.6 (3H, m), 10.22 (1H, s)
204		^{1}H-NMR ($CDCl_3$) dppm : 1.35-1.9 (5H, m), 2.56 (3H, s), 2.5-2.7 (4H, m), 2.9-3.1 (2H, m), 3.5-3.7 (2H, m), 3.97 (2H, d, J=7.1Hz), 4.0-4.2 (4H, m), 6.82 (1H, d, J=6.1Hz), 7.0-7.2 (3H, m), 7.25-7.4 (2H, m)
205		^{1}H-NMR (DMSO-d_6) dppm : 1.45-1.9 (5H, m), 2.6-2.7 (4H, m), 2.85-3.0 (2H, m), 3.15-3.4 (2H, m), 3.85-4.15 (6H, m), 5.92 (1H, s), 7.04 (1H, d, J=7.3Hz), 7.15-7.6 (8H, m), 7.86 (1H, d, J=6.8Hz), 8.06 (1H, d, J=7.0Hz), 10.23 (1H, s)

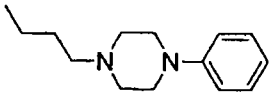
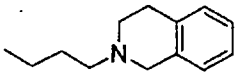
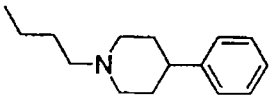
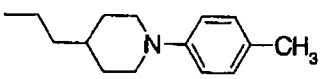
Table 33



Ref. Ex.	R^{721}	NMR
206	-Cl	^{1}H-NMR ($CDCl_3$) dppm : 2.54-2.60 (2H, m), 3.34-3.40 (2H, m), 3.99 (3H, s), 5.25 (2H, s), 7.01 (1H, d, J=8.6Hz), 7.36 (1H, s), 7.62 (1H, d, J=8.6Hz), 10.04 (1H, s)
207	-C_6H_5	^{1}H-NMR ($CDCl_3$) dppm : 2.57-2.62 (2H, m), 3.34-3.40 (2H, m), 4.01 (3H, s), 5.48 (2H, s), 6.98 (1H, d, J=8.7Hz), 7.37-7.40 (3H, m), 7.56-7.60 (2H, m), 7.82-7.86 (2H, m), 10.01 (1H, s)
208	-3-THIENYL	^{1}H-NMR ($CDCl_3$) dppm : 2.56-2.62 (2H, m), 3.34-3.39 (2H, m), 4.01 (3H, s), 5.46 (2H, s), 6.98 (1H, d, J=8.7Hz), 7.34 (1H, dd, J1=3.0Hz, J2=5.0Hz), 7.44-7.47 (1H, m), 7.51 (1H, s), 7.58 (1H, d, J=8.7Hz), 7.72-7.75 (1H, m), 10.01 (1H, s)
209	-3-PYRIDYL	^{1}H-NMR ($CDCl_3$) dppm : 2.58-2.63 (2H, m), 3.35-3.41 (2H, m), 4.02 (3H, s), 5.46 (2H, s), 7.00 (1H, d, J=8.6Hz), 7.34 (1H, dd, J1=4.8Hz, J2=8.0Hz), 7.60 (1H, d, J=8.6Hz), 7.66 (1H, s), 8.13 (1H, ddd, J1=1.9Hz, J2=8.0Hz), 8.61 (1H, dd, J=1.9Hz, J2=4.8Hz), 9.07 (1H, d, J=1.9Hz), 10.02 (1H, s)

Table 34



Ref. Ex.	R^{732}	NMR
210	$-(CH_2)_4F$	^{1}H-NMR ($CDCl_3$) dppm : 1.5-1.75 (2H, m), 2.45-2.6 (2H, m), 3.3-3.45 (2H, m), 3.69 (3H, s), 4.02 (2H, t, J=7.2Hz), 4.25-4.35 (1H, m), 4.45-4.55 (1H, m), 6.98 (1H, d, J=8.6Hz), 7.60 (1H, d, J=8.6Hz), 10.06 (1H, s)
211		^{1}H-NMR ($CDCl_3$) dppm : 1.8-1.95 (2H, m), 2.4-2.75 (6H, m), 3.1-3.25 (4H, m), 3.35-3.6 (3H, m), 3.95-4.2 (3H, m), 6.8-7.0 (3H, m), 7.2-7.6 (5H, m), 10.22 (1H, s)
212		^{1}H-NMR ($CDCl_3$) dppm : 1.8-2.05 (2H, m), 2.5-3.05 (8H, m), 3.35-3.5 (2H, m), 3.61 (2H, s), 4.0-4.25 (2H, m), 6.9-7.6 (7H, s), 10.2 (1H, s)
213		^{1}H-NMR ($CDCl_3$) dppm : 1.6-2.3 (8H, m), 2.45-2.8 (4H, m), 3.0-3.25 (2H, m), 3.4-3.65 (2.5H, m), 3.95-4.2 (2.5H, m), 7.1-7.6 (8H, m), 10.21 (1H, s)
214		^{1}H-NMR ($CDCl_3$) dppm : 1.35-1.95 (7H, m), 2.26 (3H, s), 2.5-2.75 (4H, m), 3.35-3.5 (2H, m), 3.5-3.65 (2H, m), 3.95-4.1 (2H, m), 6.86 (2H, d, J=8.5Hz), 7.06 (2H, d, J=8.5Hz), 7.15-7.6 (3H, m), 10.22 (1H, s)

5

Example 1

Synthesis of 5-(8-methoxy-1-methyl-2-oxo-1,2-dihydroquinolin-5-ylmethyl)thiazolidine-2,4-dione

1.0 g of 2-chloro-3-(8-methoxy-1-methyl-2-oxo-1,2-dihydroquinolin-5-yl)propionic acid, 0.45 g of thiourea, and 0.4 g of sodium acetate were added to 20 ml of methoxy ethanol, and the mixture was stirred at 110°C for 7.5 hours. The reaction mixture was concentrated under reduced pressure, an aqueous sodium hydrogencarbonate solution was added to the residue to precipitate a solid, and the precipitated solid was collected by filtration. The filtrate was extracted with dichloromethane, and the extract was dried over anhydrous sodium sulfate and concentrated. The concentrated residue and the solid collected by filtration were combined and added to a mixed solvent of 10% hydrochloric acid and ethanol, followed by heating and refluxing overnight. The solvent was distilled off under reduced pressure, and the residue was recrystallized from an aqueous DMF, giving 0.41 g of 5-(8-methoxy-1-methyl-2-oxo-1,2-dihydroquinolin-5-ylmethyl)thiazolidine-2,4-dione as a yellow powder.
Melting point: 254°C-255°C

Example 2

Synthesis of 5-[2-(8-methoxy-1-methyl-2-oxo-1,2-dihydroquinolin-5-yl)ethyl]thiazolidine-2,4-dione

912 mg of 2-chloro-4-(8-methoxy-1-methyl-2-oxo-1,2-dihydroquinolin-5-yl)butyric acid, 390 mg of thiourea, and 394 mg of sodium acetate were added to 20 ml of methoxyethanol, followed by stirring at 110°C for 4 hours. The reaction mixture was concentrated under reduced pressure. Water was added to the residue, and the mixture was extracted with dichloromethane. The extract was dried over anhydrous sodium sulfate and concentrated. The residue was added to a mixed solvent of 10 ml of 10% hydrochloric acid and 10 ml of ethanol, followed by heating and refluxing overnight. The

solvent was distilled off under reduced pressure, and the residue was recrystallized from a DMF-ethanol mixed solvent, giving 332 mg (31% yield) of 5-[2-(8-methoxy-1-methyl-2-oxo-1,2-dihydroquinolin-5-yl)ethyl]thiazolidine-2,4-dione as a yellow powder.

Melting point: 222°C to 224°C

Example 3

Synthesis of 5-[3-(8-methoxy-1-methyl-2-oxo-1,2-dihydroquinolin-5-yl)propyl]thiazolidine-2,4-dione

1 g of 2-chloro-5-(8-methoxy-1-methyl-2-oxo-1,2-dihydroquinolin-5-yl)valeric acid, 380 mg of thiourea, and 380 mg of sodium acetate were added to 20 ml of methoxyethanol, followed by stirring at 110°C for 5 hours. The reaction mixture was concentrated under reduced pressure, and water and a small amount of ethanol were added to the residue to precipitate a solid. The precipitated solid was collected by filtration. The solid collected by filtration was added to a mixed solvent of 10 ml of 10% hydrochloric acid and 10 ml of ethanol, followed by heating and refluxing overnight. The solvent was distilled off under reduced pressure, and the residue was extracted with dichloromethane. The extract was dried over anhydrous sodium sulfate and concentrated. The concentrated residue was purified by silica gel column chromatography (dichloromethane:methanol of 100:1 → 10:1), and recrystallized from an ethanol-ether mixed solvent, giving 332 mg (29% yield) of 5-[3-(8-methoxy-1-methyl-2-oxo-1,2-dihydroquinolin-5-yl)propyl]thiazolidine-2,4-dione as a light yellow powder.

Melting point: 172°C to 175°C

Example 4

Synthesis of 5-(8-methoxy-1-methyl-2-oxo-1,2-dihydroquinolin-5-yl)thiazolidine-2,4-dione

3.02 g of ethyl chloro-(8-methoxy-1-methyl-2-oxo-

1,2-dihydroquinolin-5-yl)acetate, 1.4 g of thiourea, and 2 g of sodium acetate were added to 50 ml of methoxyethanol, followed by stirring at 110°C for 2.5 hours. The reaction mixture was concentrated under reduced pressure. Water was added to the residue to precipitate a solid, and the precipitated solid was collected by filtration. The collected solid was added to a mixed solvent of 30 ml of 10% hydrochloric acid and 30 ml of ethanol, followed by heating and refluxing overnight. The resultant was concentrated to half its original volume under reduced pressure. Water was added thereto, and the mixture was cooled with ice to precipitate a solid. The precipitated solid was collected by filtration. The solid was recrystallized from a DMF-ethanol mixed solvent, giving 1.68 g (57% yield) of 5-(8-methoxy-1-methyl-2-oxo-1,2-dihydroquinolin-5-yl)thiazolidine-2,4-dione as a gray powder.

Melting point: 255°C (decomposition)

Example 5

Synthesis of 5-[1-(4-chlorobenzyl)-2-oxo-1,2-dihydroquinolin-4-ylmethylidene]thiazolidine-2,4-dione

1.50 g of 1-(4-chlorobenzyl)-2-oxo-1,2-dihydroquinolin-4-carboxaldehyde and 0.826 g of 2,4-thiazolidinedione were suspended in 30 ml of toluene. Five drops of piperidine and five drops of acetic acid were added, followed by heating and refluxing for 6 hours. The resultant was allowed to cool to precipitate a solid, and the precipitated solid was collected by filtration and dried, giving 1.01 g (50% yield) of 5-[1-(4-chlorobenzyl)-2-oxo-1,2-dihydroquinolin-4-ylmethylidene]thiazolidine-2,4-dione as a light-brown powder.

^{1}H-NMR(DMSO-d_6) dppm:

5.53 (2H, s), 6.76 (1H, s), 7.11-7.49 (6H, m), 7.53-7.64 (1H, m), 7.81 (1H, d, J=8.1Hz), 8.04 (1H, s), 12.21-13.32 (1H, br)

Example 6

Synthesis of 5-[1-(4-chlorobenzyl)-2-oxo-1,2-dihydroquinolin-3-ylmethylidene]thiazolidine-2,4-dione

1.50 g of 1-(4-chlorobenzyl)-2-oxo-1,2-dihydroquinolin-3-carboxaldehyde and 0.826 g of 2,4-thiazolidinedione were suspended in 30 ml of toluene, and five drops of piperidine and five drops of acetic acid were added, followed by heating and refluxing for 6 hours. The resultant was allowed to cool to precipitate a solid. The precipitated solid was collected by filtration and dried, giving 1.36 g of 5-[1-(4-chlorobenzyl)-2-oxo-1,2-dihydroquinolin-3-ylmethylidene]thiazolidine-2,4-dione as a yellow powder (68% yield).

^{1}H-NMR(DMSO-d_6) dppm:

5.55 (2H, s), 7.18-7.45 (6H, m), 7.53-7.65 (1H, m), 7.88-8.00 (2H, m), 8.21 (1H, s), 12.59 (1H, brs)

Using appropriate starting materials, the same procedure as in Example 6 was conducted, giving compounds of the following Examples 7 to 13.

Example 7

5-[1-(1-Biphenyl-4-ylmethyl-2-oxo-1,2-dihydroquinolin-4-yl)methylidene]thiazolidine-2,4-dione

^{1}H-NMR(DMSO-d_6) dppm:

5.59 (2H, brs), 6.78 (1H, s), 7.18-7.70 (12H, m), 7.82 (1H, d, J=8.0Hz), 8.05 (1H, s), 12.81 (1H, brs)

Example 8

5-[1-(1-Biphenyl-4-ylmethyl-2-oxo-1,2-dihydroquinolin-3-yl)methylidene]thiazolidine-2,4-dione

^{1}H-NMR(DMSO-d_6) dppm:

5.61 (2H, brs), 7.21-7.51 (7H, m), 7.51-7.68 (5H, m), 7.87-8.00 (2H, m), 8.22 (1H, s), 12.60 (1H, brs)

Example 9

5-[1-(8-Methoxy-1-methyl-2-oxo-1,2-dihydroquinolin-5-yl)methylidene]thiazolidine-2,4-dione

Melting point: 300°C or higher

^{1}H-NMR(DMSO-d_6) δppm:

3.80 (3H, s), 3.95 (3H, s), 6.70 (1H, d, J=9.8Hz), 7.35-7.45 (2H, m), 8.05 (1H, d, J=9.8Hz), 8.14 (1H, s), 12.63 (1H, brs)

Example 10

5-[1-(8-Methoxy-1-methyl-2-oxo-1,2-dihydroquinolin-5-yl)methylidene]-3-methylthiazolidine-2,4-dione

Melting point: 270°C (decomposition)

Example 11

5-{1-[8-Methoxy-1-(4-bromobenzyl)-2-oxo-1,2-dihydroquinolin-5-yl]methylidene}thiazolidine-2,4-dione

^{1}H-NMR(DMSO-d_6) δppm:

3.65 (3H, s), 5.67 (2H, s), 6.80 (1H, d, J=9.8Hz), 7.03 (2H, d, J=8.5Hz), 7.25-7.40 (2H, m), 7.40-7.52 (2H, m), 8.16 (2H, d, J=10.9Hz), 12.64 (1H, brs)

Example 12

5-[1-(1-Biphenyl-4-ylmethyl-2-oxo-1,2,3,4-tetrahydroquinolin-7-yl)methylidene]thiazolidine-2,4-dione

^{1}H-NMR(DMSO-d_6) δppm:

2.70-2.84 (2H, m), 2.97-3.09 (2H, m), 5.22 (2H, brs), 7.12 (1H, s), 7.15-7.25 (1H, m), 7.25-7.49 (6H, m), 7.56-7.71 (5H, m), 12.52 (1H, brs)

Example 13

5-[1-(1-Biphenyl-4-ylmethyl-2-oxo-1,2,3,4-tetrahydroquinolin-8-yl)methylidene]thiazolidine-2,4-dione

^{1}H-NMR(DMSO-d_6) δppm:

2.55-2.68 (2H, m), 2.80-2.94 (2H, m), 4.98 (2H, s), 6.98-7.16 (3H, m), 7.22-7.63 (9H, m), 7.75 (1H, s), 12.57 (1H, brs)

Example 14

Synthesis of 5-[1-(4-chlorobenzyl)-2-oxo-1,2-dihydroquinolin-4-ylmethyl]thiazolidine-2,4-dione

0.96 g of 5-[1-(4-chlorobenzyl)-2-oxo-1,2-dihydroquinolin-4-ylmethylidene]thiazolidine-2,4-dione, 0.735 g of diethyl 1,4-dihydro-2,6-dimethyl-3,5-pyridinedicarboxylate, and 0.96 g of silica gel were added to 30 ml of toluene, followed by heating and refluxing overnight. The solvent was distilled off, and the residue was purified by silica gel column chromatography (dichloromethane:ethyl acetate of 10:1 → 3:1), and the purified product was recrystallized from a chloroform-ether mixed solvent, giving 0.87 g (91% yield) of 5-[1-(4-chlorobenzyl)-2-oxo-1,2-dihydroquinolin-4-ylmethyl]thiazolidine-2,4-dione as a white powder.

Melting point: 142.1°C to 143.7°C

Example 15

Synthesis of 5-[1-(4-chlorobenzyl)-2-oxo-1,2-dihydroquinolin-3-ylmethyl]thiazolidine-2,4-dione

1.207 g of 5-[1-(4-chlorobenzyl)-2-oxo-1,2-dihydroquinolin-3-ylmethylidene]thiazolidine-2,4-dione, 0.924 g of diethyl 1,4-dihydro-2,6-dimethyl-3,5-pyridinedicarboxylate, and 1.2 g of silica gel were added to 30 ml of toluene, followed by heating and refluxing overnight. 0.77 g of diethyl 1,4-dihydro-2,6-dimethyl-3,5-pyridine dicarboxylate was further added to the reaction liquid, followed by heating and refluxing overnight. The solvent was distilled off, and the residue was purified by silica gel column chromatography (dichloromethane:ethyl acetate of 10:1 → 3:1). The purified product was recrystallized from a chloroform-ether mixed solvent, giving 0.74 g (61% yield) of 5-[1-(4-chlorobenzyl)-2-oxo-1,2-dihydroquinolin-4-ylmethyl]thiazolidine-2,4-dione as a white powder.

Melting point: 230.7°C to 231.9°C

Using appropriate starting materials, the same procedure as in Example 15 was conducted, giving compounds of the following Examples 16 to 19.

Example 16

5-(2-Oxo-1,2-dihydroquinolin-3-ylmethyl)thiazolidine-2,4-dione

^{1}H-NMR(DMSO-d_6) δppm:

2.45-2.55 (1H, m), 3.35-3.5 (1H, m), 4.9-5.0 (1H, m), 7.15-7.7 (4H, m), 7.84 (1H, s), 11.91 (1H, brs), 12.08 (1H, brs)

Example 17

5-[1-(Biphenyl-4-ylmethyl)-2-oxo-1,2-dihydroquinolin-3-ylmethyl]thiazolidine-2,4-dione

Melting point: 220.4°C to 221.8°C

Example 18

5-[1-(Biphenyl-4-ylmethyl)-2-oxo-1,2,3,4-tetrahydroquinolin-7-ylmethyl]thiazolidine-2,4-dione

Melting point: 213.2°C to 213.7°C

Example 19

5-[1-(Biphenyl-4-ylmethyl)-2-oxo-1,2,3,4-tetrahydroquinolin-8-ylmethyl]thiazolidine-2,4-dione

^{1}H-NMR(DMSO-d_6) δppm:

2.40-2.53 (2H, m), 2.70-2.85 (2H, m), 3.09-3.25 (1H, m), 3.50-3.64 (1H, m), 4.79-4.90 (1H, m), 4.90-5.16 (2H, m), 7.02 (1H, t, J=7.5Hz), 7.08-7.21 (4H, m), 7.28-7.64 (7H, m), 12.04 (1H, s)

Example 20

Synthesis of 5-[8-methoxy-1-(4-nitrobenzyl)-2-oxo-1,2, 3,4-tetrahydroquinolin-5-ylmethyl]thiazolidine-2,4-dione

600 mg of 5-[8-methoxy-1-(4-nitrobenzyl)-2-oxo-1,2,3,4-tetrahydroquinolin-5-ylmethylidene]thiazolidine-2,4-dione, 415 mg of diethyl 1,4-dihydro-2,6-dimethyl-3,5-pyridinedicarboxylate, and 600 mg of silica gel were added to 20 ml of toluene, followed by heating and refluxing for 14 hours. The solvent was distilled off, and the residue was purified by silica gel column chromatography (n-hexane:ethyl acetate=4:1 → 1:1). The purified product was recrystallized from an ethyl acetate-ether mixed solvent, giving 585 mg (97% yield) of 5-[8-methoxy-1-(4-nitrobenzyl)-2-oxo-1,2,3,4-tetrahydroquinolin-5-ylmethyl]thiazolidine-2,4-dione as a white powder.

Melting point: 246.5°C to 246.6°C.

Example 21

Synthesis of 5-[1-(4-aminobenzyl)-8-methoxy-2-oxo-1,2,3,4-tetrahydroquinolin-5-ylmethyl]thiazolidine-2,4-dione

10 g of 10% palladium carbon was added to a DMF solution (100 ml) of 10.0 g of 5-[8-methoxy-1-(4-nitrobenzyl)-2-oxo-1,2,3,4-tetrahydroquinolin-5-ylmethyl]thiazolidine-2,4-dione, and the mixture was subjected to a catalytic reduction at 40°C for 5 hours. The catalyst was removed by filtration, and the filtrate was concentrated. Ethyl acetate and water were added to the residue, and celite filtration was carried out. The filtrate was washed with water and dried over magnesium sulfate, followed by concentration. The residue was purified by silica gel chromatography (n-hexane:ethyl acetate=4:1 → 1:4), and the purified product was recrystallized from ethyl acetate, giving 7.98 g (86% yield) of 5-[1-(4-aminobenzyl)-8-methoxy-2-oxo-1,2,3,4-tetrahydroquinolin-5-ylmethyl]thiazolidine-2,4-dione as a white powder.

Melting point: 174.1°C to 174.8°C

Example 22

Synthesis of 5-{8-methoxy-1-[4-(2-naphthoylamino)benzyl]-2-oxo-1,2,3,4-tetrahydroquinolin-5-ylmethyl}thiazolidine-2,4-dione

0.52 g of triethylamine and 0.42 g of diethylphosphoro cyanidate (DEPC) were added with ice cooling to a DMF solution (14 ml) of 0.7 g of 5-[1-(4-aminobenzyl)-8-methoxy-2-oxo-1,2,3,4-tetrahydroquinolin-5-ylmethyl]thiazolidine-2,4-dione and 0.59 g of 2-naphthoic acid, followed by stirring for 16 hours. Water and ethyl acetate were added to the reaction liquid, and the insoluble matter thus formed was collected by filtration. The collected insoluble matter was dissolved in a dichloromethane-methanol mixed solvent and concentrated. The residue was washed with diethylether and diisopropyl ether. The residue was dried under reduced pressure, giving 0.74 g (77% yield) of 5-{8-methoxy-1-[4-(2-naphthoylamino)benzyl]-2-oxo-1,2,3,4-tetrahydroquinolin-5-ylmethyl}thiazolidin-2,4-dione as a white amorphous solid.

Melting point: 202°C to 208°C

^{1}H-NMR(DMSO-d_6) dppm:

2.44-2.52 (2H, m), 2.82-2.88 (2H, m), 3.03-3.13 (1H, m), 3.35-3.45 (1H, m), 3.73 (3H, s), 4.79 (1H, dd, J_1=4.1Hz, J_2=9.9Hz), 5.20 (2H, s), 6.83 (1H, d, J=8.6Hz), 6.91 (1H, d, J=8.6Hz), 7.05 (2H, d, J=8.4Hz), 7.58-7.66 (4H, m), 7.95-8.08 (4H, m), 8.52 (1H, s), 10.33 (1H, s), 12.06 (1H, s)

Example 23

Synthesis of 5-[1-(4-pentyloxycarbonylaminobenzyl)-8-methoxy-2-oxo-1,2,3,4-tetrahydroquinolin-5-ylmethyl]thiazolidine-2,4-dione

0.6 g of 5-[1-(4-aminobenzyl)-8-methoxy-2-oxo-1,2,3,4-tetrahydroquinolin-5-ylmethyl]thiazolidine-2,4-dione was suspended in dichloromethane (6 ml), and 4 ml of pyridine was added with ice cooling to form a solution. 0.26 g of amyl chloroformate was added to this solution, followed by

stirring for 1 hour. 1 N hydrochloric acid was added to the reaction liquid, and extracted with ethyl acetate. The extract was washed twice with water and once with saturated sodium chloride solution, dried over anhydrous sodium sulfate, and concentrated under reduced pressure. The residue was purified by silica gel column chromatography (n-hexane:ethyl acetate=2:1 → 1:1), and recrystallized from diisopropyl ether, giving 3.75 g (97% yield) of 5-[1-(4-pentyloxycarbonylaminobenzyl)-8-methoxy-2-oxo-1,2,3,4-tetrahydroquinolin-5-ylmethyl]thiazolidine-2,4-dione as a white powder.

Melting point: 98°C to 102°C.

Example 24

Synthesis of 5-[8-methoxy-1-(4-methoxycarbonylbenzyl)-2-oxo-1,2,3,4-tetrahydroquinolin-5-ylmethylidene]thiazolidine-2,4-dione

7.0 g of 8-methoxy-1-(4-methoxycarbonylbenzyl)-2-oxo- 1,2,3,4-tetrahydroquinoline-5-carboxaldehyde and 3.25 g of 2,4-thiazolidinedione were suspended in 70 ml of toluene. Ten drops of piperidine and ten drops of acetic acid were added, followed by heating and refluxing for 4 hours. The resultant was allowed to cool to precipitate a solid, and the precipitated solid was collected by filtration and dried, giving 8.0 g (90% yield) of 5-[8-methoxy-1-(4-methoxycarbonylbenzyl)-2-oxo-1,2,3,4-tetrahydroquinolin-5-ylmethylidene]thiazolidine-2,4-dione as a light yellow powder.

^{1}H-NMR(DMSO-d_6) dppm:

2.52-2.66 (2H, m), 2.91-3.05 (2H, m), 3.65 (3H, s), 3.79 (3H, s), 5.17 (2H, s), 7.02 (1H, d, J=8.7Hz), 7.16 (1H, d, J=8.7 Hz), 7.25 (2H, d, J=8.3Hz), 7.74- 7.90 (3H, m) 12.55 (1H, brs)

Example 25

Synthesis of 5-[8-methoxy-1-(4-

methoxycarbonylbenzyl)-2-oxo-1,2,3,4-tetrahydroquinolin-5-ylmethyl]thiazolidine-2,4-dione

7.0 g of 10% palladium carbon was added to a DMF solution (70 ml) of 7.0 g of 5-[8-methoxy-1-(4-methoxycarbonyl benzyl)-2-oxo-1,2,3,4-tetrahydroquinolin-5-ylmethylidene]thiazolidine-2,4-dione, and a catalytic reduction was carried out at 40°C for 5 hours. The catalyst was removed by filtration and the filtrate was concentrated. The residue was purified by silica gel column chromatography (n-hexane:ethyl acetate=4:1 → 1:1). The purified product was recrystallized from an ethyl acetate-diethyl ether mixed solvent, giving 5.23 g (74% yield) of 5-[8-methoxy-1-(4-methoxycarbonylbenzyl)-2-oxo-1,2,3,4-tetrahydroquinolin-5-ylmethyl]thiazolidine-2,4-dione as a white powder.

Melting point: 193.1°C to 195.5°C

Example 26

Synthesis of 5-[8-methoxy-1-(4-carboxybenzyl)-2-oxo-1,2,3,4-tetrahydroquinolin-5-ylmethyl]thiazolidine-2,4-dione

35 ml of an aqueous 1 N-lithium hydroxide solution was added to a mixed ethanol (200 ml) and THF (200 ml) solution of 4.0 g of 5-[8-methoxy-1-(4-methoxycarbonylbenzyl)-2-oxo-1,2,3,4-tetrahydroquinolin-5-ylmethyl]thiazolidine-2,4-dione, followed by stirring at room temperature overnight. The solvent was distilled off under reduced pressure, hydrochloric acid was added to the residue, and the insoluble matter thus formed was collected by filtration. The collected insoluble matter was purified by silica gel column chromatography (n-hexane:ethyl acetate=1:1 → 1:3), and recrystallized from ethyl acetate, giving 3.75 g (97% yield) of 5-[8-methoxy-1-(4-carboxybenzyl)-2-oxo-1,2,3,4-tetrahydroquinolin-5-ylmethyl]thiazolidine-2,4-dione as a white powder.

^{1}H-NMR(DMSO-d_6) dppm:

2.42-2.61 (2H, m), 2.70-2.94 (2H, m), 3.01-3.15 (1H, m), 3.34-3.48 (1H, m), 3.56 (3H, s), 4.78 (1H, dd, J=4.4, 9.8Hz), 5.17 (2H, brs), 6.81 (1H, d, J=8.6Hz), 6.90 (1H, d, J=8.6Hz), 7.17 (2H, d, J=8.2Hz), 7.77 (2H, d, J=8.2Hz), 12.06 (1H, brs), 12.76 (1H, brs)

Example 27

Synthesis of 5-{1-[4-(4-isopropylphenylamino carbonyl)benzyl]-8-methoxy-2-oxo-1,2,3,4-tetrahydroquinolin-5-ylmethyl}thiazolidine-2,4-dione

0.34 g of triethylamine and 0.28 g of diethyl phosphorocyanidate (DEPC) were added with ice cooling to a DMF solution (10 ml) of 0.5 g of 5-[8-methoxy-1-(4-carboxybenzyl)-2-oxo-1,2,3,4-tetrahydroquinolin-5-ylmethyl]thiazolidine-2,4-dione and 0.23 g of 4-isopropylaniline, followed by stirring for 0.5 hours. Water was added to the reaction liquid and the mixture was extracted with ethyl acetate. The organic layer was washed twice with water and once with saturated sodium chloride solution, and dried over anhydrous sodium sulfate. The solvent was distilled off under a reduced pressure, the residue was purified by silica gel column chromatography (dichloromethane:methanol=100:1 → 20:1), and recrystallized from a mixed solvent of ethyl acetate and n-hexane, giving 0.57 g (64% yield) of 5-{1-[4-(4-isopropylphenylaminocarbonyl)benzyl]-8-methoxy-2-oxo-1,2,3,4-tetrahydroquinolin-5-ylmethyl}thiazolidine-2,4-dione as a white powder.

Melting point: 243°C to 244°C.

Using appropriate starting materials, the same procedure as in Example 27 was conducted, giving compounds of the following Examples 28 and 29.

Example 28

5-{8-Methoxy-1-[4-(piperidine-1-carbonyl)benzyl]-2-oxo-1,2,3,4-tetrahydroquinolin-5-ylmethyl}thiazolidine-2,4-dione

^{1}H-NMR(DMSO-d_6) dppm:

1.25-1.80 (6H, m), 2.39-2.62 (2H, m), 2.72-2.95 (2H, m), 2.95- 3.72 (9H, m), 4.77 (1H, dd, J=4.3, 9.6Hz), 5.16 (2H, s), 6.81 (1H, d, J=8.6Hz), 6.90 (1H, d, J=8.6Hz), 7.09 (2H, d, J=8.0Hz), 7.18 (2H, d, J=8.0Hz), 12.05 (1H, brs)

Example 29

5-[1-(4-Cyclohexylaminocarbonylbenzyl)-8-methoxy-2-oxo-1,2,3,4-tetrahydroquinolin-5-ylmethyl]thiazolidine-2,4-dione

^{1}H-NMR(DMSO-d_6) dppm:

0.95-1.85 (10H, m), 2.39-2.60 (2H, m), 2.70-2.94 (2H, m), 3.00-3.19 (1H, m), 3.23-3.50 (1H, m), 3.63 (3H, s), 3.80-3.99 (1H, m), 4.64-4.88 (1H, m), 5.19 (2H, s), 6.80 (1H, d, J=8.6Hz), 6.89 (1H, d, J=8.6Hz), 7.11 (2H, d, J=8.0Hz), 7.65 (2H, d, J=8.0Hz), 8.03 (1H, d, J=7.8Hz), 12.06 (1H, brs)

Example 30

Synthesis of 5-(1-benzyl-8-hydroxy-2-oxo-1,2,3,4-tetrahydroquinolin-5-ylmethylidene)thiazolidine-2,4-dione

2.0 g of 1-benzyl-8-hydroxy-2-oxo-1,2,3,4-tetrahydroquinoline-5-carboxaldehyde and 0.874 g of 2,4-thiazolidinedione were suspended in 20 ml of toluene. Ten drops of piperidine and ten drops of acetic acid were added, followed by heating and refluxing for 8 hours. The resultant was allowed to cool to precipitate a solid, and the precipitated solid was collected by filtration and dried, giving 2.7 g (92% yield) of 5-(1-benzyl-8-hydroxy-2-oxo-1,2,3,4-tetrahydroquinolin-5-ylmethylidene)thiazolidine-2,4-dione as a yellow powder.

^{1}H-NMR(DMSO-d_6) dppm:

2.41-2.60 (2H, m), 2.75-2.98 (2H, m), 5.31 (2H, s), 6.84 (1H,

d, J=8.6Hz), 7.00-7.30 (6H, m), 7.81 (1H, s), 10.72 (1H, s), 12.48 (1H, brs)

Example 31

Synthesis of 5-(1-benzyl-8-hydroxy-2-oxo-1,2,3,4-tetrahydroquinolin-5-ylmethyl)thiazolidine-2,4-dione

2.2 g of 10% palladium carbon was added to a DMF solution (20ml) of 2.2 g of 5-(1-benzyl-8-hydroxy-2-oxo-1,2,3,4-tetrahydroquinolin-5-ylmethylidene)thiazolidine-2,4-dione, and the mixture was subjected to catalytic reduction at room temperature for 2 hours. The catalyst was removed by filtration, and the filtrate was concentrated. The residue was dissolved in ethyl acetate, washed with water and saturated sodium chloride solution, and concentrated. The residue was purified by silica gel column chromatography (dichloromethane:methanol=50:1). The purified product was recrystallized from a dichloromethane-ether mixed solvent, giving 1.9 g (88% yield) of 5-(1-benzyl-8-hydroxy-2-oxo-1,2,3,4-tetrahydroquinolin-5-ylmethyl)thiazolidine-2,4-dione as a white powder.

Melting point: 213.2°C to 213.7°C

Example 32

Synthesis of 5-(1-benzyl-8-butoxy-2-oxo-1,2,3,4-tetrahydroquinolin-5-ylmethyl)thiazolidine-2,4-dione

55.5 mg of potassium *tert*-butoxide was added to a DMSO solution (1 ml) of 90 mg of 5-(1-benzyl-8-hydroxy-2-oxo-1,2,3,4-tetrahydroquinolin-5-ylmethyl)thiazolidine-2,4-dione, followed by stirring at room temperature for 1 hour. 29.8 µl of 4-iodobutane was added thereto, followed by stirring at room temperature for 2 hours. Water was added to the reaction liquid, potassium hydrogensulfate was added to the mixture, and the mixture was extracted with ethyl acetate. After washing with water, the extract was dried over anhydrous magnesium sulfate, and concentrated. The residue

was purified by preparative silica gel thin layer chromatography (dichloromethane:methanol=20:1), giving 42 mg (41% yield) of 5-(1-benzyl-8-butoxy-2-oxo-1,2,3,4-tetrahydroquinolin-5-ylmethyl)thiazolidine-2,4-dione as a colorless amorphous solid.

^{1}H-NMR($CDCl_3$) dppm:

0.93 (3H, t, J=7.3Hz), 1.35-1.50 (2H, m), 1.57-1.73 (2H, m), 2.52-2.67 (2H, m), 2.67-2.95 (2H, m), 3.05 (1H, dd, J=10.1Hz, J=14.0Hz), 3.51 (1H, dd, J=4.0Hz, J=14.0Hz), 3.89 (2H, t, J=6.6Hz), 4.39 (1H, dd, J=4.0Hz, J=10.1Hz), 5.32 (2H, s), 6.71 (1H, d, J=8.6Hz), 6.87 (1H, d, J=8.6Hz), 7.02-7.25 (5H, m), 9.15 (1H, brs)

Example 33

Synthesis of 5-(1-benzyl-8-benzyloxy-2-oxo-1,2,3,4-tetrahydroquinolin-5-ylmethyl)thiazolidine-2,4-dione

55.5 mg of potassium *tert*-butoxide was added to a DMSO solution (1 ml) of 90 mg of 5-(1-benzyl-8-hydroxy-2-oxo-1,2,3,4-tetrahydroquinolin-5-ylmethyl)thiazolidine-2,4-dione, followed by stirring at room temperature for 1 hour. 30 µl of benzyl bromide was added thereto, followed by stirring at room temperature for 1 hour. Water was added to the reaction liquid, potassium hydrogensulfate was added to the mixture, and the mixture was extracted with ethyl acetate. The extract was washed with water, dried over anhydrous magnesium sulfate, and concentrated. The residue was purified by preparative silica gel thin layer chromatography (dichloromethane:methanol=20:1), giving 84.5 mg (76% yield) of 5-(1-benzyl-8-benzyloxy-2-oxo-1,2,3,4-tetrahydroquinolin-5-ylmethyl)thiazolidine-2,4-dione as a colorless amorphous solid.

^{1}H-NMR($CDCl_3$) dppm:

2.49-2.65 (2H, m), 2.65-2.94 (2H, m), 3.07 (1H, dd, J=10.0Hz, J=14.5Hz), 3.51 (1H, dd, J=4.1Hz, J=14.5Hz), 4.39 (1H, dd, J=4.1Hz, J=10.0Hz), 4.97 (2H, s), 5.32 (2H, s), 6.76 (1H, d,

J=8.6Hz), 6.86 (1H, d, J=8.6Hz), 6.93-7.02 (2H, m), 7.03-7.19 (3H, m), 7.29- 7.45 (5H, m), 9.07 (1H, brs)

Example 34

Synthesis of 5-(1-carboxymethyl-8-methoxy-2-oxo-1,2,3,4-tetrahydroquinolin-5-ylmethyl)thiazolidine-2,4-dione

4.16 g of 1-tert-butoxycarbonylmethyl-8-methoxy-2-oxo-1,2,3,4-tetrahydroquinolin-5-carboxaldehyde and 1.66 g of 2,4-thiazolidinedione (1.00 eq.) were suspended in 40 ml of toluene, and two drops of acetic acid and two drops of piperidine were added, followed by heating and refluxing for 13 hours using a Dean Stark trap. After cooling, crystals were separated by filtration and washed with toluene. The crystals obtained were suspended in 3.15 g of silica gel, 2.09 g of dihydropyridine, and 60 ml of toluene, followed by heating and refluxing overnight. 3.15 g of silica gel was added, the solvent was distilled off under reduced pressure, and the residue was purified by silica gel column chromatography (n-hexane:ethyl acetate=2:1), and recrystallized from ethyl acetate-hexane, giving 2.13 g (38% yield) of 5-(1-carboxymethyl-8-methoxy-2-oxo-1,2,3,4-tetrahydroquinolin-5-ylmethyl)thiazolidine-2,4-dione as a white powder.

Melting point: 251°C to 255°C

Example 35

Synthesis of 5-{1-[N-(3-trifluoromethyl phenyl)amino]carbonylmethyl-8-methoxy-2-oxo-1,2,3,4-tetrahydroquinolin-5-ylmethyl}thiazolidine-2,4-dione potassium salt

500 mg of 5-(1-carboxymethyl-8-methoxy-2-oxo-1,2,3,4-tetrahydroquinolin-5-ylmethyl)thiazolidine-2,4-dione was dissolved in 5 ml of DMF. 0.35 ml of 3-trifluoromethyl aniline, 0.32 g of 1-(3-dimethylaminopropyl)-3-ethylcarbodiimide hydrochloride(WSC), and 0.25 g of 1-

hydroxybenzotriazole (HOBT) were added to the solution, followed by stirring at room temperature overnight. Water was added to the reaction liquid, and the solid thus obtained was separated by filtration. The solid was dissolved in methylene chloride, washed with sodium chloride solution, and dried over sodium sulfate. After filtration, the filtrate was concentrated under reduced pressure. The residue was purified by silica gel column chromatography (methylene chloride:methanol=50:1), giving 412 mg of 5-{1-[N-(3-trifluoromethylphenyl)amino]carbonylmethyl-8-methoxy-2-oxo-1,2,3,4-tetrahydroquinolin-5-ylmethyl}thiazolidine-2,4-dione.

The 5-{1-[N-(3-trifluoromethyl phenyl)amino]carbonylmethyl-8-methoxy-2-oxo-1,2,3,4-tetrahydroquinolin-5-ylmethyl}thiazolidine-2,4-dione thus obtained was dissolved in 4 ml of THF. 84.5 mg of potassium *t*-butoxide was added to dissolve the solid. Diethyl ether was added, and trituration was carried out. The crystals produced were separated by filtration and dried, giving 340 mg (49% yield) of 5-{1-[N-(3-trifluoromethyl phenyl)amino]carbonylmethyl-8-methoxy-2-oxo-1,2,3,4-tetrahydroquinolin-5-ylmethyl}thiazolidine-2,4-dione•potassium salt as a brown powder.
Melting point: 135°C to 139.5°C.

Example 36

Synthesis of 5-(8-methoxy-1-piperidin-4-ylmethyl-2-oxo-1,2,3,4-tetrahydroquinolin-5-ylmethyl)thiazolidine-2,4-dione

1.7 g of 5-[8-methoxy-1-(1-*tert*-butoxycarbonyl piperidin-4-ylmethyl)-2-oxo-1,2,3,4-tetrahydroquinolin-5-ylmethyl]thiazolidine-2,4-dione was added to 50 ml of a 4 N-hydrogen chloride ethyl acetate solution, followed by stirring at room temperature for 6 hours. The resultant was concentrated under reduced pressure, and an aqueous sodium hydrogencarbonate solution was added to the residue. The

insoluble matter thus formed was collected by filtration and dried, giving 1.5 g (yield: quantitative) of 5-(8-methoxy-1-piperidin-4-ylmethyl-2-oxo-1,2,3,4-tetrahydroquinolin-5-ylmethyl)thiazolidine-2,4-dione as a white powder.

^{1}H-NMR(DMSO-d_6) dppm:

1.05-1.3(2H, m), 1.4-1.7(3H, m), 2.3-2.9(6H, m), 3.0-3.25(3H, m), 3.82(3H, s), 4.00(2H, d, J=6.8Hz), 4.63(1H, dd, J=8.7Hz, J=4.2Hz), 6.9-7.05 (2H, m)

Example 37

Synthesis of 5-(1-{2-[1-(4-methylbenzoyl)piperidin-4-yl]ethyl}-2-oxo-1,2,3,4-tetrahydroquinolin-5-ylmethyl)thiazolidine-2,4-dione

2 ml of DMF was added to 100 mg of 5-{1-[2-(1-piperidin-4-yl)ethyl]-2-oxo-1,2,3,4-tetrahydroquinolin-5-ylmethyl}thiazolidine-2,4-dione, 42.2 mg of *p*-toluic acid, 59.4 mg of 1-(3-dimethylaminopropyl)-3-ethylcarbodiimide hydrochloride (WSC), and 43.5 mg of 1-hydroxybenzotriazole (HOBt), followed by stirring at room temperature for 2.5 hours. Water was added, the mixture was stirred for a while, and the solid thus produced was collected by filtration. The collected solid was dissolved in methylene chloride, and purified by silica gel chromatography (methylene chloride:methanol=20:1), giving 68.4 mg (97% yield) of the target compound as a white solid.

Melting point: 60°C to 65°C.

Example 38

Synthesis of 5-[1-(5-benzyl-6-oxo-5,6-dihydrophenanthridin-2-yl)methylidene]thiazolidine-2,4-dione

592 mg of 5-benzyl-6-oxo-5,6-dihydrophenanthridine-2-carboxaldehyde and 221 mg of 2,4-thiazolidinedione were suspended in 10 ml of toluene. Two drops of acetic acid and two drops of piperidine were added to the suspension, followed by heating and refluxing overnight. The reaction

liquid was cooled, and the solid thus obtained was collected by filtration. The collected solid was washed with toluene-diethyl ether, and dried, giving 620 mg (80% yield) of 5-[1-(5-benzyl-6-oxo-5,6-dihydrophenanthridin-2-yl)methylidene]thiazolidine-2,4-dione as a yellow solid.
^{1}H-NMR(DMSO-d_6) dppm:
5.67 (2H, s), 7.0-8.0 (10H, m), 8.45 (1H, dd, J=8.0Hz, 1.3Hz), 8.60 (1H, d, J=8.0Hz), 8.80 (1H, d, J=1.8Hz), 12.6 (1H, brs)

Example 39

Synthesis of 5-[1-(5-benzyl-6-oxo-5,6-dihydrophenanthridin-2-yl)methyl]thiazolidine-2,4-dione

620 mg of 5-[1-(5-benzyl-6-oxo-5,6-dihydrophenanthridin-2-yl)methylidene]thiazolidine-2,4-dione was dissolved in 2.31 ml of THF. 2.31 ml of pyridine and 2.31 ml of a THF solution of 2 M lithium borohydride were added to the solution, followed by heating and refluxing for 4 hours. The reaction liquid was cooled, acidified with diluted hydrochloric acid, and extracted with dichloromethane. The organic layer was washed with water, then with saturated sodium chloride solution, and dried over sodium sulfate. After filtration, the solvent was distilled off under reduced pressure, the residue was crystallized using dichloromethane, and the solid thus obtained was separated by filtration. The solid separated by filtration was air-dried, giving 232 mg (36% yield) of 5-[1-(5-benzyl-6-oxo-5,6-dihydrophenanthridin-2-yl)methyl]thiazolidine-2,4-dione as white crystals.
^{1}H-NMR(DMSO-d_6) dppm:
3.1-3.7 (2H, m), 5.04 (1H, dd, J=13.8Hz, J=4.8Hz), 5.76 (2H, s), 7.1-7.45 (5H, m), 7.6-8.0 (2H, m), 8.3-8.6 (3H, m), 12.0 (1H, brs)

Example 40

Synthesis of 5-{8-methoxy-1-[1-(2-methylbenzyl)piperidin-4-yl]methyl-2-oxo-1,2,3,4-

tetrahydroquinolin-5-ylmethyl}thiazolidine-2,4-dione

To 5-(8-methoxy-1-piperidin-4-ylmethyl-2-oxo-1,2,3,4-tetrahydroquinolin-5-ylmethyl)thiazolidine-2,4-dione (20 μmol, 1.0 eq.) was added a DMF (200 μl) solution of 2-methylbenzaldehyde (24 μmol, 1.2 eq) and acetic acid (10 μl). Si-sodium cyanoborohydride was added further thereto. The solution was shaken for several minutes, diisopropylethylamine (30 μl) was added, and a reaction was carried out at room temperature overnight. The resin was removed by filtration and washed with dichloromethane. The solvent was distilled off from the filtrate in a nitrogen gas stream, and the residue was purified by HPLC (UV-trigger, column : CAPCELL PAK C18, UG 120 S-5, 20 mm × 50 mm, 0.05% trifluoroacetic acid-H_2O, 0.05% trifluoroacetic acid-CH_3CN). The structure was confirmed by LC-MS, and freeze-drying was conducted, giving 5-{8-methoxy-1-[1-(2-methylbenzyl)piperidin-4-yl]methyl-2-oxo-1,2,3,4-tetrahydroquinolin-5-ylmethyl}thiazolidine-2,4-dione in 50.5% yield.

MS: 508 (M^{+1})

Example 41

Synthesis of 5-{8-methoxy-1-[1-(tetrahydropyran-4-yl)piperidin-4-yl]methyl-2-oxo-1,2,3,4-tetrahydroquinolin-5-ylmethyl}thiazolidine-2,4-dione

To 5-(8-methoxy-1-piperidin-4-ylmethyl-2-oxo-1,2,3,4-tetrahydroquinolin-5-ylmethyl)thiazolidine-2,4-dione (20 μmol, 1.0 eq.) was added a DMF (200 μl) solution of tetrahydropyran-4-one (24 μmol, 1.2 eq.) and acetic acid (10 μl). MP-sodium triacetoxy borohydride was added further. After this solution was shaken for several minutes, DIEA (30 μl) was added and a reaction was carried out at 60°C overnight. The resin was removed by filtration and washed with methylene chloride. The solvent was distilled off with nitrogen gas, and the residue was purified by HPLC (UV-

trigger, column:CAPCELL PAK C18, UG 120 S-5, 20 mm × 50 mm, 0.05% trofluoroacetic acid-H_2O, 0.05% trofluoroacetic acid-CH_3CN). The structure was confirmed by LC-MS, and freeze-drying was conducted, giving 5-{8-methoxy-1-[1-(tetrahydropyran-4-yl)piperidin-4-yl]methyl-2-oxo-1,2,3,4-tetrahydroquinolin-5-ylmethyl}thiazolidine-2,4-dione in 30% yield.

MS: 488 (M^{+1})

Example 42

Synthesis of 5-[1-(4-methanesulfonylaminobenzyl)-8-methoxy-2-oxo-1,2,3,4-tetrahydroquinolin-5-ylmethyl]thiazolidine-2,4-dione

To a dichloromethane (20 ml) solution of 1.00 g (0.00243 mM) of 5-[1-(4-aminobenzyl)-8-methoxy-2-oxo-1,2,3,4-tetrahydroquinolin-5-ylmethyl]thiazolidine-2,4-dione were successively added pyridine (2.0 ml) and 0.21 ml (0.0027 mM) of methanesulfonyl chloride under ice cooling with stirring. The mixture was stirred at the same temperature for 30 minutes, and water was added to stop the reaction. The resultant was washed (twice with water and once with saturated sodium chloride solution), dried (magnesium sulfate), and concentrated under reduced pressure. The residue was purified by silica gel column chromatography (dichloromethane:ethyl acetate=1:10 → 1:1), giving 1.1 g (92% yield) of the target compound as a white amorphous solid.

^{1}H-NMR(DMSO-d_6) dppm:

2.39-2.54 (2H, m), 2.72-2.87 (2H, m), 2.88 (3H, s), 3.05 (1H, dd, J=10.0Hz, J=14.4Hz), 3.39 (1H, dd, J=4.0Hz, J=14.4Hz), 3.67 (3H, s), 4.76 (1H, dd, J=4.0Hz, J=10.0Hz), 5.13 (2H, s), 6.80 (1H, d, J=8.6Hz), 6.89 (1H, d, J=8.6Hz), 6.93-7.06 (4H, m), 9.57 (1H, s), 12.05 (1H, s)

Example 43

Synthesis of 3-methoxycarbonylmethyl-5-(8-methoxy-

1-methyl-2-oxo-1,2-dihydroquinolin-5-ylmethyl)thiazolidine-2,4-dione

350 mg of 5-(8-methoxy-1-methyl-2-oxo-1,2-dihydroquinolin-5-ylmethyl)thiazolidine-2,4-dione was dissolved in 5 ml of DMF. 0.156 ml of methyl bromoacetate and 0.25 g of potassium carbonate were added to the solution, followed by stirring at room temperature overnight. Water was added, and the mixture was extracted with methylene chloride. The organic layer was washed with saturated sodium chloride solution, and dried over sodium sulfate. After filtration, the solvent was distilled off under reduced pressure. The residue was purified by silica gel chromatography and recrystallized from methanol-acetone, giving 245 mg (57% yield) of 3-methoxycarbonylmethyl-5-(8-methoxy-1-methyl-2-oxo-1,2-dihydroquinolin-5-ylmethyl)thiazolidine-2,4-dione as white crystals.
Melting point: 182°C to 184°C

Example 44

Synthesis of 1-(biphenyl-4-ylmethyl)-5-(4-oxo-2-thioxothiazolidine-5-ylidenemethyl)-3,4-dihydro-1H-quinolin-2-one

1.50 g of 1-(biphenyl-4-ylmethyl)-2-oxo-1,2,3,4-tetrahydroquinoline-5-carboxaldehyde and 0.761 g of 2-thioxo-1,3-thiazolidin-4-one were suspended in 20 ml of toluene. Two drops of piperidine and two drops of acetic acid were added to the suspension, followed by heating and refluxing for 4 hours. After allowing to cool, the solid thus precipitated was collected by filtration, and dried, giving 2.34 g (91% yield) of 1-(biphenyl-4-ylmethyl)-5-(4-oxo-2-thioxothiazolidine-5-ylidenemethyl)-3,4-dihydro-1H-quinolin-2-one as a yellow powder.
^{1}H-NMR(DMSO-d_6) dppm:
2.76-2.81 (2H, m), 3.04-3.09 (2H, m), 5.23 (2H, m), 7.10-7.47 (8H, m), 7.54 (1H, s), 7.59-7.65 (4H, m), 13.78 (1H, brs)

Using an appropriate starting material, the same procedure as in Example 44 was performed, giving a compound of the following Example 45.

Example 45

1-(4-Bromobenzyl)-5-(4-oxo-2-thioxothiazolidine-5-ylidenemethyl)-3,4-dihydro-1H-quinolin-2-one

^{1}H-NMR(DMSO-d_6) dppm:

2.67-2.80 (2H, m), 2.93-3.09 (2H, m), 5.14 (2H, s), 7.04 (1H, d, J=8.6Hz), 7.10-7.25 (2H, m), 7.32-7.57 (5H, m), 13.77 (1H, brs)

Example 46

Synthesis of 1-(biphenyl-4-ylmethyl)-5-(4-oxo-2-thioxothiazolidin-5-ylmethyl)-3,4-dihydro-1H-quinolin-2-one

To 20 ml of toluene were added 1.4 g of 1-(biphenyl-4-ylmethyl)-5-(4-oxo-2-thioxothiazolidine-5-ylidenemethyl)-3,4-dihydro-1H-quinolin-2-one, 1.01 g of diethyl 1,4-dihydro-2,6-dimethyl-3,5-pyridine dicarboxylate, and 1.4 g of silica gel, followed by heating and refluxing overnight. The solvent was distilled off, and the residue was purified by silica gel column chromatography (n-hexane:ethyl acetate=4:1 → 2:1). The purified product was recrystallized from toluene, giving 0.84 g (60% yield) of 1-(biphenyl-4-ylmethyl)-5-(4-oxo-2-thioxothiazolidin-5-ylmethyl)-3,4-dihydro-1H-quinolin-2-one as a white powder.

Melting point: 186.3°C to 187.1°C

Example 47

Synthesis of 1-(4-bromobenzyl)-5-(4-oxo-2-thioxothiazolidin-5-ylmethyl)-3,4-dihydro-1H-quinolin-2-one

50 mg of 1-(4-bromobenzyl)-5-(4-oxo-2-thioxothiazolidine-5-ylidenemethyl)-3,4-dihydro-1H-quinolin-2-one was suspended in a mixed solvent of 0.15 ml of methanol,

0.1 ml of water, 0.08 ml of an aqueous 1 N-sodium hydroxide solution, and 0.1 ml of THF. 0.03 ml of a DMF (5 ml) solution of 42 mg of cobalt chloride 6-hydrate and 250 mg of dimethylglyoxime was further added to the suspension, and the mixture was heated to 30°C to 40°C. An aqueous solution (0.1 ml) of 15 mg of sodium borohydride was added, followed by stirring for 30 minutes. A saturated aqueous potassium hydrogensulfate solution was added, the mixture was extracted with ethyl acetate, and the extract was washed with water. The extract was dried over anhydrous magnesium sulfate and concentrated. The residue was purified by preparative silica gel thin layer chromatography (ethyl acetate:n-hexane=1:1) to give 44.7 mg (89% yield) of 1-(4-bromobenzyl)-5-(4-oxo-2-thioxothiazolidin-5-ylmethyl)-3,4-dihydro-1H-quinolin-2-one as a colorless amorphous solid, and further recrystallized from ethyl acetate-diethyl ether, giving a white powder.
Melting point: 191.3°C to 192.1°C

Using an appropriate starting material, the same procedure as in Example 47 was conducted, giving a compound of the following Example 48.

Example 48

1-(6-Chloropyridin-3-ylmethyl)-5-(4-oxo-2-thioxothiazolidin-5-ylmethyl)-3,4-dihydro-1H-quinolin-2-one•hydrochloride
Melting point: 70°C to 80°C

Using appropriate starting materials, the same procedure as in Example 6 was conducted, giving compounds of the following Examples 49 to 110.

Using appropriate starting materials, the same procedure as in Example 15 was conducted, giving compounds of the following Examples 111 to 119, 121 to 131, 134 to 138,

140 to 144, 148, 150 to 153, 156 to 159, 161 to 165, 173, 177 to 182, 184 to 188, 859 to 860, 965 to 969, 975 to 976, and 986 to 1001.

Using appropriate starting materials, the same procedure as in Example 21 was conducted, giving compounds of the following Examples 120 and 133.

Using appropriate starting materials, the same procedure as in Example 22 was conducted, giving compounds of the following Examples 189 to 225, and 258 to 291.

Using appropriate starting materials, the same procedure as in Example 23 was conducted, giving compounds of the following Examples 228 to 257, 292 to 309, 656 to 658, 664, 666 to 667, 681 to 686, and 690 to 694.

Using appropriate starting materials, the same procedure as in Example 27 was conducted, giving compounds of the following Examples 176, 310 to 545, and 1034.

Using appropriate starting materials, the same procedure as in Example 32 was conducted, giving compounds of the following Examples 546 to 606.

Using appropriate starting materials, the same procedure as in Example 35 was conducted, giving compounds of the following Examples 607 to 613, 614 to 655, 659 to 663, 665, 668 to 680, and 687 to 689.

Using appropriate starting materials, the same procedure as in Example 38 was conducted, giving compounds of the following Examples 695 to 699, and 921 to 959.

Using appropriate starting materials, the same

procedure as in Example 39 was conducted, giving compounds of the following Examples 139, 145 to 147, 154 to 155, 166 to 172, 174 to 175, 700 to 704, 913 to 920, 960 to 964, 970 to 972, and 977 to 985.

Using appropriate starting materials, the same procedure as in Example 40 was conducted, giving compounds of the following Examples 705 to 759.

Using appropriate starting materials, the same procedure as in Example 42 was conducted, giving compounds of the following Examples 760 to 855.

Using appropriate starting materials, the same procedure as in Example 43 was conducted, giving compounds of the following Examples 857, and 861 to 912.

Using appropriate starting materials, the same procedure as in Example 6 was conducted, giving compounds of Examples 1002 to 1031.

Using appropriate starting materials, the same procedure as in Example 15 was conducted, giving compounds of Examples 1032 to 1033, 1038, 1041 to 1045, 1047, 1050 to 1055, 1057 to 1058, 1069 to 1070, 1076 to 1079, and 1088.

Using appropriate starting materials, the same procedure as in Example 23 was conducted, giving a compound of Example 1059.

Using appropriate starting materials, the same procedure as in Example 35 was conducted, giving compounds of Examples 1115 to 1314.

Using appropriate starting materials, the same

procedure as in Example 36 was conducted, giving compounds of Examples 160 and 1056.

Using appropriate starting materials, the same procedure as in Example 47 was conducted, giving compounds of Examples 974, 1035 to 1037, 1039 to 1040, 1048, 1060 to 1068, 1071 to 1075, 1080 to 1087, and 1089 to 1090.

The same procedure as in Example 1 was conducted, giving compound of Example 856.

Using appropriate starting materials, the same procedure as in Example 1317 was conducted, giving compounds of Examples 1049, and 1091 to 1114.

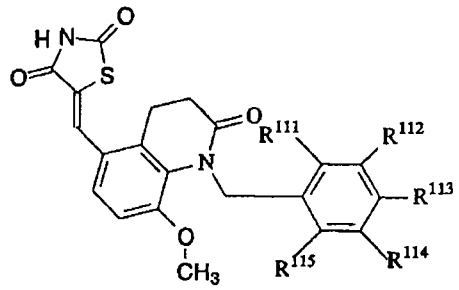
Using appropriate starting materials, the same procedure as in Example 25 was conducted, giving compounds of the following Examples 226, 227, and 1046.

Using appropriate starting materials, the same procedure as in Example 26 was conducted, giving compounds of the following Examples 149, 858, and 973.

Using an appropriate starting material, the same procedure as in Example 31 was conducted, giving a compound of the following Example 183.

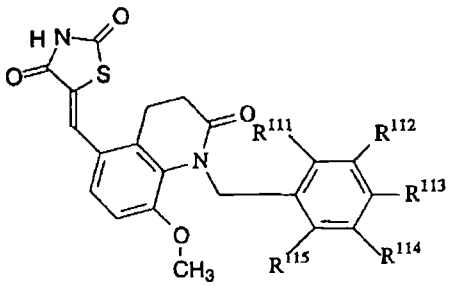
Using an appropriate starting material, the same procedure as in Example 34 was conducted, giving a compound of the following Example 132.

Table 35



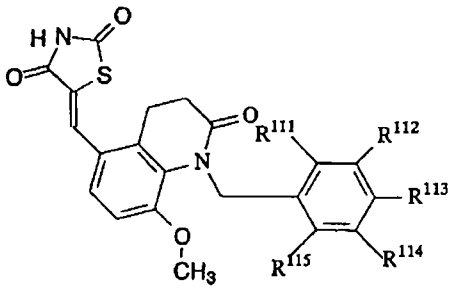
Ex.	R^{111}	R^{112}	R^{113}	R^{114}	R^{115}	^1H NMR (DMSO-d_6) dppm
49	-H	-H	-H	-H	-H	2.55(1H, t, J=6.9Hz), 2.93(2H, t, J=6.9Hz), 3.76(3H, s), 5.21(2H, s), 7.0-7.25(7H, m), 7.83(1H, s), 12.56(1H, br s)
50	-H	-H	$-C_6H_5$	-H	-H	2.57(2H, t, J=6.9Hz), 2.97(2H, t, J=6.9Hz), 3.80(3H, s), 5.25(2H, s), 7.0-7.65(11H, m), 7.85(1H, s), 13.1(1H, br s)
51	-H	-H	$-C(CH_3)_3$	-H	-H	1.20(9H, s), 2.54(2H, t, J=6.9Hz), 2.93(2H, t, J=6.9Hz), 3.81(3H, s), 5.20(2H, s), 7.00(2H, d, J=8.2Hz), 7,08(1H, d, J=8.8Hz), 7.17(1H, d, J=8.8Hz), 7.22(2H, d, J=8.2Hz), 7.84(1H, s), 12.5(1H, br s)
52	-H	-H	-H	$-C_6H_5$	-H	2.58(2H, t, J=6.9Hz), 2.96(2H, t, J=6.9Hz), 3.77(3H, s), 5.77(2H, s), 6.8-7.65(11H, m), 7.86(1H, s), 12.7(1H, br s)
53	-H	-H	-H	-H	$-C_6H_5$	2.50(2H, t, J=6.9Hz), 2.78(2H, t, J=6.9Hz), 3.36(3H, s), 5.20(2H, s), 6.90(1H, d, J=8.6Hz), 7.1-7.6(10H, m), 7.81(1H, s), 12.6(1H, br s)
54	-H	-H	$-NO_2$	-H	-H	2.55-2.69 (2H, m), 2.95-3.10 (2H, m), 3.60 (3H, s), 5.15 (2H, s), 7.05 (1H, d, J = 8.8 Hz), 7.19 (1H, d, J = 8.8 Hz), 7.40 (2H, d, J = 8.8 Hz), 7.85 (1H, s), 8.11 (2H, d, J = 8.8 Hz), 12.56 (1H, brs).
55	-H	-H	$-CO_2CH_3$	-H	-H	2.52-2.66 (2H, m), 2.91-3.05 (2H, m), 3.65 (3H, s), 3.79 (3H, s), 5.17 (2H, s), 7.02 (1H, d, J = 8.7 Hz), 7.16 (1H, d, J = 8.7 Hz), 7.25 (2H, d, J = 8.3 Hz), 7.74-7.90 (3H, m), 12.55 (1H, brs).

Table 36



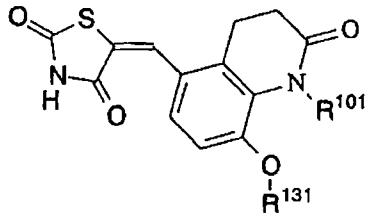
Ex.	R^{111}	R^{112}	R^{113}	R^{114}	R^{115}	^{1}H NMR (DMSO-d_6) dppm
56	-H	-H	$-OCH_3$	-H	-H	2.40-2.62 (2H, m), 2.80-3.00 (2H, m), 3.64 (3H, s), 3.81 (3H, s), 5.16 (2H, s), 6.69-6.82 (2H, m), 6.95-7.10 (3H, m), 7.10-7.13 (1H, m), 7.81 (1H, s), 12.54 (1H, brs).
57	-H	-H	-Cl	-H	-H	7.45-7.65 (2H, m), 2.85-3.04 (2H, m), 3.72 (3H, s), 5.12 (2H, s), 7.03 (1H, d, J = 8.7 Hz), 7.06-7.31 (5H, m), 7.82 (1H, s), 12.53 (1H, brs).
58	-H	-H	-Br	-H	-H	2.42-2.65 (2H, m), 2.85-3.04 (2H, m), 3.72 (3H, s), 5.11 (2H, s), 6.96-7.12 (3H, m), 7.16 (1H, d, J = 8.7 Hz), 7.39 (2H, d, J = 8.0 Hz), 7.83 (1H, s), 12.54 (1H, brs).
59	-H	-H	$-OCH_2C_6H_5$	-H	-H	2.42-2.61 (2H, m), 2.81-2.99 (2H, m), 3.80 (3H, s), 4.97 (2H, s), 5.16 (2H, s), 6.82 (2H, d, J = 8.7 Hz), 6.95-7.10 (3H, m), 7.15 (1H, d, J = 8.8 Hz), 7.22-7.43 (5H, m), 7.81 (1H, s), 12.50 (1H, brs).
60	-H	-H	-F	-H	-H	2.85-3.05 (2H, m), 3.28-3.42 (2H, m), 4.19 (3H, s), 5.60 (2H, s), 7.36-7.52 (3H, m), 7.52-7.70 (3H, m), 8.21 (1H, s), 12.40-13.45 (1H, br).
61	-H	-H	-CN	-H	-H	2.50-2.66 (2H, m), 2.90-3.06 (2H, m), 3.61 (3H, s), 5.12 (2H, s), 7.04 (1H, d, J = 8.8 Hz), 7.18 (1H, d, J = 8.8 Hz), 7.32 (2H, d, J = 8.2 Hz), 7.70 (2H, d, J = 8.2 Hz), 7.85 (1H, s), 12.56 (1H, s).

Table 37



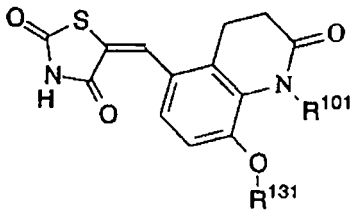
Ex.	R^{111}	R^{112}	R^{113}	R^{114}	R^{115}	^{1}H NMR (DMSO-d_6) dppm
62	-H	-H	$-CH_3$	-H	-H	2.17 (3H, s), 2.42-2.62 (2H, m), 2.76-3.00 (2H, m), 3.79 (3H, s), 5.18 (2H, s), 6.88-7.08 (5H, m), 7.14 (1H, d, J = 8.7 Hz), 7.82 (1H, s), 12.54 (1H, s).
63	-H	-H	$-OC_6H_5$	-H	-H	2.50-2.64 (2H, m), 2.87-3.02 (2H, m), 3.78 (3H, s), 5.18 (2H, s), 6.84 (2H, d, J = 8.6 Hz), 6.90-6.93 (2H, m), 7.03-7.11 (4H, m), 7.18 (1H, d, J = 8.7 Hz), 7.32-7.37 (2H, m), 7.84 (1H, s), 12.59 (1H, brs).

Table 38



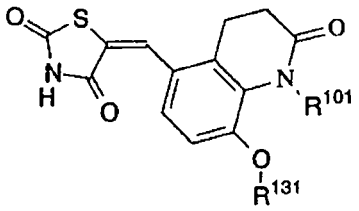
Ex.	R^{101}	R^{131}	^1H NMR (DMSO-d_6) dppm
64	$-CH_3$	$-CH_3$	2.44(2H, t, J=6.9Hz), 2.90(2H, t, J=6.9Hz), 3.21(3H, s), 3.89(3H, s), 7,17(1H, d, J=8.8Hz), 7.23(1H, d, J=8.8Hz), 7.86(1H, s), 12.59(1H, br s)
65	-H	$-CH_3$	2.47(2H, t, J=6.9Hz), 2.99(2H, t, J=6.9Hz), 3.89(3H, s), 7.05-7.2(2H, m), 7.86(1H, s)
66	$-C_4H_9$	$-CH_3$	0.81(3H, t, J=7.3Hz), 1.1-1.2(2H, m), 1.3-1.4(2H, m), 2.43(2H, t, J=6.9Hz), 2.87(2H, t, J=6.9Hz), 3.89(3H, s),3.92(2H, t, J=7.3Hz), 7,17(1H, d, J=8.8Hz), 7.24(1H, d, J=8.8Hz), 7.86(1H, s), 12.57(1H, br s)
67	$-(CH_2)_3C_6H_5$	$-CH_3$	1.65-1.8(2H, m), 2.35-2.5(4H, m), 2.89(2H, t, J=6.9Hz), 3.78(3H, s),3.92(2H, t, J=7.3Hz), 7.0-7.3(7H, m), 7.86(1H, s), 12.25(1H, br s)
68	$-(CH_2)_2C_6H_5$	$-CH_3$	2.35(2H, t, J=6.9Hz), 2.55(2H, t, J=4.5Hz), 2.73(2H, t, J=6.9Hz), 3.96(3H, s), 4.16(2H, t, J=4.5Hz), 6.99(1H, d, J=8.8Hz), 7.1-7.3(5H, m), 7.79(1H, s), 12.59(1H, br s)
69	$-C_2H_5$	$-CH_3$	1.07(3H, t, J=7.0Hz), 2.42(2H, t, J=6.9Hz), 2.87(2H, t, J=6.9Hz), 3.85(2H, q, J=7.0Hz), 3.90(3H, s), 7.18(1H, d, J=8.8Hz), 7.24(1H, d, J=8.8Hz), 7.86(1H, s), 12.59(1H, br s)
70	$-CH_2$-cyclo-C_3H_5	$-CH_3$	0.05-0.10(2H, m), 0.25-0.30(2H, m), 0.75-0.80(1H, m), 2.45(2H, t, J=6.9Hz), 2.90(2H, t, J=6.9Hz), 3.85-3.90(5H, m), 7.17(1H, d, J=8.8Hz), 7.26(1H, d, J=8.8Hz), 7.86(1H, s), 12.59(1H, br s)
71	$-(CH_2)_2OC_6H_5$	$-CH_3$	2.47(2H, t, J=6.9Hz), 2.84(2H, t, J=6.9Hz), 3.86(3H, s), 4.04(2H, t, J=5.9Hz), 4.29(2H, t, J=5.9Hz), 6.77(2H, d, J=8.6Hz), 6.89(1H, t, J=8.6Hz), 7.1-7.3(4H, m), 7.82(1H, s), 13.2(1H, br s)

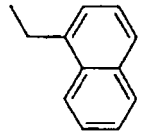
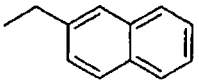
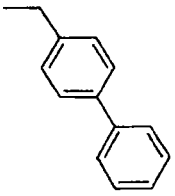
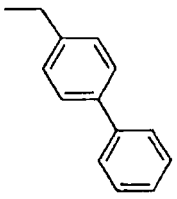
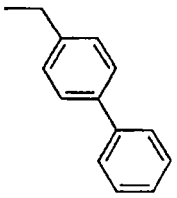
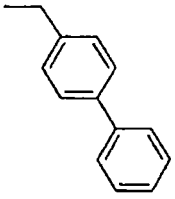
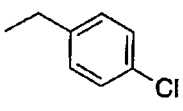
Table 39



Ex.	R^{101}	R^{131}	^1H NMR (DMSO-d_6) dppm
72	$-CH_2$-cyclo-C_6H_{11}	$-CH_3$	0.75-1.57(11H, m), 2.45(2H, t, J=6.9Hz), 2.88(2H, t, J=6.9Hz), 3.89(3H, s), 3.90-3.95(2H, m), 7,17(1H, d, J=8.8Hz), 7.25(1H, d, J=8.8Hz), 7.88(1H, s), 12.59(1H, br s)
73	$-CH_2CH_2OCH_3$	$-CH_3$	2.46(2H, t, J=6.9Hz), 2.86(2H, t, J=6.9Hz), 3.10(3H, s), 3.35(2H, t, J=6.0Hz), 3.90(3H, s), 4.10(2H, t, J=6.0Hz), 7.17(2H, d, J=8.6Hz), 7.24(1H, t, J=8.6Hz), 7.86(1H, s), 12.6(1H, br s)
74	$-CH(C_6H_5)_2$	$-CH_3$	2.47(2H, t, J=6.9Hz), 285(2H, t, J=6.9Hz), 3.40(3H, s), 6.29(2H, s), 7.00(1H, d, J=8.8Hz), 7.15-7.3(11H, m), 7.87(1H, s), 12.55(1H, br s)
75	$-CH_2C_6H_5$	-H	2.41-2.60 (2H, m), 2.75-2.98 (2H, m), 5.31 (2H, s), 6.84 (1H, d, J = 8.6 Hz), 7.00-7.30 (6H, m), 7.81 (1H, s), 10.72 (1H, s), 12.48 (1H, brs).
76	$-CH_2CH_2CN$	$-CH_3$	2.37-2.55 (2H, m), 2.78 (2H, t, J = 6.8 Hz), 2.83-2.98 (2H, m), 3.92 (3H, s), 4.06 (2H, t, J = 6.8 Hz), 7.19 (1H, d, J = 8.8 Hz), 7.27 (1H, d, J = 8.8 Hz), 7.85 (1H, s), 12.57 (1H, s).
77	$-(CH_2)_4C_6H_5$	$-CH_3$	1.35-1.55(4H, m), 2.40-2.70(4H, m), 2.80(2H, t, J=6.9Hz), 3.83(3H, s), 3.85-3.95(2H, m), 7.05-7.3(7H, m), 7.85(1H, s), 12.7(1H, br s)
78	$-(CH_2)_5C_6H_5$	$-CH_3$	1.05-1.15(2H, m), 1.35-1.5(4H, m), 2.35-2.70(4H, m), 2.77(2H, t, J=6.9Hz), 3.87(3H, s), 3.91(2H, t, J=7.0Hz), 7.05-7.3(7H, m), 7.83(1H, s), 12.6(1H, br s)
79	$-(CH_2)_2CO_2C_2H_5$	$-CH_3$	1.13 (3H, t, J = 7.1 Hz), 1.60-1.76 (2H, m), 2.17 (2H, t, J = 7.3 Hz), 2.35-2.47 (2H, m), 2.80-2.92 (2H, m), 3.79-3.84 (5H, m), 3.98 (2H, q, J = 7.1 Hz), 7.16 (1H, d, J = 8.8 Hz), 7.24 (1H, d, J = 8.8 Hz), 7.85 (1H, s), 12.54 (1H, s).

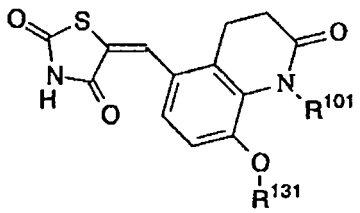
Table 40



Ex.	R^{101}	R^{131}	^1H NMR dppm
80		$-CH_3$	2.60(2H, t, J=6.9Hz), 2.84(2H, t, J=6.9Hz), 3.70(3H, s), 5.64(2H, s), 6.95-8.05(9H, m), 12.5(1H, br s)
81		$-CH_3$	2.60(2H, t, J=6.9Hz), 2.99(2H, t, J=6.9Hz), 3.78(3H, s), 5.37(2H, s), 6.95-7.85(9H, m), 12.6(1H, br s)
82		$-C_4H_9$	0.82(3H, t, J=7.4Hz), 1.2-1.35(2H, m), 1.45-1.6(2H, m), 2.59(2H, t, J=6.9Hz), 2.97(2H, t, J=6.9Hz), 3.99(2H, t, J=6.4Hz), 5.21(2H, s), 7.0-7.65(11H, m), 7.85(1H, s), 12.6(1H, br s)
83		$-CH_2CO_2C(CH_3)_3$	$CDCl_3$: 1.53(9H, s), 2.70(2H, t, J=6.8Hz), 2.98(2H, t, J=6.8Hz), 4.46(2H, s), 5.47(2H, s), 6.69(1H, d, J=8.5Hz), 7.1-7.6(10H, m), 7.96(1H, s), 8.48(1H, br s)
84		-H	2.56(2H, t, J=6.9Hz), 2.93(2H, t, J=6.9Hz), 5.36(2H, s), 6.8-7.65(11H, m), 7.83(1H, s), 10.79(1H, s), 12.6(1H, br s)
85		$-CH_2OCH_3$	$CDCl_3$: 2.6-2.8(m, 2H), 2.9-3.1(m, 2H), 3.40(s, 3H), 3.44(s, 3H), 5.02(s, 2H), 5.13(s, 2H), 5.32(s, 2H), 7.05-7.6(11H, m), 8.06(s, 1H)
86		$-CH_3$	7.45-7.65 (2H, m), 2.85-3.04 (2H, m), 3.72 (3H, s), 5.12 (2H, s), 7.03 (1H, d, J = 8.7 Hz), 7.06-7.31 (5H, m), 7.82 (1H, s), 12.53 (1H, brs).

DMSO-d_6 is used for measuring NMR, unless otherwise specified.

Table 41



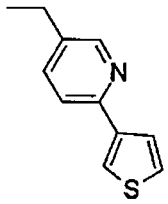
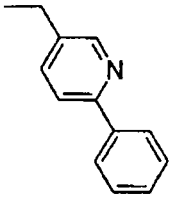
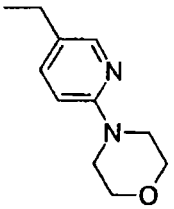
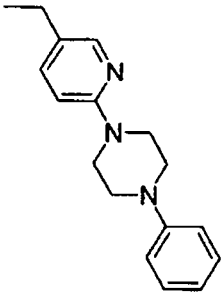
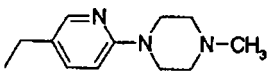
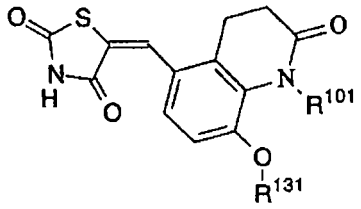
Ex.	R^{101}	R^{131}	^1H NMR (DMSO-d_6) dppm
87		$-CH_3$	2.48-2.51 (2H, m), 2.96-2.99 (2H, m), 3.75 (3H, s), 5.18 (2H, s), 6.88 (1H, d, J=10.3Hz), 7.06 (1H, d, J=10.3Hz), 7.53-7.74 (4H, m), 7.84 (1H, s), 8.09-8.10 (1H, m), 8.35 (1H, d, J=2.0Hz), 12.57 (1H, brs)
88		$-CH_3$	2.48-2.51 (2H, m), 2.98-3.01 (2H, m), 3.75 (3H, s), 5.19 (2H, s), 7.07 (1H, d, J=10.5Hz), 7.20 (1H, d, J=10.5Hz), 7.43-7.66 (4H, m), 7.82-7.84 (2H, m), 8.01-8.04 (2H, m), 8.43-8.45 (1H, m), 12.56 (1H, brs)
89		$-CH_3$	DMSO overlap (2H), 2.80-2.85 (2H, m), 3.40-3.47 (4H, m), 3.61-3.68 (4H, m), 3.84 (3H, s), 5.11 (2H, s), 6.65 (1H, d, J=9.0Hz), 6.98-7.24 (3H, m), 7.77 (1H, s), 7.87 (1H, d, J=2.1Hz), 12.18 (1H, brs)
90		$-CH_3$	2.84-2.89 (2H, m), 3.15-3.19 (4H, m), 3.25-3.30 (2H, m), 3.50-3.54 (4H, m), 3.86 (3H, s), 5.12 (2H, s), 6.69-6.90 (2H, m), 6.96 (2H, d, J=8.0Hz), 7.07 (1H, d, J=8.9Hz), 7.16-7.30 (4H, m), 7.81 (1H, s), 7.88 (1H, d, J=2.2Hz), 12.53 (1H, brs)
91		$-CH_3$	2.35 (3H, s), 2.55-2.59 (4H, m), 2.83-2.89 (2H, m), 3.34-3.44 (6H, m), 3.84 (3H, s), 5.11 (2H, s), 6.68 (1H, d, J=8.6Hz), 7.04 (1H, d, J=8.8Hz), 7.20 (1H, d, J=8.8Hz), 7.26 (1H, dd, J1=2.2Hz, J2=8.8Hz), 7.68 (1H, s), 7.86 (1H, d, J=2.2Hz)

Table 42



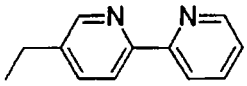
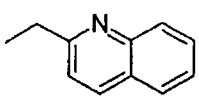
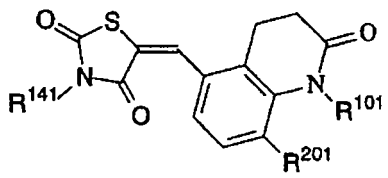
Ex.	R^{101}	R^{131}	^1H NMR (DMSO-d_6) dppm
92		$-CH_3$	2.50-2.58 (2H, m), 2.95-3.03 (2H, m), 3.71 (3H, s), 5.20 (2H,s), 7.04 (1H, d, J=8.7Hz), 7.21 (1H, d, 8.7Hz), 7.39-7.44 (1H, m), 7.61-7.70 (2H, m), 7.87-7.94 (1H, m), 8.25 (1H, d, J=8.2Hz), 8.32 (1H, d, J=8.0Hz), 8.45-8.46 (1H, m), 8.64 (1H, d, J=4.1Hz), NH n.d. (1H, brs)
93		$-CH_3$	2.82-2.87 (2H, m), 3.05-3.10 (2H, m), 3.62 (3H, s), 5.32 (2H,s), 7.06 (1H, d, J=8.8Hz), 7.20 (1H, d, J=8.8Hz), 7.38 (1H, d, J=8.6Hz), 7.50-7.56 (1H, m), 7.67-7.73 (1H, m), 7.87-7.93 (1H, m), 8.24 (1H, d, J=8.5Hz), 12.56 (1H, brs)

Table 43



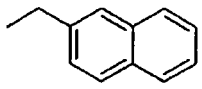
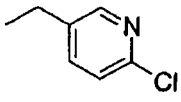
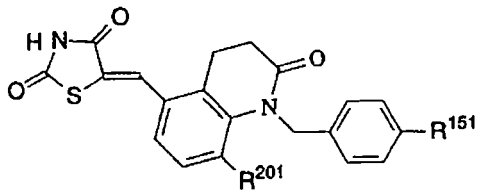
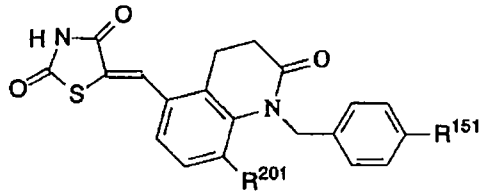
Ex.	R^{101}	R^{141}	R^{201}	^1H NMR (DMSO-d_6) dppm
94		-H	-H	2.70-2.83 (2H, m), 2.98-3.15 (2H, m), 5.32 (2H, s), 6.99-7.10 (2H, m), 7.18-7.30 (1H, m), 7.35-7.54 (3H, m), 7.70 (1H, s), 7.75-7.90 (3H, m), 7.94 (1H, s), 12.63 (1H, s).
95	$-C_6H_5$	-H	-H	2.71-2.76 (2H, m), 3.10-3.33 (2H, m), 6.30 (1H, d, J = 7.7 Hz), 7.10-7.28 (4H, m), 7.40-7.57 (3H, m), 7.98 (1H, s), 12.66 (1H, s).
96		-H	-H	2.69-2.75 (2H, m), 3.01-3.06 (2H, m), 5.21 (2H,s), 7.05-7.14 (2H, m), 7.31 (1H, t, J=8.0Hz), 7.45 (1H, d, J=8.3Hz), 7.69 (1H, dd, J1=2.4Hz, J2=8.3Hz), 7.92 (1H, s), 8.36 (1H, d, J=2.4Hz), 12.60 (1H, brs)

Table 44



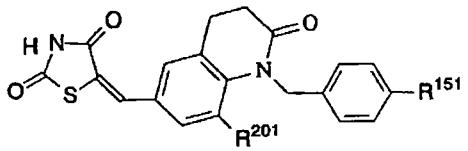
Ex.	R^{151}	R^{201}	^1H NMR (DMSO-d_6) dppm
97	$-C_6H_5$	-H	2.68-2.81 (2H, m), 3.04 (2H, t, J = 6.6 Hz), 5.21 (2H, s), 7.01-7.15 (2H, m), 7.21-7.39 (4H, m), 7.39-7.50 (2H, m), 7.5-7.65 (4H, m), 7.93 (1H, s), 12.62 (1H, s).
98	-Br	-H	2.60-2.80 (2H, m), 2.95-3.10 (2H, m), 5.13 (2H, s), 6.99 (1H, d, J = 8.2 Hz), 7.09 (1H, d, J = 7.7 Hz), 7.11-7.32 (3H, m), 7.49 (2H, d, J = 8.4 Hz), 7.92 (1H, s), 12.64 (1H, s).
99	-Cl	-H	7.63-7.80 (2H, m), 2.92-3.10 (2H, m), 5.16 (2H, s), 7.01 (1H, d, J = 8.1 Hz), 7.10 (1H, d, J = 7.7 Hz), 7.20-7.31 (3H, m), 7.31-7.45 (2H, m), 7.93 (1H, s), 12.65 (1H, brs).
100	$-CH_3$	-H	2.25 (3H, s), 2.49-2.51 (2H, m), 2.68-2.73 (2H, m), 5.12 (2H, s), 7.02 (1H, d, J = 8.2 Hz), 7.07-7.29 (6H, m), 7.93 (1H, s), 12.64 (1H, brs).
101	$-C_6H_5$	$-C_6H_5$	2.62-2.77 (2H, m), 2.89-3.07 (2H, m), 4.36 (2H, brs), 6.85 (2H, d, J = 8.2 Hz), 7.20-7.61 (14H, m), 7.93 (1H, s), 12.66 (1H, brs).
102	$-CO_2CH_3$	-H	2.71-2.77 (2H, m), 3.02-3.08 (2H, m), 3.83 (3H, s), 5.24 (2H,s), 6.96 (1H, d, J=7.9Hz), 7.11 (1H, d, J=7.9Hz), 7.27 (1H, t, J=7.9Hz), 7.38 (2H, d, J=8.3Hz), 7.90 (2H, d, J=8.3Hz), 7.94 (1H, s), 12.64 (1H, brs)
103	$-NO_2$	-H	2.72-2.78 (2H, m), 3.04-3.10 (2H, m), 5.31 (2H,s), 6.98 (1H, d, J=8.0Hz), 7.12 (1H, d, J=8.0Hz), 7.28 (1H, t, J=8.0Hz), 7.51 (2H, d, J=8.7Hz), 7.94 (1H, s), 8.18 (2H, d, J=8.7Hz), 12.66 (1H, brs)

Table 45



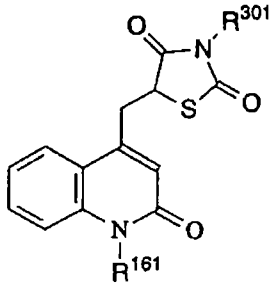
Ex.	R^{151}	R^{201}	1H NMR ($CDCl_3$) dppm
104	$-C_6H_5$	$-CH_3$	2.43 (3H, s), 2.57-2.63 (2H, m), 2.84-2.91 (2H, m), 5.12 (2H, s), 7.06-7.22 (4H, m), 7.22-7.60 (7H, m), 7.98 (1H, s), 8.42 (1H, brs).
105	$-C_6H_5$	-Cl	2.60-2.66 (2H, m), 2.85-2.92 (2H, m), 5.44 (2H, s), 7.11 (1H, d, J = 8.5 Hz), 7.18 (2H, d, J = 8.2 Hz), 7.23-7.48 (6H, m), 7.48-7.59 (2H, m), 7.91 (1H, s), 7.23 (1H, brs).

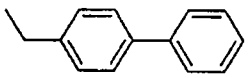
Table 46



Ex.	R^{151}	R^{201}	^{1}H NMR (DMSO-d_6) dppm
106	$-C_6H_5$	-H	2.70-2.84 (2H, m), 2.97-3.10 (2H, m), 5.22 (2H, s), 7.04-7.20 (2H, m), 7.20-7.49 (6H, m), 7.49-7.65 (4H, m), 7.68 (1H, s), 12.53 (1H, s).
107	-Br	-H	2.66-2.81 (2H, m), 2.91-3.09 (2H, m), 5.13 (2H, s), 7.03 (1H, d, J = 8.6 Hz), 7.19 (2H, d, J = 8.4 Hz), 7.36 (1H, dd, J = 2.0, 8.6 Hz), 7.40-7.55 (3H, m), 7.67 (1H, s), 12.54 (1H, brs).
108	$-NO_2$	-H	2.71-2.87 (2H, m), 2.97-3.15 (2H, m), 5.31 (2H, s), 7.02 (1H, d, J = 8.6 Hz), 7.38 (1H, dd, J = 1.9, 8.6 Hz), 7.45-7.60 (3H, m), 7.69 (1H, s), 8.18 (2H, m), 12.55 (1H, brs).
109	$-C_6H_5$	$-OCH_3$	2.55-2.70 (2H, m), 2.85-3.01 (2H, m), 3.78 (3H, s), 5.31 (2H, s), 7.07 (1H, s), 7.12 (1H, s), 7.21 (2H, d, J = 8.2 Hz), 7.25-7.35 (1H, m), 7.35-7.47 (2H, m), 7.54 (2H, d, J = 8.2 Hz), 7.60 (2H, d, J = 7.3 Hz), 7.68 (1H, s), 12.57 (1H, brs).
110	$-C_6H_5$	$-CH_3$	2.36 (3H, s), 2.53-2.68 (2H, m), 2.79-3.04 (2H, m), 5.15 (2H, s), 7.22 (2H, d, J = 8.2 Hz), 7.25-7.36 (3H, m), 7.36-7.49 (2H, m), 7.50-7.70 (5H, m), 12.57 (1H, brs).

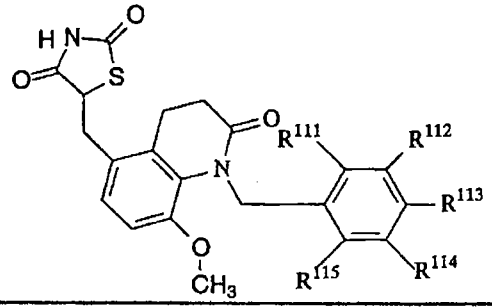
Table 47



Ex.	R^{161}	R^{301}	M.p.(°C)
111	-H	-H	290-291
112	$-CH_3$	-H	246-248
113	$-CH_3$	$-CH_3$	143-145
114		-H	244.7-246.7

5

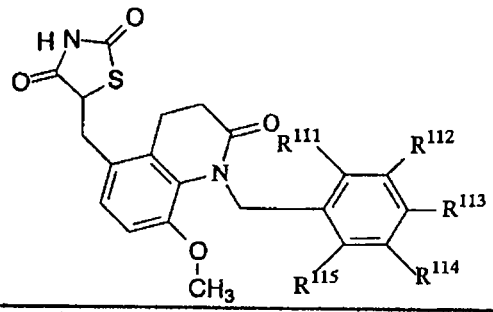
Table 48



Ex.	R^{111}	R^{112}	R^{113}	R^{114}	R^{115}	M.p.(°C)
115	-H	-H	-H	-H	-H	178-180
116	-H	-H	$-C_6H_5$	-H	-H	211-213
117	-H	-H	-H	-H	-H	210-215
118	-H	-H	$-C(CH_3)_3$	-H	-H	215-217
119	-H	-H	$-NO_2$	-H	-H	246.5-246.6
120	-H	-H	$-NH_2$	-H	-H	174.1-174.8
121	-H	-H	$-OCH_3$	-H	-H	177.5-179.0
122	-H	-H	-Cl	-H	-H	190.5-191.8
123	-H	-H	-Br	-H	-H	178.1-179.0
124	-H	-H	-F	-H	-H	177.7-179.2
125	-H	-H	-CN	-H	-H	206.4-208.0
126	-H	-H	$-CH_3$	-H	-H	165.2-167.0
127	-H	-H	$-OCH_2C_6H_5$	-H	-H	106.4-109.1
128	-H	-H	$-OC_6H_5$	-H	-H	213.9-214.7

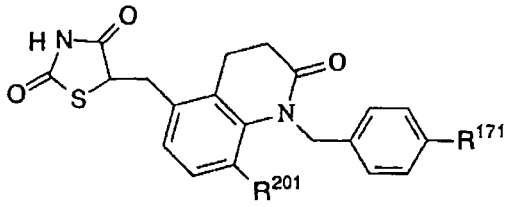
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Table 49



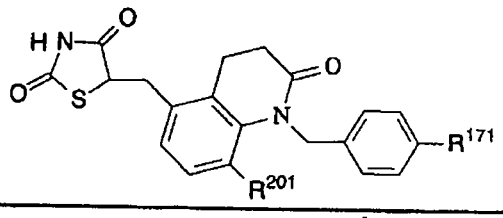
Ex.	R^{111}	R^{112}	R^{113}	R^{114}	R^{115}	^{1}H NMR (DMSO-d_6) dppm
129	-H	-H	-H	-H	$-C_6H_5$	2.39-2.52(m, 2H), 2.63-2.80(m, 2H), 3.06(dd; J=9.9, 14.4Hz, 1H), 3.33(S, 3H), 3.39(dd; J=4.2, 14.4Hz, 1H), 4.76(dd; J=4.2, 9.9Hz, 1H), 5.18(s, 2H), 6.69(d, J=8.6Hz, 1H), 6.86(d, J=8.6Hz, 1H), 7.04-7.47(m, 9H), 12.08(brs, 1H)
130	-H	-H	-H	$-C_6H_5$	-H	2.45-2.57(m, 2H), 2.79-2.90(m, 2H), 3.09(dd; J=10.1, 14.4Hz, 1H), 3.41(dd; J=4.3, 14.4Hz, 1H), 3.68(S, 3H), 4.77(dd; J=4.3, 10.1Hz, 1H), 5.26(s, 2H), 6.84(d, J=8.6Hz, 1H), 6.92(d, J=8.6Hz, 1H), 7.03(d, J=7.6Hz, 1H), 7.25-7.55(m, 8H), 12.09(brs, 1H)
131	-H	-H	$-NHSO_2CH_3$	-H	-H	2.39-2.54 (2H, m), 2.72-2.87 (2H, m), 2.88 (3H, s), 3.05 (1H, dd, J = 10.0, 14.4 Hz), 3.39 (1H, dd, J = 4.0, 14.4 Hz), 3.67 (3H, s), 4.76 (1H, dd, J = 4.0, 10.0 Hz), 5.13 (2H, s), 6.80 (1H, d, J = 8.6 Hz), 6.89 (1H, d, J = 8.6 Hz), 6.93-7.06 (4H, m), 9.57 (1H, s), 12.05 (1H, s).

Table 50



Ex.	R^{171}	R^{201}	M.p.(°C)
132	$-C_6H_5$	$-OCH_2CO_2H$	128-133
133	$-C_6H_5$	-H	198.1-199.2
134	-Br	-H	224.3-225.8
135	-Cl	-H	212.1-212.9
136	$-CH_3$	-H	209.3-210.3
137	$-CO_2CH_3$	-H	247-249
138	$-NO_2$	-H	243-250

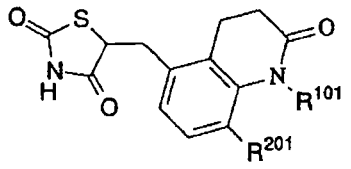
Table 51



Ex.	R^{171}	R^{201}	^{1}H NMR dppm
139	$-C_6H_5$	$-OC_4H_9$	0.82(t, J=7.4Hz, 3H), 1.25-1.33(m, 2H), 1.46-1.55(m, 2H), 2.45-2.56(m, 2H), 2.80-2.91(m, 2H), 3.11(dd; J=9.6, 14.4Hz, 1H), 3.41(dd; J=4.4, 14.4Hz, 1H), 3.84-3.92(m, 2H), 4.80(dd; J=4.4, 9.6Hz, 1H), 5.21(s, 2H), 6.87d, J=8.6Hz, 1H), 6.90(d, J=8.6Hz, 1H), 7.14(d, J=8.1Hz, 2H), 7.27-7.62(m, 7H), 12.08(brs, 1H)
140	$-C_6H_5$	$-CH_3$	2.28 (3H, s), 2.37-2.57 (2H, m), 2.67-2.94 (2H, m), 3.16 (1H, dd, J = 9.3, 14.3 Hz), 3.44 (1H, d, J = 4.4, 14.3 Hz), 4.83 (1H, dd, J = 4.4, 9.3 Hz), 4.95-5.20 (2H, m), 6.87 (1H, d, J = 7.9 Hz), 7.00 (1H, d, J = 7.9 Hz), 7.15 (2H, d, J = 8.1 Hz), 7.25-7.48 (3H, m), 7.51 (2H, d, J = 8.2 Hz), 7.60 (2H, d, J = 7.4 Hz), 12.07 (1H, brs).
141	$-C_6H_5$	-Cl	2.43-2.62 (2H, m), 2.80-2.98 (2H, m), 3.21 (1H, dd, J = 9.3, 14.3 Hz), 3.45 (1H, dd, J = 4.7, 14.3 Hz), 4.84 (1H, dd, J = 4.7, 9.3 Hz), 5.31 (2H, s), 6.97 (1H, d, J = 8.4 Hz), 7.15 (2H, d, J = 8.2 Hz), 7.25 (1H, d, J = 8.4 Hz), 7.27-7.45 (3H, m), 7.50 (2H, d, J = 8.2 Hz), 7.59 (2H, d, J = 7.2. Hz), 12.10(1H, brs).
142	$-C_6H_5$	$-C_6H_5$	2.56-2.75 (2H, m), 2.80-3.00 (2H, m), 3.13-3.30 (1H, m), 3.45-3.60 (1H, m), 4.18-4.50 (2H, m), 4.90 (1H, dd, J = 4.5, 9.4 Hz), 6.80 (2H, d, J = 8.2 Hz), 7.04 (1H, d, J = 8.0 Hz), 7.12 (1H, d, J = 8.0 Hz), 7.21-7.64 (12H, m), 12.12 (1H, brs).
143	$-CO_2H$	-H	2.67-2.72 (2H, m), 2.97-3.02 (2H, m), 3.11-3.60 (2H, m), 4.85 (1H, dd, J1=4.6Hz, J2=10.7Hz), 5.21 (2H,s), 6.79 (1H, d, J=7.8Hz), 6.90 (1H, d, J=7.8Hz), 7.09 (1H, t, J=7.8Hz), 7.32 (2H, d, J=8.2Hz), 7.88 (2H, d, J=8.2Hz), 12.19 (1H, brs), 12.88 (1H, brs)
144	$-C_6H_5$	$-OCH_2CO_2C(CH_3)_3$	$CDCl_3$:1.57(9H, s), 2.55-2.8(2H, m), 2.75-2.95(2H, m), 3.05-3.2(1H, m), 3.5-3.6(1H, m), 4.38(3H, s), 4.35-4.5(1H, m), 5.4-5.55(2H, m), 6.57(1H, d, J=8.6Hz), 6.87(1H, d, J=8.6Hz), 7.15-7.6(9H, m), 7.96(1H, br s)

DMSO-d_6 is used for measuring NMR, unless otherwise specified.

Table 52



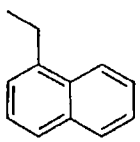
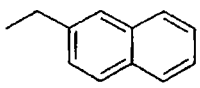
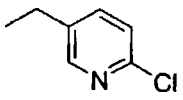
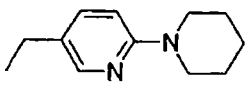
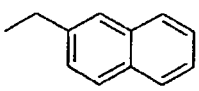
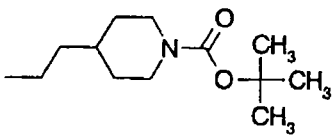
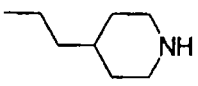
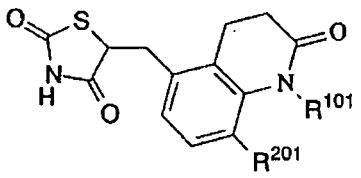
Ex.	R^{101}	R^{201}	M.p.(°C)
145	$-CH_3$	$-OCH_3$	204-208
146	-H	$-OCH_3$	253-256
147	$-C_2H_5$	$-OCH_3$	179-181
148	$-CH_2CH_2CN$	$-OCH_3$	197.9-199.9
149	$-(CH_2)_3CO_2H$	$-OCH_3$	164.7-165.5
150	$-C_6H_5$	-H	225.5-2272
151	$-(CH_2)_3CO_2C_2H_5$	$-OCH_3$	154.7-156.0
152	$-CH_2CH=CH_2$	$-OCH_3$	160.0-161.5
153	$-C_8H_{17}$	$-OCH_3$	102.0-103.0
154		$-OCH_3$	117-121
155		$-OCH_3$	97-99
156		$-OCH_3$	183-185
157		$-OCH_3$	107-114
158		-H	228.1-230.0
159		-H	76-94
160		-H	261.5-263

Table 53



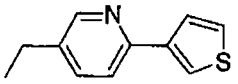
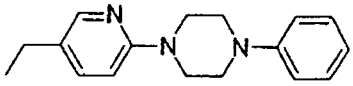
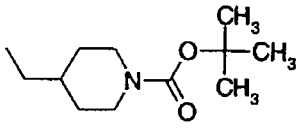
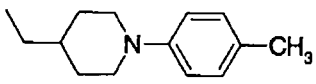
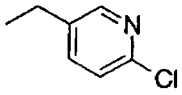
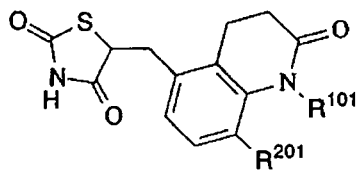
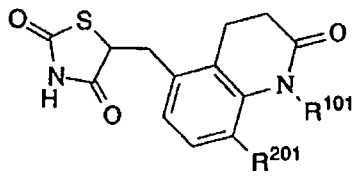
Ex.	R^{101}	R^{201}	M.p.(°C)
161		$-OCH_3$	121-126
162		$-OCH_3$	135-137
163		$-OCH_3$	215(dec.)
164		$-OCH_3$	104-109
165		-H	225-226

Table 54



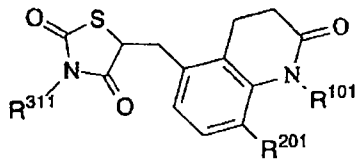
Ex.	R^{101}	R^{201}	^1H NMR (DMSO-d_6) dppm
166	$-(CH_2)_3C_6H_5$	$-OCH_3$	1.62-1.73(m, 2H), 2.32-2.45(m, 4H), 2.75-2.85(m, 2H), 3.10(dd; J=10.1, 14.4Hz, 1H), 3.44(dd; J=4.3, 14.4Hz, 1H), 3.70(S, 3H), 3.85-3.95(m, 2H), 4.81(dd; J=4.3, 10.1Hz, 1H), 6.93(d, J=8.6Hz, 1H), 6.98(d, J=8.6Hz, 1H), 7.04(d, J=7.5Hz, 2H), 7.14(t, J=7.5Hz, 1H), 7.22(t, J=7.5Hz, 2H), 12.10(brs, 1H)
167	$-(CH_2)_2C_6H_5$	$-OCH_3$	2.22-2.31(m, 2H), 2.32-2.55(m, 2H), 2.63-2.75(m, 2H), 3.05(dd; J=10.4, 14.5Hz, 1H), 3.41(dd; J=4.2, 14.5Hz, 1H), 3.87(S, 3H), 4.10-4.30(m, 2H), 4.69(dd; J=4.2, 10.4Hz, 1H), 6.90-7.05(m, 4H), 7.12-7.25(m, 3H), 12.12(brs, 1H)
168	$-C_4H_9$	$-OCH_3$	0.79(t; J=7.2Hz, 3H), 1.13(tt; J=7.2, 7.2Hz, 2H), 1.36(tt; J=7.2, 7.2Hz, 2H), 2.30-2.42(m, 2H), 2.70-2.80(m, 2H), 3.11(dd; J=9.8, 14.5Hz, 1H), 3.42(dd; J=4.4, 14.5Hz, 1H), 3.80(S, 3H), 3.92(t; J=7.2Hz, 2H), 4.80(dd; J=4.4, 9.8Hz, 1H), 6.80(d; J=8.6Hz, 1H), 6.97(d; J=8.6Hz, 1H), 12.09(brs, 1H)
169	$-CH_2$-cyclo-C_3H_5	$-OCH_3$	0-0.05(m, 2H), 0.20-0.26(m, 2H), 0.73-0.84(m, 1H), 2.30-2.42(m, 2H), 2.70-2.85(m, 2H), 3.14(dd; J=9.6, 14.5Hz, 1H), 3.42(dd; J=4.4, 14.5Hz, 1H), 3.81(S, 3H), 3.84-3.90(m, 2H), 4.82(dd; J=4.4, 9.6Hz, 1H), 6.94(d; J=8.6Hz, 1H), 6.98(d; J=8.6Hz, 1H), 12.07(brs, 1H)
170	$-(CH_2)_2OC_6H_5$	$-OCH_3$	2.35-2.47(m, 2H), 2.70-2.83(m, 2H), 3.07(dd; J=10.2, 14.5Hz, 1H), 3.42(dd; J=4.2, 14.5Hz, 1H), 3.79(S, 3H), 4.00-4.07(m, 2H), 4.21-4.30(m, 2H), 4.73(dd; J=4.2, 10.2Hz, 1H), 6.79(d, J=7.7Hz, 2H), 6.88(t, J=7.7Hz, 1H), 6.95(d, J=8.7Hz, 1H), 6.98(d, J=8.7Hz, 1H), 7.21(t, J=7.7Hz, 2H), 12.11(brs, 1H)

Table 55



Ex.	R^{101}	R^{201}	^1H NMR (DMSO-d_6) dppm
171	$-CH_2$-cyclo-C_6H_{11}	$-OCH_3$	0.71-0.80(m, 2H), 0.94-1.07(m, 3H), 1.20-1.27(m, 1H), 1.37-1.45(m, 2H), 1.45-1.59(m, 3H), 2.34-2.44(m, 2H), 2.71-2.82(m, 2H), 3.13(dd; J=9.4, 14.4Hz, 1H), 3.42(dd; J=4.4, 14.4Hz, 1H), 3.80(S, 3H), 3.89-3.99(m, 2H), 4.82(dd; J=4.4, 9.4Hz, 1H), 6.94(d, J=8.6Hz, 1H), 6.97(d, J=8.6Hz, 1H), 12.06(brs, 1H)
172	$-CH_2CH_2OCH_3$	$-OCH_3$	2.35-2.44(m, 2H), 2.71-2.80(m, 2H), 3.08(S, 3H), 3.11(dd; J=9.8, 14.5Hz, 1H), 3.25-3.36(m, 2H), 3.42(dd; J=4.3, 14.5Hz, 1H), 3.80(S, 3H), 4.03-4.12(m, 2H), 4.80(dd; J=4.3, 9.8Hz, 1H), 6.95(d, J=8.6Hz, 1H), 6.98(d, J=8.6Hz, 1H), 12.09(brs, 1H)
173	$-(CH_2)_2CH(CH_3)_2$	$-OCH_3$	0.75-0.85(6H, m), 1.2-1.5(3H, m), 2.3-2.5(2H, m), 2.6-2.9(2H, m), 3.0-3.15(1H, m), 3.35-3.5(1H, m), 3.80(3H, s), 3.94(2H, t, J=7.1Hz), 4.75-4.85(1H, m), 6.9-7.1(2H, m), 12.05(1H, br s)
174	$-(CH_2)_4C_6H_5$	$-OCH_3$	1.38-1.45(m, 4H), 2.33-2.42(m, 2H), 2.44-2.50(m, 2H), 2.70-2.81(m, 2H), 3.10(dd; J=10.0, 14.5Hz, 1H), 3.42(dd; J=4.3, 14.5Hz, 1H), 3.74(S, 3H), 3.88-3.96(m, 2H), 4.80(dd; J=4.3, 10.0Hz, 1H), 6.93(d, J=8.6Hz, 1H), 6.97(d, J=8.6Hz, 1H), 7.10(d, J=7.3Hz, 2H), 7.14(t, J=7.3Hz, 1H), 7.23(t, J=7.3Hz, 2H), 12.10(brs, 1H)
175	$-(CH_2)_5C_6H_5$	$-OCH_3$	1.04-1.15(m, 2H), 1.35-1.50(m, 4H), 2.32-2.41(m, 2H), 2.42-2.53(m, 2H), 2.65-2.73(m, 2H), 3.09(dd; J=10.0, 14.5Hz, 1H), 3.42(dd; J=4.3, 14.5Hz, 1H), 3.78(S, 3H), 3.86-3.96(m, 2H), 4.78(dd; J=4.3, 10.0Hz, 1H), 6.94(d, J=8.6Hz, 1H), 6.97(d, J=8.6Hz, 1H), 7.11(d, J=7.5Hz, 2H), 7.15(t, J=7.5Hz, 1H), 7.24(t, J=7.5Hz, 2H), 12.10(brs, 1H)

Table 56



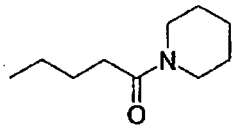
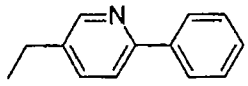
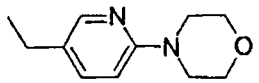
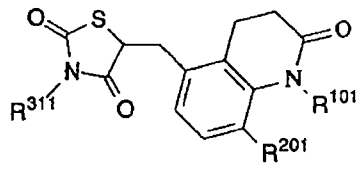
Ex.	R^{101}	R^{311}	R^{201}	^1H NMR (DMSO-d_6) dppm
176		-H	$-OCH_3$	1.25-1.45 (4H, m), 1.45-1.70 (4H, m), 2.09 (2H, t, J = 7.7 Hz), 2.31-2.48 (2H, m), 2.65-2.88 (2H, m), 3.00-3.21 (3H, m), 3.21-3.50 (3H, m), 3.79 (3H, s), 3.85-4.00 (2H, m), 4.78 (1H, dd, J = 4.2, 10.0 Hz), 6.86-8.09 (2H, m), 12.08 (1H, brs).
177		-H	$-OCH_3$	DMSO overlap (2H), 2.82-2.88 (2H, m), 3.06-3.14 (1H, m), 3.37-3.45 (1H, m), 3.66 (3H, s), 4.79 (1H, dd, J1=4.4Hz, J2=9.5Hz), 5.18 (2H, s), 6.85 (1H, d, J=8.6Hz), 6.91 (1H, d, J=8.6Hz), 7.39-7.66 (4H, m), 7.78-7.81 (2H, m), 8.43 (1H, d, J=2.0Hz), 12.56 (1H, brs)
178		-H	$-OCH_3$	DMSO overlap (2H), 2.67-2.73 (2H, m), 2.98-3.18 (2H, m), DMSO overlap (4H, m), 3.32-3.64 (4H, m), 3.75 (3H, s), 4.68-4.72 (1H, m), 5.09 (2H, s), 6.63 (1H, d, J=8.9Hz), 6.82-6.98 (2H, m), 7.18-7.22 (1H, m), 7.85 (1H, d, J=2.1Hz), 12.02 (1H, brs)

Table 57



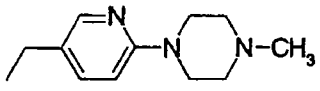
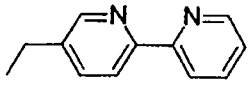
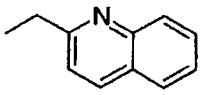
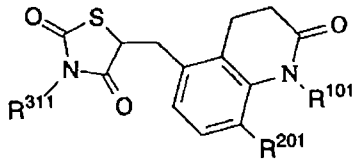
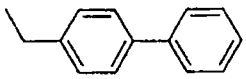
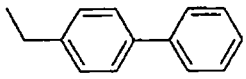
Ex.	R^{101}	R^{311}	R^{201}	^1H NMR (DMSO-d_6) dppm
179		-H	$-OCH_3$	2.20 (3H, s), 2.34-2.38 (4H, m), DMSO overlap (2H, 4H), 2.71-2.76 (2H, m), 2.97-3.05 (2H, m), 3.75 (3H, s), 4.65-4.70 (1H, m), 5.08 (2H, s), 6.62 (1H, d, J=8.7Hz), 6.83 (1H, d, J=8.6Hz), 6.90 (1H, d, J=8.6Hz), 7.17 (1H, dd, J1=2.4Hz, J2=8.7Hz), 7.83 (1H, d, J=2.4Hz), NH n. d. (1H)
180		-H	$-OCH_3$	2.55-2.57 (2H, m), 2.87-2.89 (2H, m), 3.07-3.14 (1H, m), 3.39-3.46 (1H, m), 3.64 (3H, s), 4.76-4.82 (1H, m), 5.19 (2H,s), 6.85 (1H, d, J=8.5Hz), 6.93 (1H, d, J=8.5Hz), 7.38-7.43 (1H, m), 7.61 (1H, dd, J1=2Hz, J2=8.2Hz), 7.90 (1H, ddd, J1=1.5Hz, J2=7.8Hz, J3=7.9Hz), 8.24 (1H, d, J=8.2Hz), 8.32 (1H, d, J=7.9Hz), 8.45 (1H, d, J=1.5Hz), 8.64 (1H, d, J=4.6Hz), 12.06 (1H, brs)
181		-H	$-OCH_3$	2.55-2.60 (2H, m), 3.02-3.07 (2H, m), 3.11-3.16 (1H, m), 3.41-3.46 (1H, m), 3.52 (3H, s), 4.80-4.86 (1H, m), 5.30 (2H,s), 6.84 (1H, d, J=8.5Hz), 6.93 (1H, d, J=8.5Hz), 7.33 (1H, d, J=8.6Hz), 7.50-7.56 (1H, m), 7.66-7.72 (1H, m), 7.88-7.91 (1H, m), 8.21 (1H, d, J=8.6Hz), 12.12 (1H, brs)

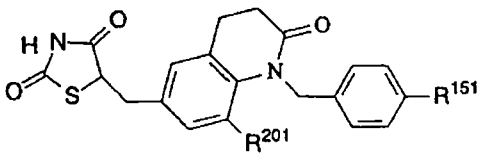
Table 58



Ex.	R^{101}	R^{311}	R^{201}	^1H NMR dppm
182		$-CH_2OCH_3$	$-OCH_2OCH_3$	$CDCl_3$:2.55-2.75(2H, m), 2.75-3.0(2H, m), 3.05-3.15(1H, m), 3.28(3H, s), 3.38(3H, s), 3.55-3.65(2H, m), 4.35-4.45(1H, m), 4.9-5.1(4H, m), 5.25-5.4(2H, m), 6.88(1H, d, J=8.6Hz), 6.97(1H, d, J=8.6Hz), 7.1-7.6(11H, m)
183		$-CH_2OCH_3$	-OH	2.45-2.55(2H, m), 2.75-2.9(2H, m), 3.05-3.2(4H, m), 3.35-3.45(1H, m), 4.7-5.0(3H, m), 5.34(2H, s), 6.65(1H, d, J=8.4Hz), 6.76(1H, d, J=8.4Hz), 7.1-7.7(9H, m), 9.94(1H, br s)

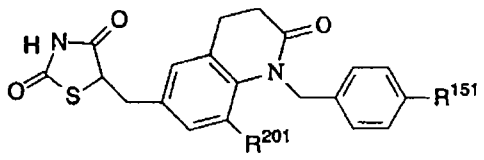
DMSO-d_6 is used for measuring NMR, unless otherwise specified.

Table 59



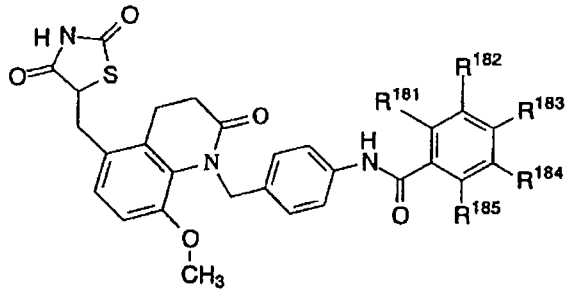
Ex.	R^{151}	R^{201}	M.p.(°C)
184	-Br	-H	193.4-195.0
185	$-NO_2$	-H	215.5-216.1

Table 60



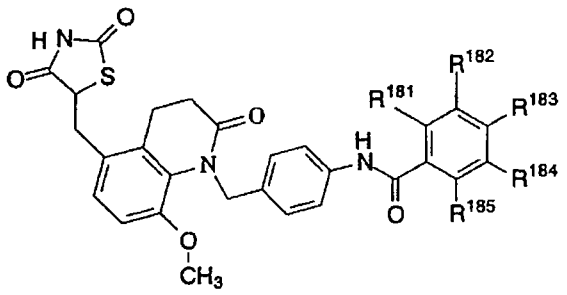
Ex.	R^{151}	R^{201}	^1H NMR (DMSO-d_6) dppm
186	$-C_6H_5$	-H	2.62-2.76 (2H, m), 2.85-3.07 (3H, m), 3.20-3.40 (1H, m), 4.85 (1H, dd, J = 4.2, 9.7 Hz), 5.16 (2H, s), 6.89 (1H, d, J = 8.3 Hz), 6.96-7.06 (1H, m), 7.11 (1H, s), 7.24-7.38 (3H, m), 7.38-7.50 (2H, m), 7.50-7.68 (4H, m), 12.02 (1H, s).
187	$-C_6H_5$	$-OCH_3$	2.4.8-2.60 (2H, m), 2.60-2.88 (2H, m), 2.90-3.06 (1H, m), 3.26-3.40 (1H, m), 3.70 (3H, s), 4.82-4.95 (1H, m), 5.24 (2H, s), 6.73 (1H, d, J = 1.5 Hz), 6.80 (1H, d, J = 1.5 Hz), 7.18 (2H, d, J = 8.2 Hz), 7.25-7.37 (1H, m), 7.37-7.46 (2H, m), 7.46-7.55 (2H, m), 7.55-7.68 (2H, m), 12.06 (1H, brs).
188	$-C_6H_5$	$-CH_3$	2.26 (3H, s), 2.45-2.60 (2H, m), 2.70-2.85 (2H, m), 2.87-3.05 (1H, m), 3.18-3.40 (1H, m), 4.87 (1H, dd, J = 4.3, 9.8 Hz), 5.07 (2H, s), 6.93 (1H, s), 6.98 (1H, s), 7.18 (2H, m), 7.27-7.38 (1H, m), 7.38-7.48 (2H, m), 7.48-7.56 (2H, m), 7.56-7.66 (2H, m), 12.06 (1H, s).

Table 61



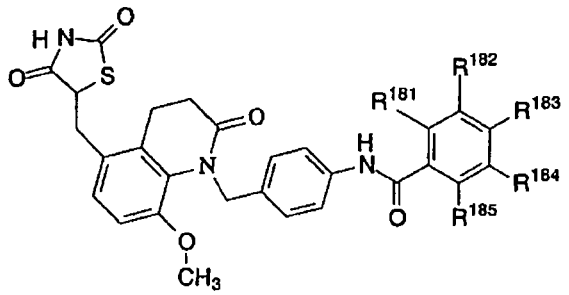
Ex.	R^{181}	R^{182}	R^{183}	R^{184}	R^{185}	M.p.(°C)
189	-H	-H	-H	-H	-H	231.1-232.2
190	-H	-H	-H	$-OC_6H_5$	-H	208-209
191	-H	-H	$-OCH_3$	-H	-H	199-200
192	-H	-H	-H	-H	$-OCH_3$	209
193	-H	-H	-Cl	-H	-H	223-225

Table 62



Ex.	R^{181}	R^{182}	R^{183}	R^{184}	R^{185}	^{1}H NMR (DMSO-d_6) dppm
194	-H	-H	-H	$-OCH_3$	-H	2.81-2.87 (2H, m), 3.01-3.11 (1H, m), DMSO overlap (2H, 1H), 3.71 (3H, s), 3.82 (3H, s), 4.58-4.61 (1H, m), 5.18 (2H, s), 6.82 (1H, d, J=8.6Hz), 6.90 (1H, d, J=8.6Hz), 7.03 (2H, d, J=8.5Hz), 7.11-7.15 (1H, m), 7.38-7.50 (3H, m), 7.57 (2H, d, J=8.5Hz), 10.10 (1H, s), 12.07 (1H, s)
195	-H	-H	$-OC_6H_5$	-H	-H	2.80-2.86 (2H, m), 3.01-3.11 (1H, m), DMSO overlap (2H, 1H), 3.72 (3H, s), 4.78 (1H, dd, J1=4.4Hz, J2=9.9Hz), 5.18 (2H, s), 6.82 (1H, d, J=8.6Hz), 6.90 (1H, d, J=8.6Hz), 7.00-7.12 (6H, m), 7.19-7.25 (1H, m), 7.42-7.48 (2H, m), 7.57 (2H, d, J=8.5Hz), 7.94 (2H, d, J=8.7Hz), 10.08 (1H, s), 12.07 (1H, s)
196	-H	-H	-H	-H	-Cl	2.80-2.86 (2H, m), 3.06 (1H, dd, J1=9.9Hz, J2=14.5Hz), DMSO overlap (2H, 1H), 3.73 (3H, s), 4.78 (1H, dd, J1=4.2Hz, J2=9.9Hz), 5.19 (2H, s), 6.82 (1H, d, J=8.7Hz), 6.90 (1H, d, J=8.7Hz), 7.02 (2H, d, J=8.5Hz), 7.37-7.54 (6H, m), 10.37 (1H, s), 12.05 (1H, s)
197	-Cl	-H	-H	-H	-Cl	2.82-2.88 (2H, m), 3.02-3.12 (1H, m), DMSO overlap (2H, 1H), 3.74 (3H, s), 4.76-4.79 (1H, m), 5.15 (2H, s), 6.78 (1H, d, J=8.4Hz), 6.91 (1H, d, J=8.4Hz), 7.04 (2H, d, J=8.2Hz), 7.48-7.56 (5H, m), 10.63 (1H, s), 12.07 (1H, s)

Table 63



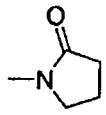
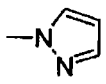
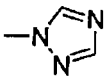
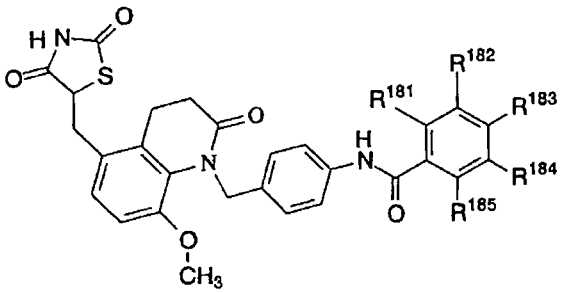
Ex.	R^{181}	R^{182}	R^{183}	R^{184}	R^{185}	MS(M+1)
198	-H	-H	$-NHCOCH_3$	-H	-H	573
199	-H	-H	-H	$-NHCOCH_3$	-H	573
200	-H	-H	$-CF_3$	-H	-H	584
201	-H	-H	-H	-H	$-NO_2$	561
202	-H	-H	-H	-H	$-C_6H_5$	592
203	-H	-H	-H	-H	$-N(CH_3)_2$	559
204	-H	-H	-H	-H	$-NHC_6H_5$	607
205	-Cl	-H	-H	-H	-Cl	584
206	-H	-H	-H	-CN	-H	541
207	-H	-H	-H	$-NO_2$	-H	561
208	-H	-H	-H	$-OC_6H_5$	-H	608
209	-H	-H	-H	-F	$-CH_3$	548
210	-H	-H	$-COCH_3$	-H	-H	558
211	-H	-H	-H	-H	$-CF_3$	584
212	-H	-H	-H	$-CF_3$	-H	584
213	-H	-H	-H	-H	$-OC_6H_5$	608
214	-H	-H	$-OC_6H_5$	-H	-H	608
215	-H	-H	-F	-H	-Cl	568
216	-H	-H		-H	-H	599
217	-H	-H	-1-PYRRYL	-H	-H	581
218	-H	-H		-H	-H	582
219	-H	-H		-H	-H	583

Table 64



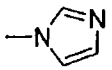
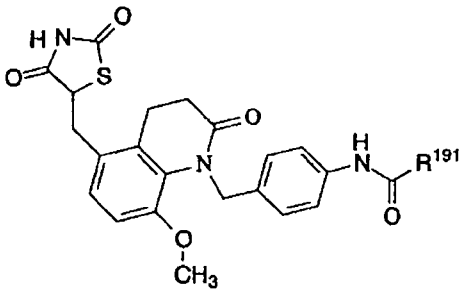
Ex.	R^{181}	R^{182}	R^{183}	R^{184}	R^{185}	MS(M+1)
220	-H	-H		-H	-H	582
221	-H	-H	-H	-H	$-OCH_3$	546
222	-H	-Cl	-H	-H	$-OCH_3$	580
223	-H	-H	-Cl	-H	-H	550
224	-H	-H	-H	-H	-H	516

Table 65



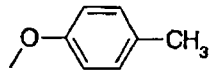
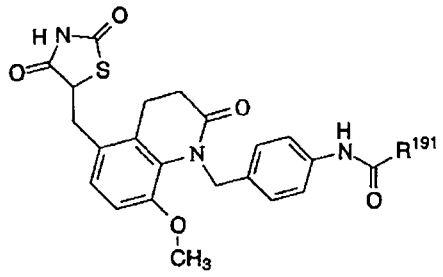
Ex.	R^{191}	M.p.(°C)
225	-cyclo-C_6H_{11}	124.7-126.4
226	-NHC_6H_5	233.0-234.6
227	-NHC_2H_5	195.7-196.9
228	-C_2H_5	198.3-200.3
229	-CH_3	215.2-217.8
230	-OCH_3	136.3-138.6
231	-3-PYRIDYL	233.0-234.2
232	-OC_5H_{11}	98-102
233		166-168
234	-$OCH_2C_6H_5$	186-189

Table 66



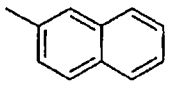
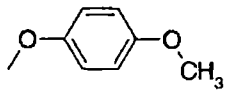
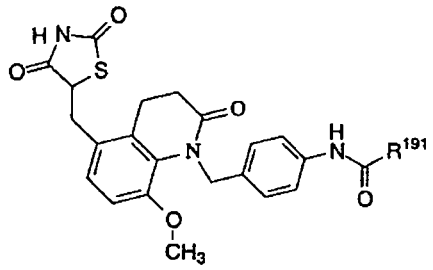
Ex.	R^{191}	^1H NMR (DMSO-d_6) dppm
235	-2-FURYL	2.76-2.81 (2H, m), 3.01-3.11 (1H, m), DMSO overlap (2H), 3.32-3.42 (1H, m), 3.71 (3H, s), 4.76-4.79 (1H, m), 5.17 (2H, s), 6.67 (1H, dd, J1=1.7Hz, J2=3.5Hz), 6.82 (1H, d, J=8.6Hz), 6.90 (1H, d, J=8.5Hz), 7.01 (2H, d, J=8.5Hz), 7.28 (1H, dd, J1=0.7Hz, J2=3.5Hz), 7.55 (2H, d, J=8.6Hz), 7.90 (1H, dd, J1=0.7Hz, J2=1.7Hz), 10.06 (1H, s), 12.06 (1H, s)
236		2.82-2.88 (2H, m), 3.03-3.13 (1H, m), DMSO overlap (2H, 1H), 3.73 (3H, s), 4.79 (1H, dd, J1=4.1Hz, J2=9.9Hz), 5.20 (2H, s), 6.83 (1H, d, J=8.6Hz), 6.91 (1H, d, J=8.6Hz), 7.05 (2H, d, J=8.4Hz), 7.58-7.66 (4H, m), 7.95-8.08 (4H, m), 8.52 (1H, s), 10.33 (1H, s), 12.06 (1H, s)
237		2.79-2.85 (2H, m), 3.00-3.10 (1H, m), DMSO overlap (2H, 1H), 3.70 (3H, s), 3.74 (3H, s), 4.74-4.78 (1H, m), 5.15 (2H, s), 6.80 (1H, d, J=8.7Hz), 6.91-7.00 (5H, m), 7.06-7.11 (2H, m), 7.30 (2H, d, J=8.5Hz), 10.01 (1H, s), 12.05 (1H, s)

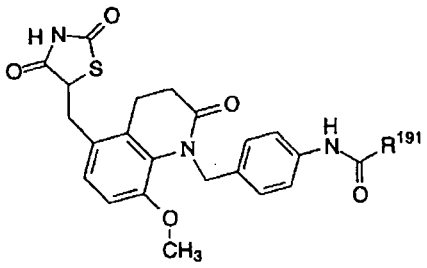
Table 67

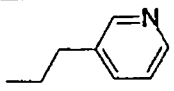
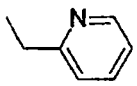
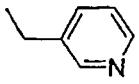
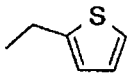
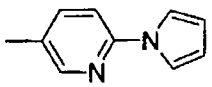
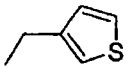
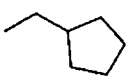
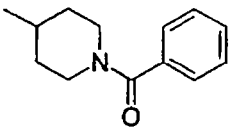
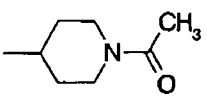


Ex.	R^{191}	MS(M+1)
238	$-(CH_2)_2OC_6H_5$	560
239	-3-PYRIDYL	517
240	-4-PYRIDYL	517
241	-2-FURYL	506
242	-2-THIENYL	522
243	-3-FURYL	506
244	-3-THIENYL	522
245	-cyclo-C_5H_9	508
246	-cyclo-C_6H_{11}	522
247	$-CH_2$-cyclo-C_6H_{11}	536
248	$-CH_2OC_6H_5$	546
249	$-(CH_2)_2C_6H_5$	544
250	-2-PYRIDYL	517
251	$-CH=CHC_6H_5$(trans)	542
252	$-OC_6H_5$	532
253	$-OC_3H_7$	498
254	$-OC_5H_{11}$	526
255	$-OCH_2C_6H_5$	546
256	$-OCH_3$	470
257	$-OC_4H_9$	512

5

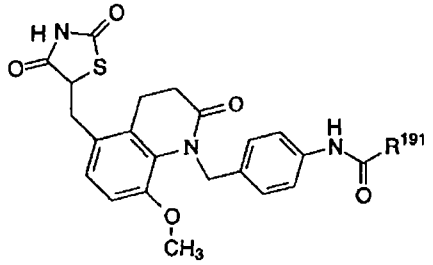
Table 68



Ex.	R^{191}	MS(M+1)
258		545
259		531
260		531
261		536
262		582
263		536
264		522
265		627
266		565

5

Table 69



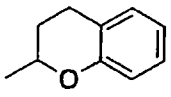
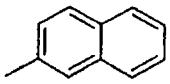
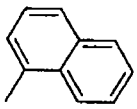
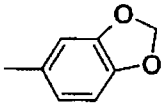
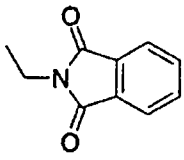
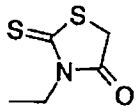
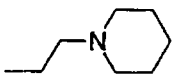
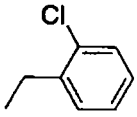
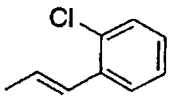
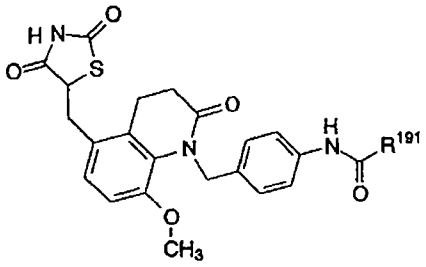
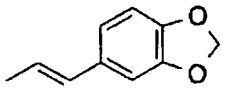
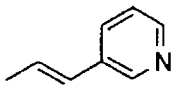
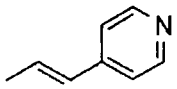
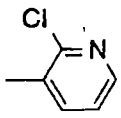
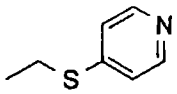
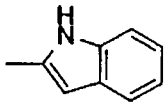
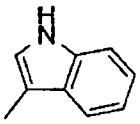
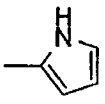
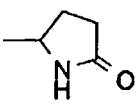
Ex.	R^{191}	MS(M+1)
267		572
268		566
269		566
270		560
271		599
272		585
273		551
274		564
275		576

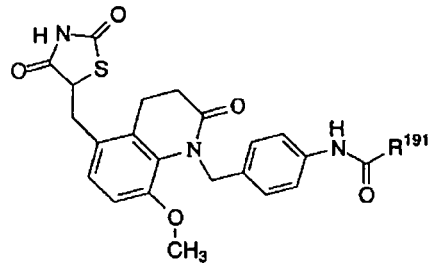
Table 70



Ex.	R^{191}	MS(M+1)
276		586
277		543
278		543
279		551
280		563
281		555
282		555
283		505
284		523

5

Table 71



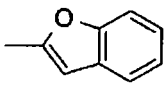
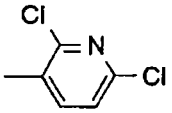
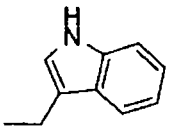
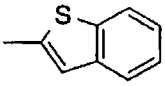
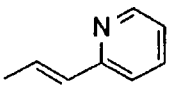
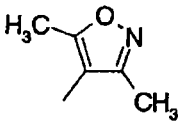
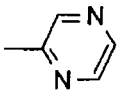
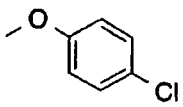
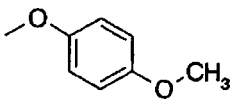
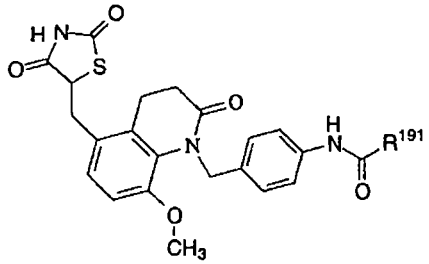
Ex.	R^{191}	MS(M+1)
285		556
286		585
287		569
288		572
289		543
290		535
291		518
292		566
293		562

Table 72



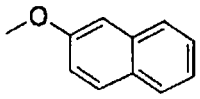
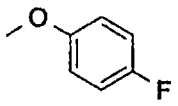
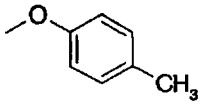
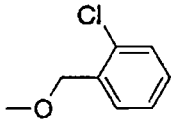
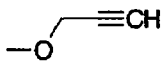
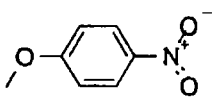
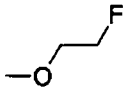
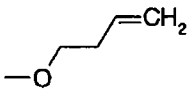
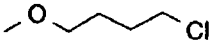
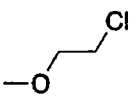
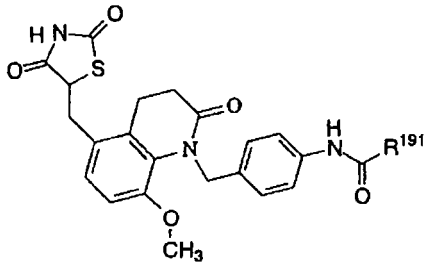
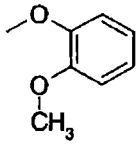
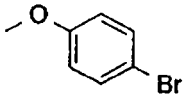
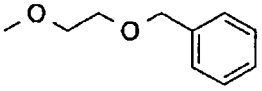
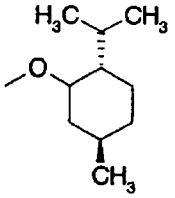
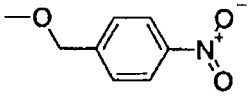
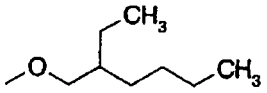
Ex.	R^{191}	MS(M+1)
294		582
295		550
296		546
297		580
298		494
299		577
300		502
301		510
302		546
303		518

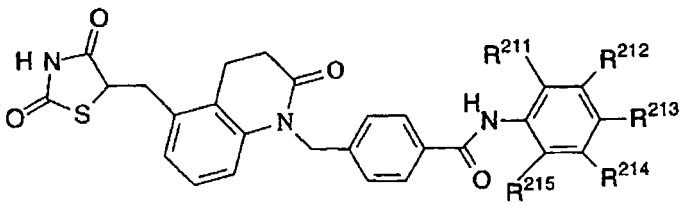
Table 73



Ex.	R^{191}	MS(M+1)
304		562
305		612
306		590
307		594
308		591
309		568

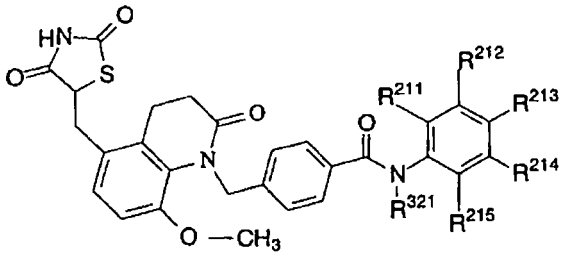
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Table 74



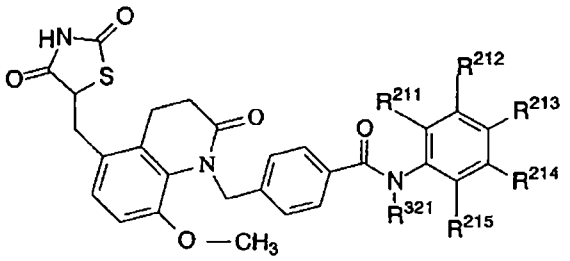
Ex.	R^{211}	R^{212}	R^{213}	R^{214}	R^{215}	M.p.(°C)
310	-H	-H	$-CH(CH_3)_2$	-H	-H	226
311	-H	-H	-H	$-OC_6H_5$	-H	139-142
312	-H	-H	-Cl	-H	-H	154-158
313	-H	-H	$-OCH_3$	-H	-H	225-230

Table 75



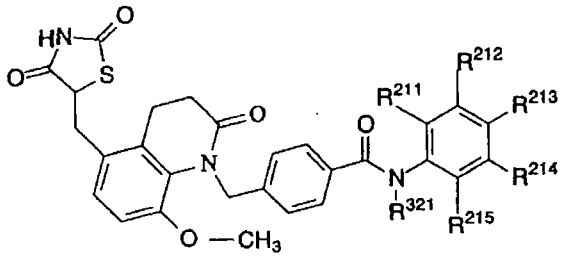
Ex.	R^{321}	R^{211}	R^{212}	R^{213}	R^{214}	R^{215}	M.p.(°C)
314	-H	-H	-H	-H	-H	-H	242.7-243.5
315	-H	-H	-H	-Cl	-H	-H	240-241
316	-H	-H	-H	$-CH(CH_3)_2$	-H	-H	243-244
317	-H	-H	-H	$-OC_6H_5$	-H	-H	152-156
318	-H	-H	-H	$-OCH_3$	-H	-H	215-216
319	-H	-H	-H	-H	$-OC_6H_5$	-H	203-204

Table 76



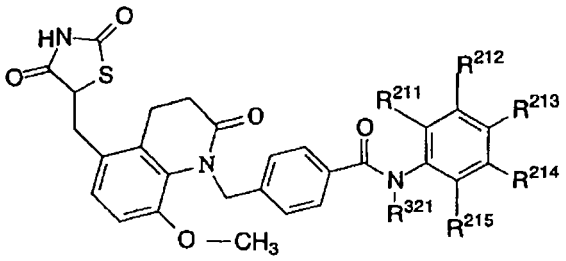
Ex.	R^{321}	R^{211}	R^{212}	R^{213}	R^{214}	R^{215}	MS(M+1)
320	-H	-H	-H	-H	-H	$-OCH_3$	546
321	$-CH_3$	-H	-H	-H	-H	$-OCH_3$	560
322	-H	-H	-H	-H	$-SCH_3$	-H	562
323	-H	-H	-H	-H	-H	$-SCH_3$	562
324	-H	-H	-H	-Cl	-Cl	-H	584
325	-H	-H	-H	$-OCF_3$	-H	-H	600
326	-H	-H	-H	-H	-H	-H	516
327	-H	-H	-H	-Cl	-H	-H	550
328	-H	-H	-H	$-OCH_3$	-H	-H	546
329	-H	-H	-H	-H	$-OCH_3$	-H	546
330	-H	-H	-H	-H	-Cl	-H	550
331	-H	-H	-H	$-CH_3$	-H	-H	530
332	-H	-H	-H	$-OCH_3$	-H	$-OCH_3$	576
333	-H	$-OCH_3$	-H	-H	-Cl	-H	580
334	-H	$-OCH_3$	-H	-H	$-NHCOCH_3$	-H	603
335	-H	-H	-H	$-OCH_3$	$-OCH_3$	-H	576
336	-H	-H	-H	-H	-H	$-C(CH_3)=CH_2$	556
337	-H	-H	-H	-H	$-OCF_3$	-H	600
338	-H	-H	-H	-H	-H	$-CH_3$	530
339	-H	-H	-H	-H	-H	-F	534
340	-H	-H	-H	-H	-F	-H	534
341	-H	-H	-H	-F	-H	-H	534
342	-H	-H	-H	-H	$-N(CH_3)_2$	-H	559
343	-H	-H	-H	$-OC_2H_5$	-H	-H	560
344	-H	-H	-H	-H	$-CF_3$	-H	584
345	-H	-H	-H	-H	$-NHCOCH_3$	-H	573
346	-H	-H	-H	$-NHCOCH_3$	-H	-H	573
347	$-CH_3$	-H	-H	-H	$-CH_3$	-H	544
348	-H	-H	-H	-H	-H	$-OC_6H_5$	608
349	-H	-H	-H	-H	$-OC_6H_5$	-H	608
350	-H	-H	-H	$-OC_6H_5$	-H	-H	608

Table 77



Ex.	R^{321}	R^{211}	R^{212}	R^{213}	R^{214}	R^{215}	MS(M+1)
351	-H	-H	-H	$-CF_3$	-H	-H	584
352	-H	-H	-Cl	-H	-Cl	-H	584
353	-H	-H	-H	-H	$-CH_3$	$-CH_3$	544
354	-H	-H	-H	$-CH_3$	-H	$-CH_3$	544
355	-H	-H	$-CH_3$	-H	$-CH_3$	-H	544
356	-H	-H	-F	-H	-F	-H	552
357	-H	-H	-H	$-OCH_3$	-F	-H	564
358	-H	-H	-H	$-SO_2NH_2$	-H	-H	595
359	-H	-H	-H	$-CH_3$	$-OCH_3$	-H	560
360	-H	-H	-H	$-OCH_3$	-Cl	-H	580
361	-H	-H	-H	$-CH_3$	-Cl	-H	564
362	-H	-H	$-OCH_3$	-H	$-CF_3$	-H	614
363	-H	-H	-H	-F	-Cl	-H	568
364	-H	-H	-H	-OH	-Cl	-H	566
365	-H	-Cl	-H	-H	$-NHCOCH_3$	-H	607
366	-H	-H	-H	$-SCH_3$	-H	-H	562
367	-H	-H	-H	$-CH(CH_3)_2$	-H	-H	558
368	-H	-H	-H	$-C(CH_3)_3$	-H	-H	572
369	-H	-H	-H	$-NHSO_2CH_3$	-H	-H	609
370	-H	-H	-H	$-CONHCH_3$	-H	-H	573
371	-H	-H	-H	-H	-H	$-OCH_2C_6H_5$	622
372	-H	-H	-H	$-CH=CH_2$	-H	-H	544
373	$-CH_3$	-H	-H	-Cl	-H	-H	564
374	-H	-H	-H	-H	-H	-Cl	550
375	-H	-H	-CN	-H	-H	-H	541
376	-H	-H	-H	-F	-H	-Cl	568
377	-H	-H	-H	-CN	-H	-H	541

Table 78



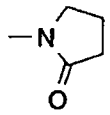
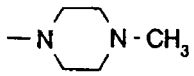
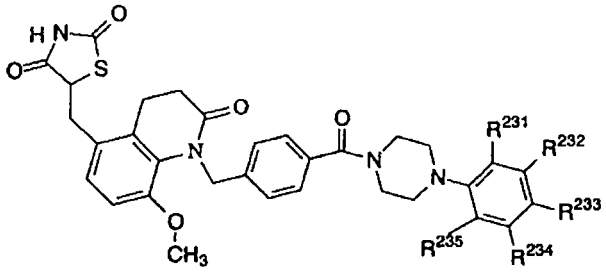
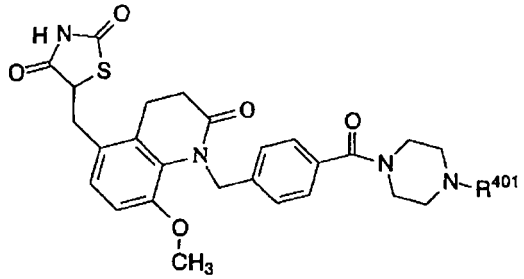
Ex.	R^{321}	R^{211}	R^{212}	R^{213}	R^{214}	R^{215}	MS(M+1)
378	-H	-H	-H		-H	-H	599
379	-H	-H	-H		-H	-H	614

Table 79



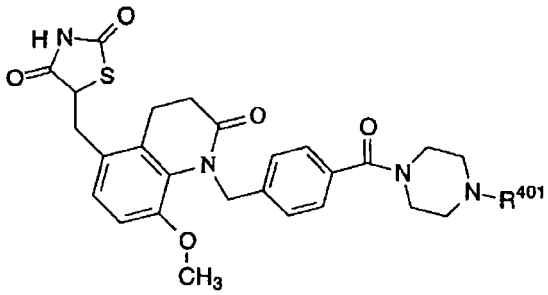
Ex.	R^{231}	R^{232}	R^{233}	R^{234}	R^{235}	MS(M+1)
380	-H	-H	-H	-Cl	-H	619
381	-H	-H	-H	-H	-F	603
382	-H	-H	-H	-H	$-OCH_3$	615
383	-H	-H	-F	-H	-H	603
384	-H	-H	$-CF_3$	-H	-H	653
385	-H	-H	-CN	-H	-H	610
386	-H	-H	-H	-H	-H	585

Table 80



Ex.	R^{401}	MS(M+1)
387	-2-PYRIDYL	586
388	-cyclo-C_5H_9	577
389	-4-PYRIDYL	586
390	-$(CH_2)_2C_6H_5$	613
391	-CH_3	613
392	-$C(CH_3)_3$	579
393	-3-PYRIDYL	586
394	-H	508

Table 81



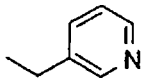
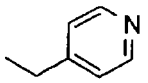
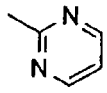
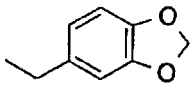
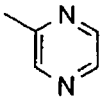
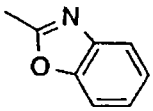
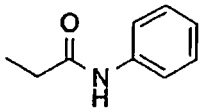
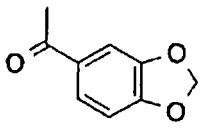
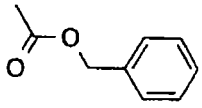
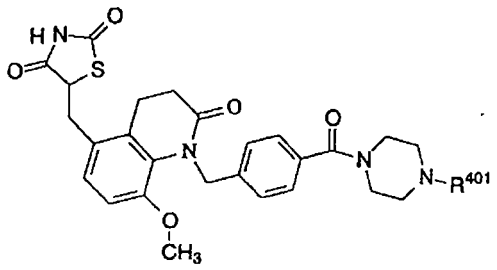
Ex.	R^{401}	MS(M+1)
395		600
396		600
397		587
398		643
399		587
400		626
401		642
402		657
403		643

Table 82



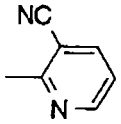
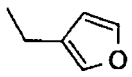
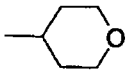
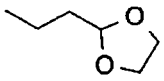
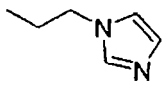
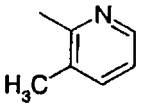
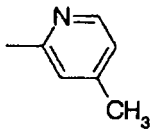
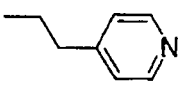
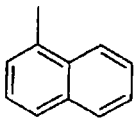
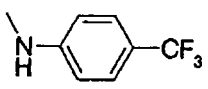
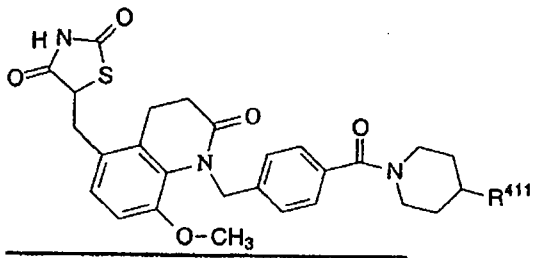
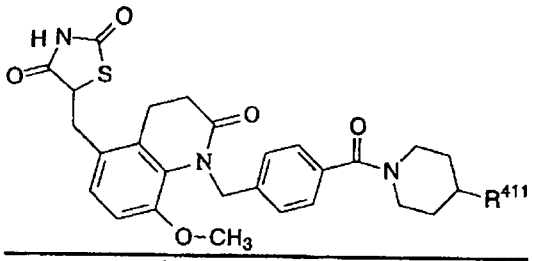
Ex.	R^{401}	MS(M+1)
404		611
405		589
406		593
407		609
408		603
409		600
410		600
411		614
412		635
413		668

Table 83



Ex.	R^{411}	MS(M+1)
414	$-OCH_3$	538
415	-cyclo-C_6H_{11}	590
416	$-CH_2C_6H_5$	598
417	$-C_6H_5$	584

Table 84



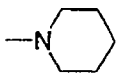
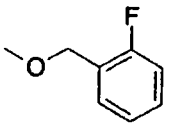
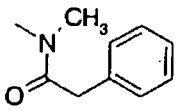
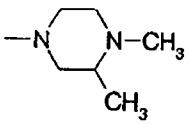
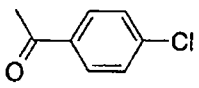
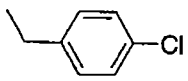
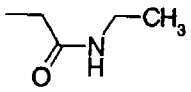
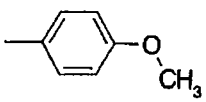
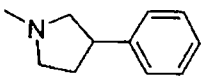
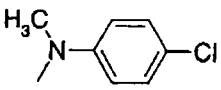
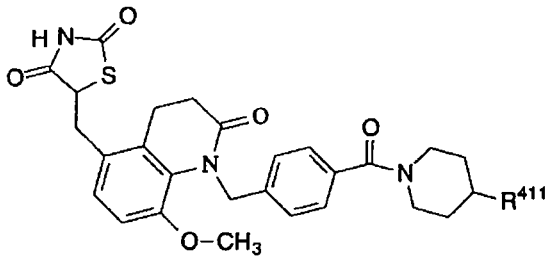
Ex.	R^{411}	MS(M+1)
418		591
419		632
420		655
421		620
422		646
423		632
424		593
425		614
426		653
427		647

Table 85



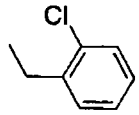
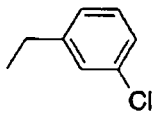
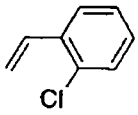
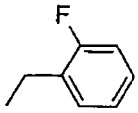
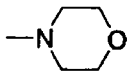
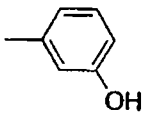
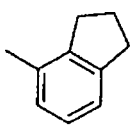
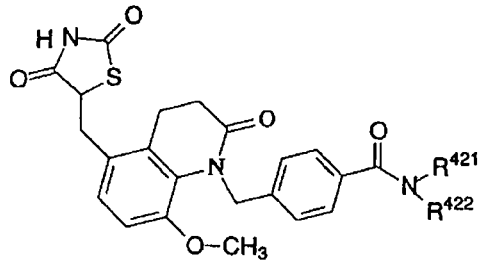
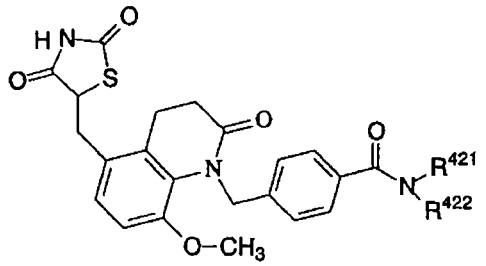
Ex.	R^{411}	MS(M+1)
428		632
429		632
430		630
431		616
432		593
433		600
434		624

Table 86



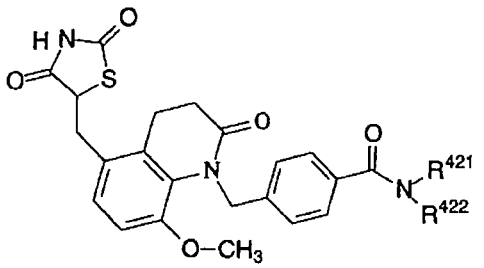
Ex.	R^{421}	R^{422}	M.p.(°C)
435	$-C_2H_5$	-H	277.7-279.1
436	$-CH(CH_3)_2$	-H	256.5-257.4
437	$-CH_2CH_2OH$	-H	248.1-249.9
438	-3-PYRIDYL	-H	251.9-254.1

Table 87



Ex.	R^{421}	R^{422}	MS(M+1)
439	-3-PYRIDYL	-H	517
440	-cyclo-C_6H_{11}	-CH_3	536
441	-C_4H_9	-C_4H_9	552
442	-$CH_2CH(CH_3)_2$	-$CH_2CH(CH_3)_2$	552
443	-CH_2-cyclo-C_3H_5	-C_3H_7	536
444	-cyclo-C_5H_9	-$CH_2CH=CH_2$	548
445	-C_4H_9	-H	496
446	-cyclo-C_3H_5	-H	480
447	-$CH_2C_6H_5$	-H	530
448	-$CH_2C_6H_5$	-cyclo-C_6H_{11}	612
449	-$CH_2C_6H_5$	-$CH(CH_3)_2$	572
450	-cyclo-C_6H_{11}	-C_2H_5	550
451	-C_3H_7	-H	482
452	-CH_2-cyclo-C_6H_{11}	-C_2H_5	564
453	-$CH_2CH_2OC_2H_5$	-H	512
454	-1-CH_3-CYCLOHEXYL	-H	536
455	-CH_2-cyclo-C_6H_{11}	-H	536
456	-$CH(CH_3)C_6H_5$	-H	544
457	-$(CH_2)_3C_6H_5$	-H	558
458	-$(CH_2)_2C_6H_5$	-H	544
459	-CH_2CONH_2	-H	497
460	-$CH_2CO_2CH_3$	-CH_3	526
461	-C_5H_{11}	-CH_3	524
462	-2-PYRIDYL	-H	517

Table 88



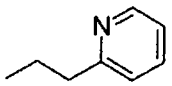
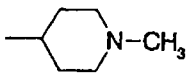
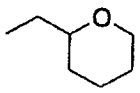
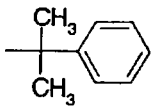
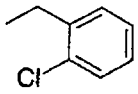
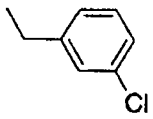
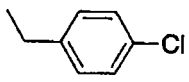
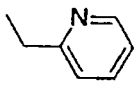
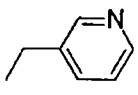
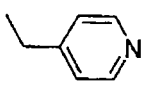
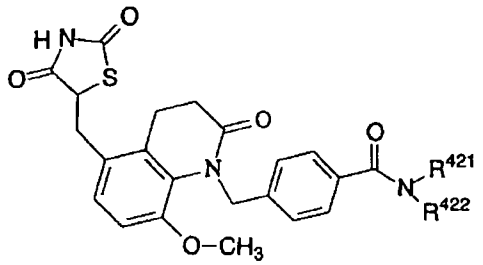
Ex.	R^{421}	R^{422}	MS(M+1)
463		$-CH_3$	559
464		$-CH_3$	551
465		$-C_2H_5$	566
466		-H	558
467		-H	564
468		-H	564
469		-H	564
470		-H	531
471		-H	531
472		-H	531

Table 89



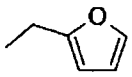
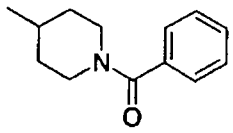
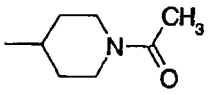
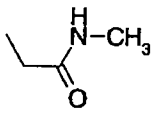
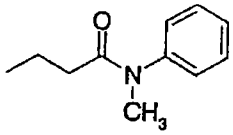
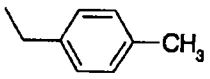
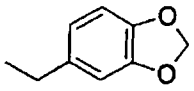
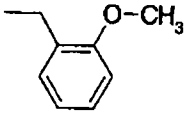
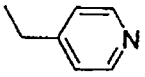
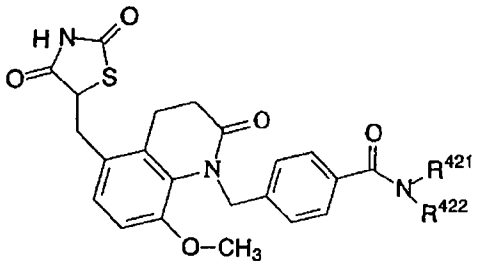
Ex.	R^{421}	R^{422}	MS(M+1)
473		-H	520
474		$-CH_3$	641
475		$-CH_3$	579
476		$-CH_2C_6H_5$	601
477		$-CH_3$	615
478		$-CH_3$	558
479		$-CH_3$	588
480		$-CH_3$	574
481		$-C_2H_5$	559

Table 90



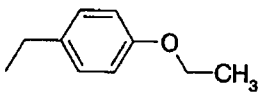
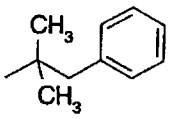
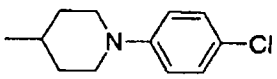
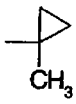
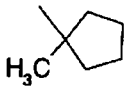
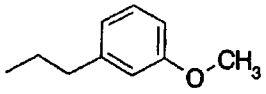
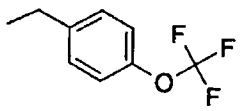
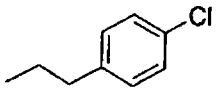
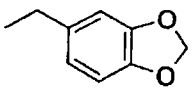
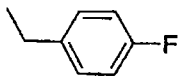
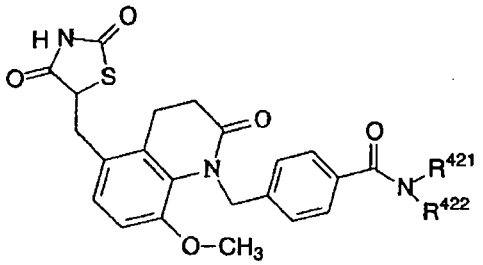
Ex.	R^{421}	R^{422}	MS(M+1)
482		$-C_2H_5$	602
483		-H	572
484		$-CH_3$	647
485		-H	494
486		-H	522
487		-H	574
488		-H	614
489		-H	578
490		-H	574
491		-H	548

Table 91



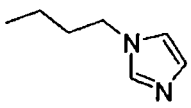
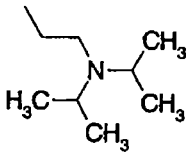
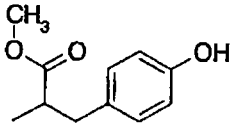
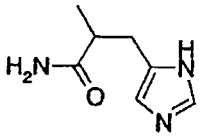
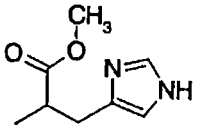
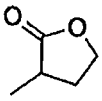
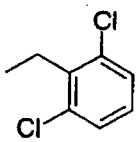
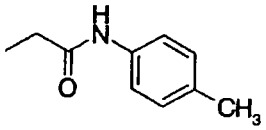
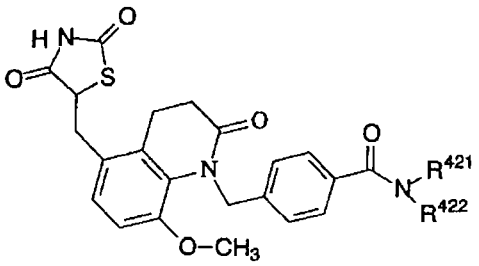
Ex.	R^{421}	R^{422}	MS(M+1)
492		-H	548
493		-H	567
494		-H	618
495		-H	577
496		-H	592
497		-H	524
498		$-C_2H_5$	626
499		$-CH_3$	601

Table 92



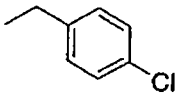
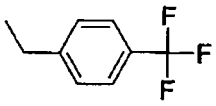
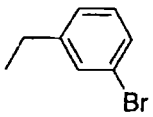
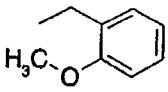
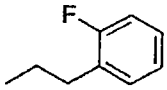
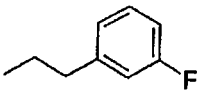
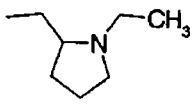
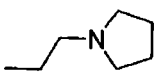
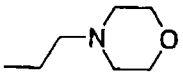
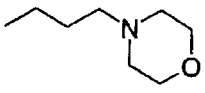
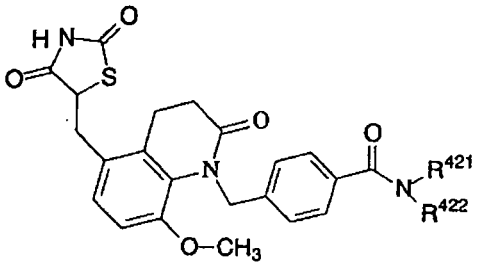
Ex.	R^{421}	R^{422}	MS(M+1)
500		$-C_2H_5$	592
501		$-C_2H_5$	626
502		$-C_2H_5$	638
503		-H	560
504		-H	562
505		-H	562
506		-H	551
507		-H	537
508		-H	553
509		-H	567

Table 93



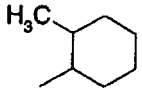
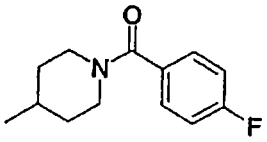
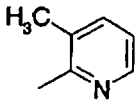
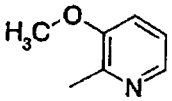
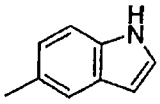
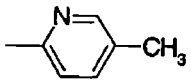
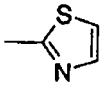
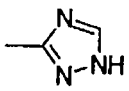
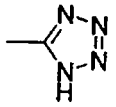
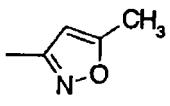
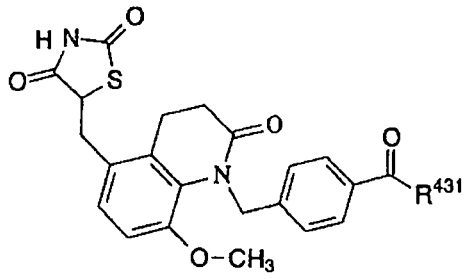
Ex.	R^{421}	R^{422}	MS(M+1)
510		-H	536
511		$-CH_3$	659
512		-H	531
513		-H	547
514		-H	555
515		-H	531
516		-H	523
517		-H	507
518		-H	508
519		-H	521

Table 94



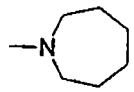
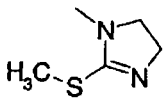
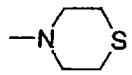
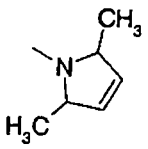
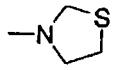
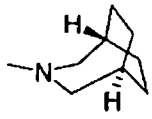
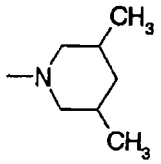
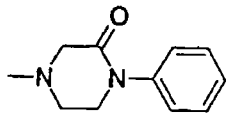
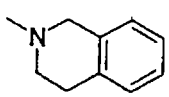
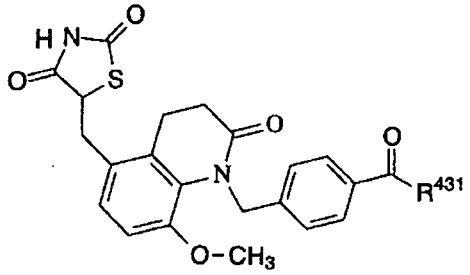
Ex.	R^{431}	MS(M+1)
520		522
521		539
522		526
523		520
524		512
525		548
526		536
527		599
528		556

Table 95



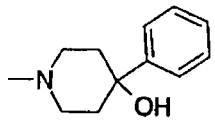
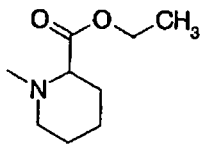
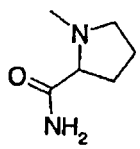
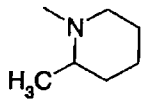
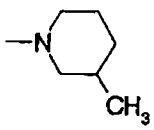
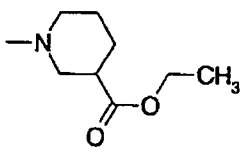
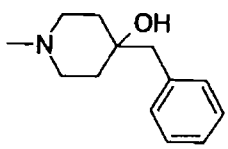
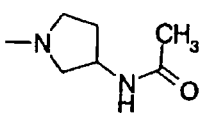
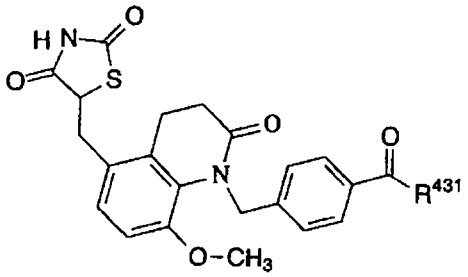
Ex.	R^{431}	MS(M+1)
529		600
530		580
531		537
532		522
533		522
534		580
535		614
536		551

Table 96



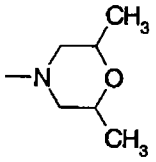
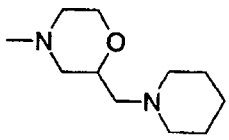
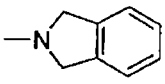
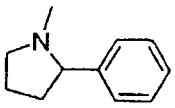
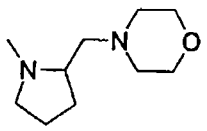
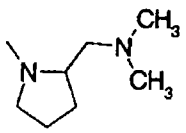
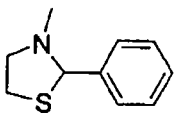
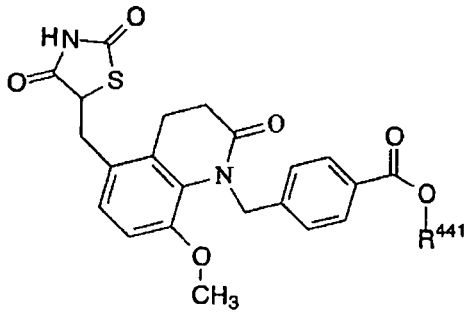
Ex.	R^{431}	MS(M+1)
537		538
538		607
539		542
540		570
541		593
542		551
543		588

Table 97



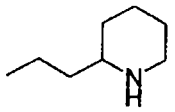
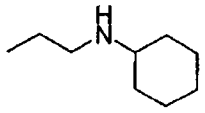
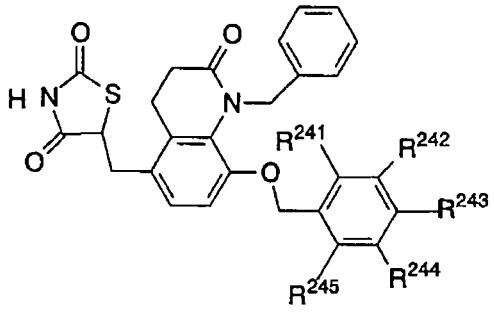
Ex.	R^{441}	MS(M+1)
544		552
545		566

Table 98



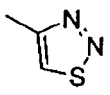
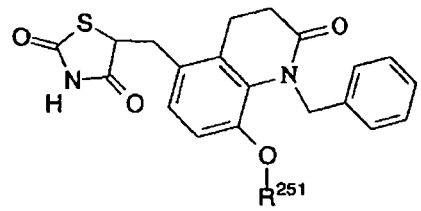
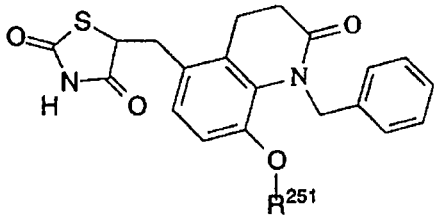
Ex.	R^{241}	R^{242}	R^{243}	R^{244}	R^{245}	MS(M+1)
546	-H	-H	-Cl	-H	-H	507
547	-Cl	-H	-H	-H	-H	507
548	-H	$-CF_3$	-H	-H	-H	541
549	-H	-H	$-CF_3$	-H	-H	541
550	-H	-H	$-CH_3$	-H	-H	487
551	-H	-F	-H	-H	-H	491
552	-H	$-CH_3$	-H	-H	-H	487
553	-H	-H	$-CO_2CH_3$	-H	-H	529
554	-H	-Cl	-H	-H	-H	507
555	-H	$-OCH_3$	-H	-H	-H	503
556	-H	-H	-H	$-NO_2$	-H	518
557	-H	-H	$-SO_2CH_3$	-H	-H	551
558	$-OCH_3$	-H	-H	-H	-H	503
559	-H	-H	$-CH=CHC_6H_5$(trans)	-H	-H	575
560	-H	-H	$-OCOCH_3$	-H	-H	531
561	-H	-H	-F	-H	-H	491
562	-H	-H	$-OCH_3$	-H	-H	503
563	-H	-H		-H	-H	557
564	-H	-H	$-SCF_3$	-H	-H	573

Table 99



Ex.	R^{251}	MS(M+1)
565	$-CH_2CH_2N(CH_3)_2$	454
566	$-CH_2CH=CHCH_3$(trans)	437
567	$-(CH_2)_3CH=CH_2$	451
568	$-(CH_2)_2C_6H_5$	487
569	$-CH_2CCCH_3$	435
570	$-CH_2CCC_6H_5$	497
571	$-CH_2CH(CH_3)_2$	439
572	$-CH_2COCH_3$	439
573	$-(CH_2)_3N(CH_3)_2$	468
574	$-(CH_2)_2SC_6H_5$	519
575	$-CH_2CCH$	421
576	$-CH_2CH=CHC_6H_5$	499
577	$-CH_2CON(CH_3)_2$	468
578	$-CH_2COC_6H_5$	501
579	$-CH_2CO_2C_2H_5$	469
580	$-(CH_2)_2OC_6H_5$	503
581	$-(CH_2)_2OCH_2C_6H_5$	517
582	$-(CH_2)_4COC_6H_5$	543
583	$-(CH_2)_3OCH_2C_6H_5$	531

Table 100



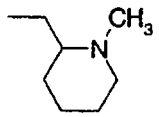
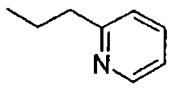
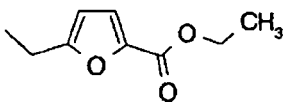
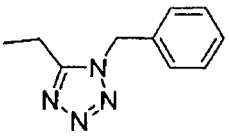
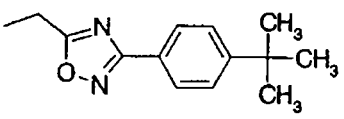
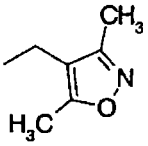
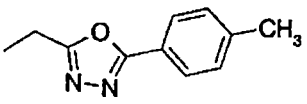
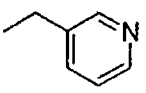
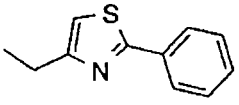
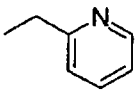
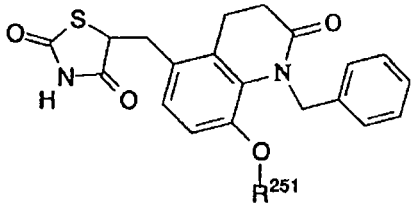
Ex.	R^{251}	MS(M+1)
584		494
585		488
586		535
587		555
588		597
589		492
590		555
591		474
592		556
593		474

Table 101



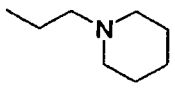
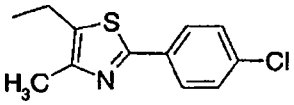
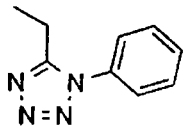
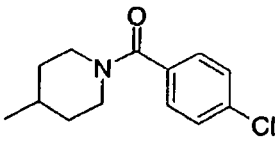
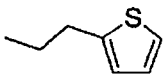
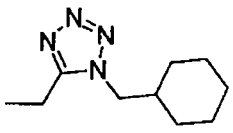
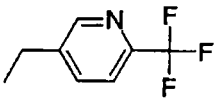
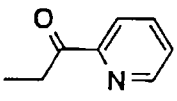
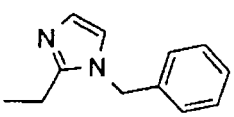
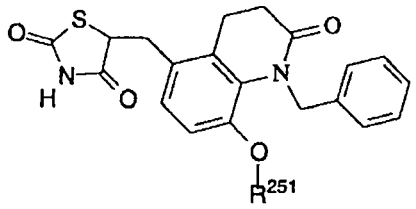
Ex.	R^{251}	MS(M+1)
594		494
595		604
596		541
597		604
598		493
599		561
600		542
601		502
602		553

Table 102



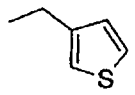
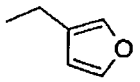
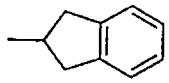
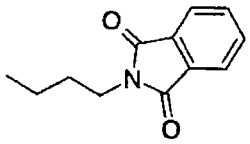
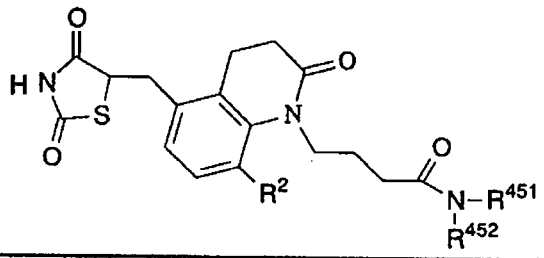
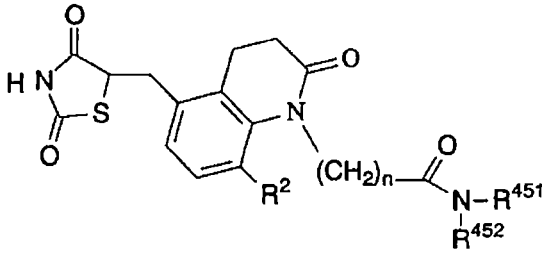
Ex.	R^{251}	MS(M+1)
603		479
604		463
605		499
606		570

Table 103



Ex.	R^{451}	R^{452}	R^2	^1H NMR (DMSO-d_6) dppm
607	$-C_2H_5$	$-C_2H_5$	$-OCH_3$	0.94 (3H, t, J = 7.1 Hz), 0.99 (3H, t, J = 7.1 Hz), 1.50-1.69 (2H, m), 2.08 (2H, t, J = 7.7 Hz), 2.26-2.45 (2H, m), 2.63-2.85 (2H, m), 2.99-3.22 (5H, m), 3.31-3.49 (1H, m), 3.79 (3H, s), 3.82-4.03 (2H, m), 4.78 (1H, dd, J = 4.2, 10.0 Hz), 6.83-7.06 (2H, m), 12.08 (1H, brs).
608	-H	$-C_6H_5$	$-OCH_3$	1.64-1.81 (2H, m), 2.20 (2H, t, J = 7.4 Hz), 2.30-2.46 (2H, m), 2.63-2.92 (2H, m), 2.99-2.16 (1H, m), 2.35-2.50 (1H, m), 3.78 (3H, s), 3.86-4.02 (2H, m), 4.69-4.85 (1H, m), 6.87-7.07 (3H, m), 7.18-7.32 (2H, m), 7.54 (2H, d, J = 7.6 Hz), 9.80 (1H, s), 12.07 (1H, s).
609	-H	-cyclo-C_6H_{11}	$-OCH_3$	0.95-1.32 (5H, m), 1.42-1.75 (7H, m), 1.83-2.00 (2H, m), 2.25-2.45 (2H, m), 2.64-2.89 (2H, m), 3.00-3.15 (1H, m), 3.35-3.52 (2H, m), 3.79 (3H, s), 3.80-3.95 (2H, m), 4.77 (1H, dd, J = 4.2, 10.0 Hz), 6.81-7.05 (2H, m), 7.56 (1H, d, J = 7.8 Hz), 12.07 (1H, brs).

Table 104



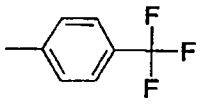
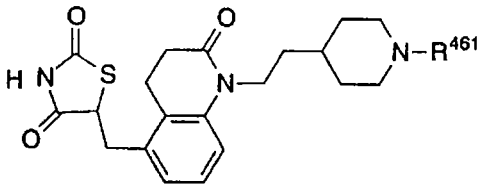
Ex.	n	R^{451}	R^{452}	R^2	M.p.(°C)
610	1	-H	-cyclo-C_6H_{11}	$-OCH_3$	105-114
611	1	-H	$-C_6H_5$	$-OCH_3$	135-138.5
612	1	-H		$-OCH_3$	128-132.5
613	3	-H	$-C_2H_5$	$-OCH_3$	174.2-175.2

Table 105



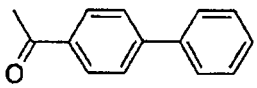
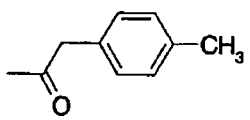
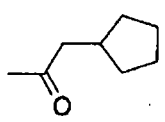
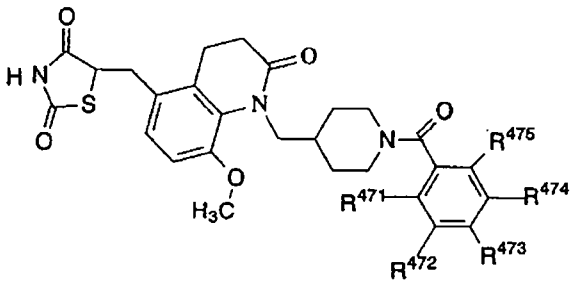
Ex.	R^{461}	M.p.(°C)
614	$-COCH_3$	209.5-211
615		120-122
616		182-184.5
617	$-COC_3H_7$	52-67
618		53-69

Table 106



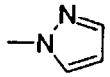
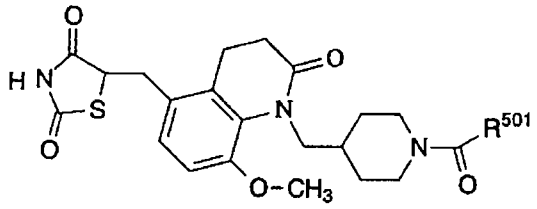
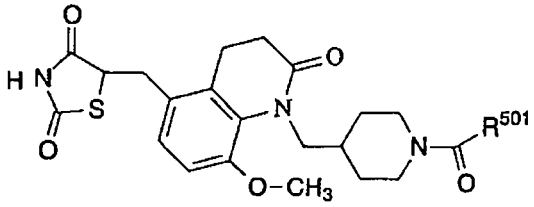
Ex.	R^{471}	R^{472}	R^{473}	R^{474}	R^{475}	MS(M+1)
619	-H	-H	-H	-H	-H	508
620	-H	-H	$-CH_3$	-H	-H	522
621	-H	-H	-Cl	-H	-H	542
622	-H	-H	-F	-H	-H	526
623	-H	-H	$-OCH_3$	-H	-H	538
624	-H	-Cl	-Cl	-H	-H	576
625	-Cl	-H	-H	-H	-H	542
626	$-CH_3$	-H	-H	-H	-H	522
627	-H	$-OCH_3$	-H	-H	-H	538
628	-H	-Cl	-H	-H	-H	542
629	-H	-CN	-H	-H	-H	533
630	-Cl	-Cl	-H	-H	-H	576
631	-H	$-CF_3$	-H	-H	-H	576
632	-Cl	-H	-F	-H	-H	560
633	-H	$-OC_6H_5$	-H	-H	-H	600
634	$-OCH_3$	-H	-H	-Cl	-H	572
635	-H	-H	$-CF_3$	-H	-H	576
636	-H	$-OCF_3$	-H	-H	-H	592
637	-Br	-H	-H	-H	-H	588
638	-H	-H	$-OCF_3$	-H	-H	592
639	$-OCF_3$	-H	-H	-H	-H	592
640	-H	-H	-CN	-H	-H	533
641	-H	-H	$-C(CH_3)_3$	-H	-H	564
642	-H	-H	$-CO_2CH_3$	-H	-H	566
643	-H	-Br	-H	-H	-H	586
644	$-CF_3$	-H	-H	-H	-H	576
645	-H	-H		-H	-H	574

Table 107



Ex.	R^{501}	MS(M+1)
646	-CH=CHC$_6$H$_5$(trans)	534
647	-2-PYRIDYL	509
648	-3-PYRIDYL	509
649	-4-PYRIDYL	509
650	-2-FURYL	498
651	-2-THIENYL	514
652	-3-FURYL	498
653	-3-THIENYL	514
654	-CH$_2$-cyclo-C$_6$H$_{11}$	528
655	-(CH$_2$)$_2$C$_6$H$_5$	536
656	-OC$_6$H$_5$	524
657	-OCH$_2$C$_6$H$_5$	538
658	-OC$_4$H$_9$	504
659	-cyclo-C$_6$H$_{11}$	514
660	-cyclo-C$_3$H$_5$	472
661	-cyclo-C$_4$H$_7$	486
662	-CH$_2$OC$_6$H$_5$	538
663	-CH(C$_2$H$_5$)C$_4$H$_9$	530
664	-N(C$_2$H$_5$)$_2$	503
665	-(CH$_2$)$_2$SCH$_3$	506
666	-OCH$_2$CCH	486
667	-O(CH$_2$)$_4$Cl	538

Table 108



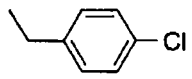
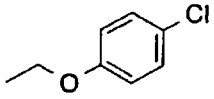
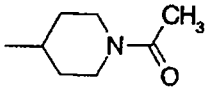
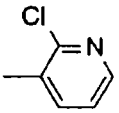
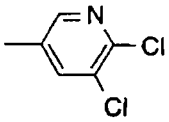
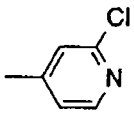
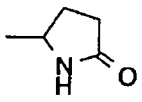
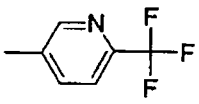
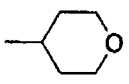
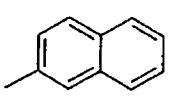
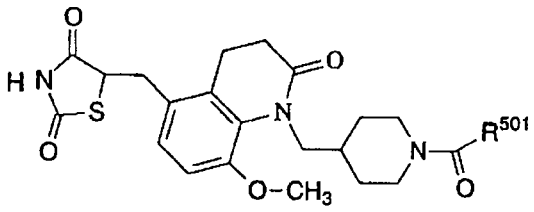
Ex.	R^{501}	MS(M+1)
668		556
669		572
670		557
671		543
672		577
673		543
674		515
675		577
676		516
677		558

Table 109



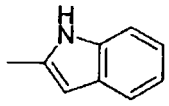
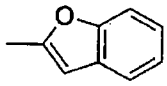
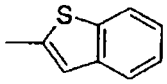
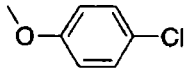
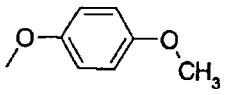
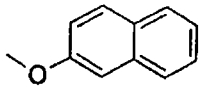
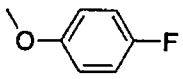
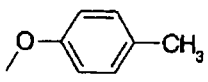
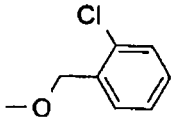
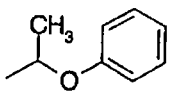
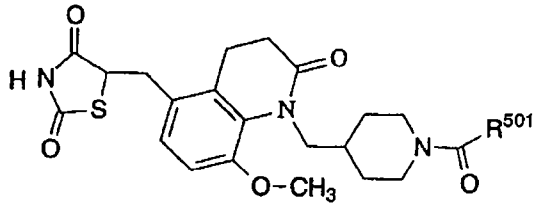
Ex.	R^{501}	MS(M+1)
678		547
679		548
680		564
681		558
682		554
683		574
684		542
685		538
686		572
687		552

Table 110



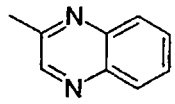
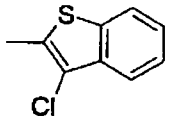
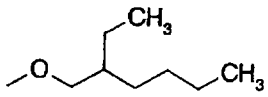
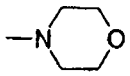
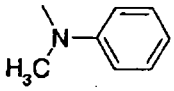
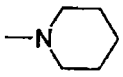
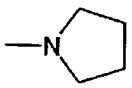
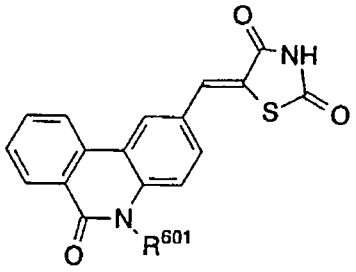
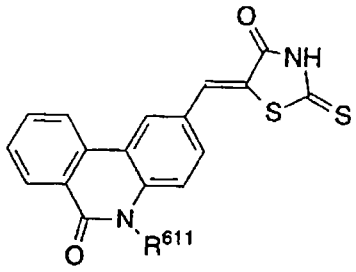
Ex.	R^{501}	MS(M+1)
688		560
689		598
690		560
691		517
692		537
693		515
694		501

Table 111



Ex.	R^{601}	^1H NMR (DMSO-d_6) dppm
695	$-CH_2C_6H_5$	5.67(2H, s), 7.0-8.0(10H, m), 8.45(1H, dd, J=8.0Hz, 1.3Hz), 8.60(1H, d, J=8.0Hz), 8.80(1H, d, J=1.8Hz), 12.6(1H, br s)
696	$-C_2H_5$	1.29(3H, t, J=7.1Hz), 4.41(2H, t, J=7.1Hz), 7.6-8.0(6H, m), 8.38(1H, dd, J=8.0Hz, 1.2Hz), 8.56(1H, d, J=8.1Hz), 8.74(1H, s), 12.6(1H, br s)

Table 112



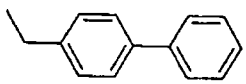
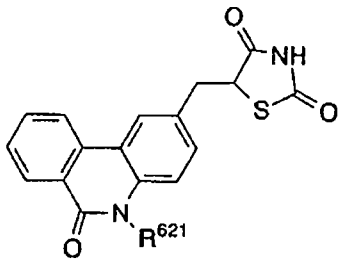
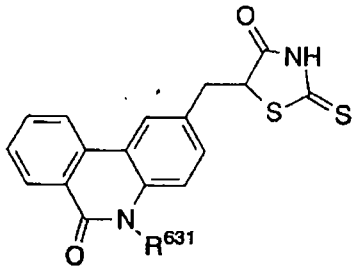
Ex.	R^{611}	^1H NMR (DMSO-d_6) dppm
697	$-CH_2C_6H_5$	5.67(2H, s), 7.1-8.1(10H, m), 8.55(1H, dd, J=8.0Hz, 1.3Hz), 8.65(1H, d, J=8.0Hz), 8.81(1H, d, J=1.8Hz), 13.8(1H, br s)
698	$-C_2H_5$	1.30(3H, t, J=7.1Hz), 4.41(2H, t, J=7.1Hz), 7.5-8.0(6H, m), 8.38(1H, dd, J=8.0Hz, 1.2Hz), 8.55(1H, d, J=8.1Hz), 8.79(1H, s), 13.9(1H, br s)
699		5.72(2H, s), 7.1-8.0(14H, m), 8.46(1H, dd, J=8.0Hz, 1.3Hz), 8.62(1H, d, J=8.0Hz), 8.82(1H, d, J=1.8Hz), 13.5(1H, br s)

Table 113



Ex.	R^{621}	^1H NMR (DMSO-d_6) dppm
700	$-CH_2C_6H_5$	3.1-3.7(2H, m), 5.04(1H, dd, J=13.8Hz, 4.8Hz), 5.76(2H, s), 7.1-7.45(5H, m), 7.6-8.0(2H, m), 8.3-8.6(3H, m),12.0(1H, br s)
701	$-C_2H_5$	1.27(3H, t, J=7.1Hz), 3.2-3.7(2H, m), 4.39(2H, t, J=7.1Hz), 5.09(1H, dd, J=13.8Hz, 4.8Hz), 7.4-7.9(4H, m), 8.25-8.6(3H, m), 12.2(1H, br s)

Table 114



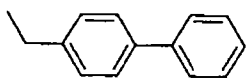
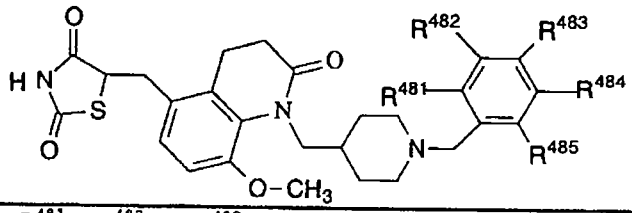
Ex.	R^{631}	^1H NMR (DMSO-d_6) dppm
702	$-CH_2C_6H_5$	3.1-3.7(2H, m), 5.16(1H, dd, J=13.8Hz, 4.8Hz), 5.63(2H, s), 7.0-7.45(5H, m), 7.6-8.0(2H, m), 8.3-8.6(3H, m),13.2(1H, br s)
703		3.1-3.7(2H, m), 5.16(1H, dd, J=13.8Hz, 4.8Hz), 5.69(2H, s), 7.1-8.0(13H, m), 8.4-8.7(3H, m),13.2(1H, br s)
704	$-C_2H_5$	1.27(3H, t, J=7.1Hz), 3.2-3.7(2H, m), 4.39(2H, t, J=7.1Hz), 5.20(1H, dd, J=13.8Hz, 4.8Hz), 7.4-7.9(4H, m), 8.35-8.6(3H, m), 13.2(1H, br s)

Table 115



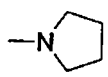
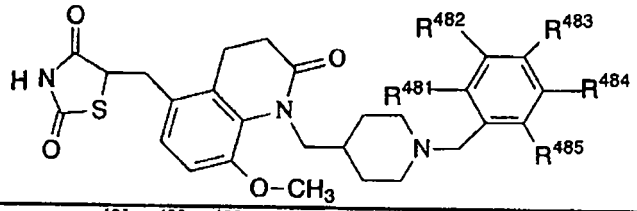
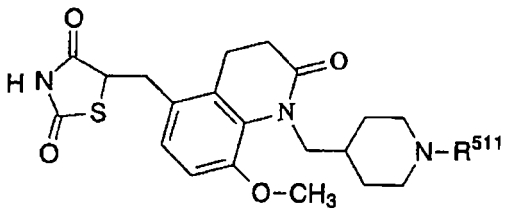
Ex.	R^{481}	R^{482}	R^{483}	R^{484}	R^{485}	MS(M+1)
705	-H	-H	-H	-H	-H	494
706	-H	-H	$-OCH_3$	-H	-H	524
707	-H	$-OCH_3$	-H	-H	-H	524
708	-H	-H	-CN	-H	-H	519
709	-H	-H	$-N(C_2H_5)_2$	-H	-H	565
710	-H	-H	$-NHCOCH_3$	-H	-H	551
711	-Cl	-H	-H	-H	-H	528
712	-H	-Cl	-H	-H	-H	528
713	-H	-H	-Cl	-H	-H	528
714	-F	-H	-H	-H	-H	512
715	-CN	-H	-H	-H	-H	519
716	$-CF_3$	-H	-H	-H	-H	562
717	-H	$-CF_3$	-H	-H	-H	562
718	-H	$-CH_3$	-H	-H	-H	508
719	-H	-H	$-CF_3$	-H	-H	562
720	-H	-H	-Br	-H	-H	574
721	-H	-H	-F	-H	-H	512
722	$-CH_3$	-H	-H	-H	-H	508
723	-H	-H	$-OC_4H_9$	-H	-H	566
724	-H	-H	$-CO_2CH_3$	-H	-H	552
725	-H	-F	-H	-H	-H	512
726	-H	-H	$-N(CH_3)_2$	-H	-H	537
727	-H	-H	$-OCOCH_3$	-H	-H	552
728	-H	-H	$-C_4H_9$	-H	-H	550
729	-H	-H	$-SO_2CH_3$	-H	-H	572
730	-H	-H	$-SC_2H_5$	-H	-H	554
731	-H	-H	$-OCHF_2$	-H	-H	560
732	-H	-H		-H	-H	563

Table 116



Ex.	R^{481}	R^{482}	R^{483}	R^{484}	R^{485}	MS(M+1)
733	-H	-H	$-OC(CH_3)_3$	-H	-H	566
734	-H	-H	-H	-H	-H	508
735	-H	-H	-H	-H	$-OCH_3$	538
736	-H	-H	-H	$-OCH_3$	-H	538
737	-H	-H	$-OCH_3$	-H	-H	538
738	-H	-H	-H	-H	-Cl	542
739	-H	-H	$-OC_4H_9$	-H	-H	580

Table 117



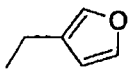
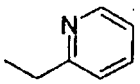
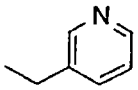
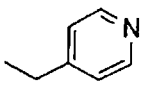
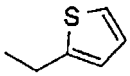
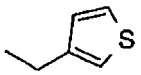
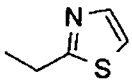
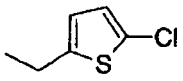
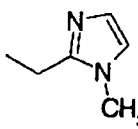
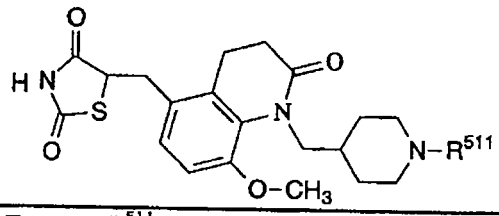
Ex.	R^{511}	MS(M+1)
740	$-CH_2$-cyclo-C_6H_{11}	500
741	$-C_6H_{13}$	488
742	-cyclo-C_6H_{11}	486
743		484
744		495
745		495
746		495
747		500
748		500
749		501
750		534
751		498

Table 118



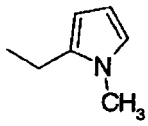
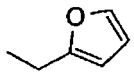
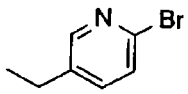
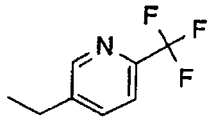
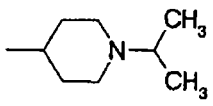
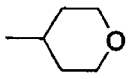
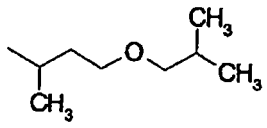
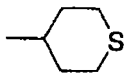
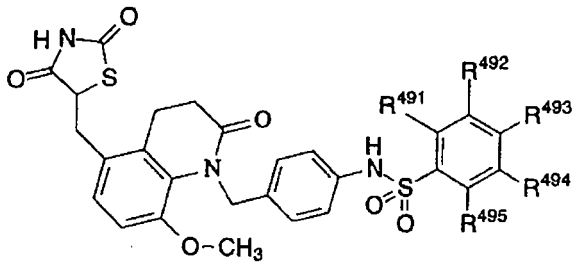
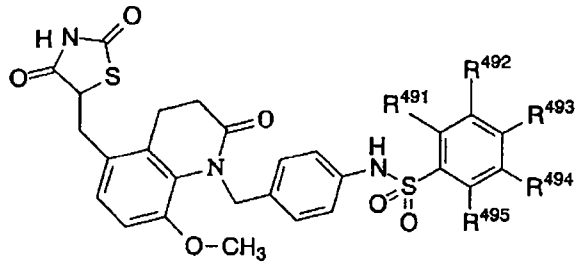
Ex.	R^{511}	MS(M+1)
752		497
753		484
754		573
755		563
756		529
757		488
758		532
759		504

Table 119



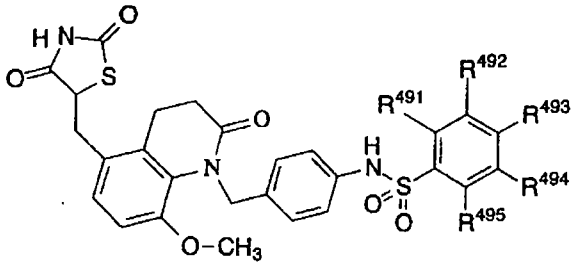
Ex.	R^{491}	R^{492}	R^{493}	R^{494}	R^{495}	MS(M+1)
760	-H	-H	$-OCH_3$	-H	-H	582
761	-H	-H	-Cl	-H	-H	586
762	-H	-H	-H	-H	$-CH_3$	566
763	-H	-H	-F	-H	-H	570
764	$-OCH_3$	-H	-H	-Cl	-H	616
765	-H	-H	-H	-H	$-CF_3$	620
766	-H	-H	-H	-H	-Cl	586
767	-H	-H	-H	-H	$-OCF_3$	636
768	-H	-H	-H	-H	$-CO_2CH_3$	610
769	-CN	-H	-H	-H	-H	577
770	-H	-H	-H	$-OCH_3$	-H	582
771	-H	-H	-H	-F	-H	570
772	-H	-H	-H	-H	-F	570
773	-H	-H	$-CF_3$	-H	-H	620
774	-H	-H	-H	$-CF_3$	-H	620
775	-H	-H	$-OCF_3$	-H	-H	636
776	-H	-H	$-OCH_3$	$-OCH_3$	-H	612
777	$-OCH_3$	-H	-H	$-OCH_3$	-H	612
778	-H	-H	-H	$-CH_3$	-H	566
779	-H	-H	-H	-H	$-NO_2$	597
780	-H	-H	-H	$-NO_2$	-H	597
781	-H	-H	-Br	-H	-H	632
782	-H	-H	-H	-Cl	-H	586
783	-H	$-CH_3$	-H	-H	$-OCH_3$	596
784	-Cl	-H	-H	-H	-Cl	620
785	-H	-H	-H	$-OCF_3$	-H	636
786	-H	-H	-H	-Cl	-Cl	620
787	-Cl	-H	-H	-Cl	-H	620
788	-H	-H	-Cl	-H	-Cl	620
789	-H	-H	$-CH_3$	$-NO_2$	-H	611
790	-H	-H	-F	-H	-Cl	604
791	-H	$-CH_3$	-Cl	-H	-Cl	634

Table 120



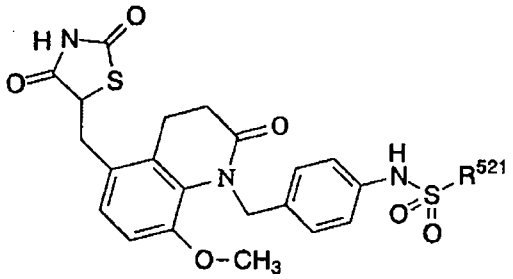
Ex.	R^{491}	R^{492}	R^{493}	R^{494}	R^{495}	MS(M+1)
792	$-CH_3$	-H	-H	$-NO_2$	-H	611
793	-Cl	-H	-H	$-NO_2$	-H	631
794	-H	-H	-CN	-H	-Cl	611
795	$-CH_3$	-H	$-CH_3$	-H	$-CH_3$	594
796	-H	-H	$-NHCOCH_3$	-H	-H	609
797	-H	-H	$-NO_2$	-H	-H	597
798	-H	-Cl	-H	-Cl	-OH	636
799	-H	-H	$-CH_3$	-H	-H	566
800	-H	-H	$-OCH_3$	-H	$-NO_2$	627
801	-H	-H	-Cl	-Cl	-H	620
802	-H	-H	$-C(CH_3)_3$	-H	-H	608
803	-H	-H	-H	$-CO_2H$	-H	596
804	-Br	-H	-H	-Cl	-H	666
805	-H	-H	$-C_2H_5$	-H	-H	580
806	-H	$-CH_3$	-H	-H	$-CH_3$	580
807	-H	-H	$-OC_4H_9$	-H	-H	624
808	-F	-H	-H	-F	-H	588
809	-H	-H	-H	-CN	-H	577
810	$-CH_3$	-H	-Cl	-H	-Cl	634
811	-H	-F	-H	-Cl	$-CH_3$	618
812	-H	-H	-Br	-H	$-CH_3$	646
813	-H	-H	-H	-Br	-H	632
814	-H	-H	-CN	-H	-H	577
815	-H	-H	$-NHCOCH_3$	-Cl	-H	643
816	-H	-H	-F	-H	-F	588
817	-H	-H	$-CH_3$	-H	$-OCH_3$	596
818	-H	-H	-H	-Cl	$-CH_3$	600
819	-F	-H	-H	-H	-F	588
820	$-CH_3$	-H	-H	-F	-H	584
821	$-CH_3$	-H	-Cl	$-CH_3$	-H	614
822	$-CH_3$	-H	-H	-H	-Cl	600
823	-H	-H	$-CH(CH_3)_2$	-H	-H	594

Table 121



Ex.	R^{491}	R^{492}	R^{493}	R^{494}	R^{495}	MS(M+1)
824	-H	-H	-F	-Cl	-H	604
825	-H	-H	-Br	-H	-F	650
826	-H	-H	$-CH_3$	-Cl	-H	600
827	-H	-H	-F	-F	-H	588
828	-H	-H	-H	-H	-Br	632
829	-H	-Cl	-H	-Cl	-H	620
830	-H	-H	$-(CH_2)_2CO_2CH_3$	-H	-H	638
831	$-CH_3$	-H	$-OCH_3$	$-CH_3$	$-CH_3$	624
832	-H	-H	-OH	$-CO_2H$	-H	612
833	-H	-H	$-CO_2H$	-H	-H	596
834	-F	-H	-F	-F	-H	606
835	-H	-H	-H	-H	-H	552

Table 122



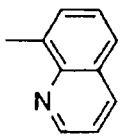
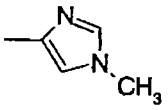
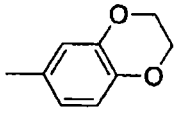
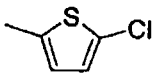
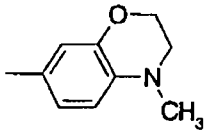
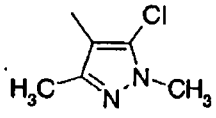
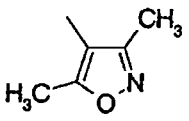
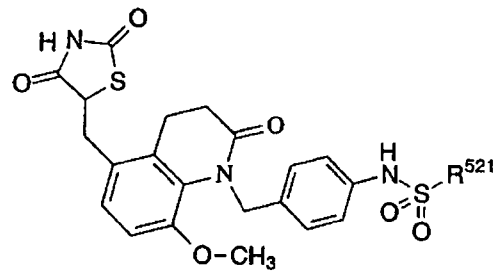
Ex.	R^{521}	MS(M+1)
836	-2-THIENYL	558
837	$-C_4H_9$	532
838	$-CH=CH_2$	502
839	$-(CH_2)_3Cl$	552
840	$-CH_2$-cyclo-C_6H_{11}	572
841	$-CH_2CF_3$	558
842	$-CH_2C_6H_5$	566
843	$-CH=CHC_6H_5$(trans)	578
844		603
845		556
846		610
847		592
848		623
849		604
850		571

Table 123



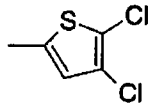
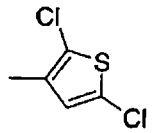
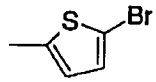
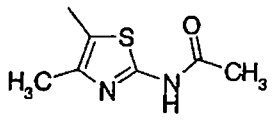
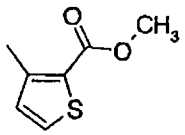
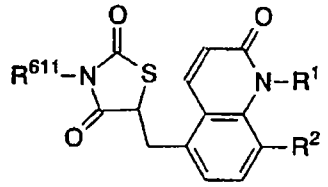
Ex.	R^{521}	MS(M+1)
851		626
852		626
853		638
854		630
855		616

Table 124



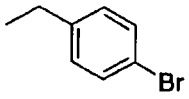
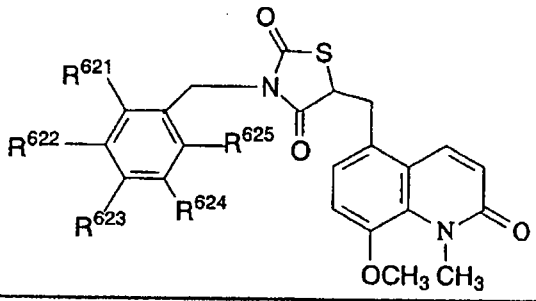
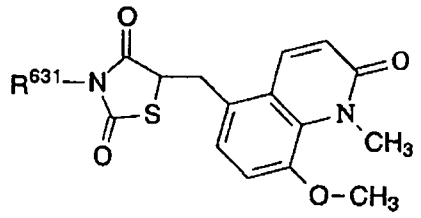
Ex.	R^1	R^2	R^{611}	M.p.(°C)
856	$-CH_3$	$-OCH_3$	-H	254-255
857	$-CH_3$	$-OCH_3$	$-CH_2CO_2CH_3$	182-184
858	$-CH_3$	$-OCH_3$	$-CH_2CO_2H$	207-210
859	$-(CH_2)_2CH(CH_3)_2$	$-OCH_3$	-H	141-145
860		$-OCH_3$	-H	247.9-251.8

Table 125



Ex.	R^{621}	R^{622}	R^{623}	R^{624}	R^{625}	MS(M+1)
861	-H	-H	-Cl	-H	-H	443
862	-H	-H	-H	-H	-Cl	443
863	-H	-H	-H	$-CF_3$	-H	477
864	-H	-H	-H	-H	$-CH_3$	423
865	-H	-H	-H	-H	$-C_6H_5$	485
866	-H	-H	$-C(CH_3)_3$	-H	-H	465
867	-H	-H	$-CF_3$	-H	-H	477
868	-H	-H	$-CH_3$	-H	-H	423
869	-H	-H	$-C_6H_5$	-H	-H	485
870	-H	-H	-H	-H	$-OCF_3$	493
871	-H	-H	-H	-F	-H	427
872	-H	-H	-H	$-CH_3$	-H	423
873	-H	-H	$-OCF_3$	-H	-H	493
874	-H	-H	-H	-Cl	-H	443
875	-H	-H	-F	-H	-H	427
876	-H	-H	-H	$-OCH_3$	-H	439
877	-H	-H	$-OCH_3$	-H	-H	439
878	-H	-H	$-CO_2CH_3$	-H	-H	467
879	-H	-H	-H	$-OC_6H_5$	-H	501
880	-H	-H	$-SCH_3$	-H	-H	465
881	-H	-H	-H	-H	-H	409
882	-H	-H	$-SO_2CH_3$	-H	-H	487
883	-H	-H	-H	$-OCF_3$	-H	493
884	-H	-H	$-OCH_2C_6H_5$	-H	-H	515
885	-H	-H	$-OCH_3$	-Cl	-H	473
886	-H	-H	-H	-H	$-OCH_3$	439
887	-H	-H	$-NHCOCH_3$	-H	-H	466

Table 126



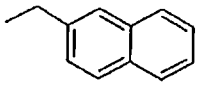
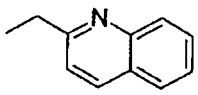
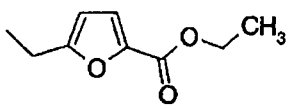
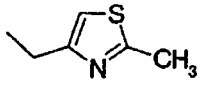
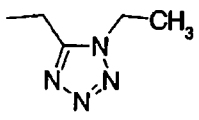
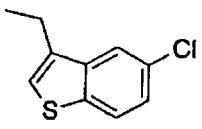
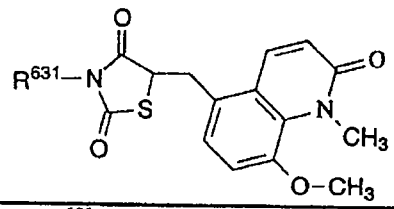
Ex.	R^{631}	MS(M+1)
888	$-CH_2C\equiv CH$	357
889	$-CH_2CH=CH_2$	359
890	$-CH_2CH=CHC_6H_5$	435
891	$-(CH_2)_2C_6H_5$	423
892	$-(CH_2)_3C_6H_5$	437
893	$-CH_3$	333
894	$-C_2H_5$	347
895	$-CH(CH_3)_2$	361
896	$-C_4H_9$	375
897	$-CH_2CH_2OH$	363
898	$-C_6H_{13}$	403
899	$-CH_2$-cyclo-C_6H_{11}	415
900	$-CH_2CO_2C_2H_5$	405
901		459
902		460
903		471
904		430
905		429
906		499

Table 127



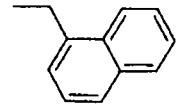
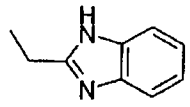
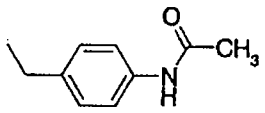
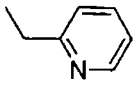
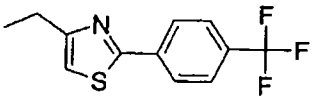
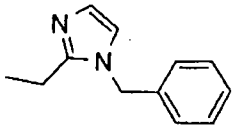
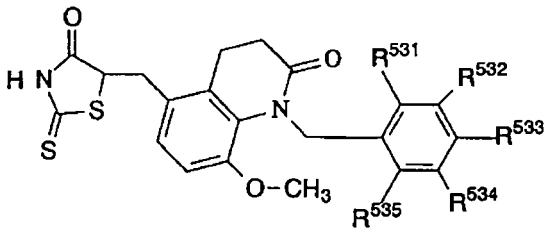
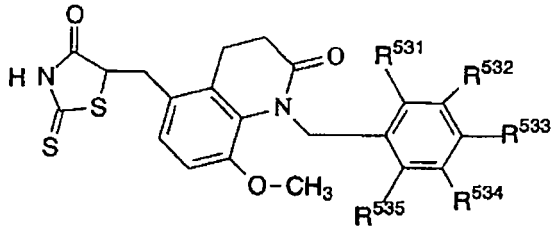
Ex.	R^{631}	MS(M+1)
907		459
908		449
909		466
910		410
911		560
912		489

Table 128



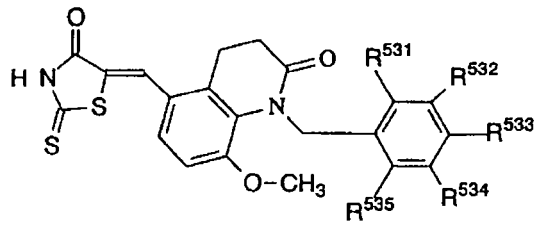
Ex.	R^{531}	R^{532}	R^{533}	R^{534}	R^{535}	M.p.(°C)
913	-H	-H	$-C_6H_5$	-H	-H	164-168
914	-H	-H	$-C(CH_3)_3$	-H	-H	222-224
915	-H	-H	-H	-H	$-C_6H_5$	193-199
916	-H	-H	-Cl	-H	-H	179.8-183.8
917	-H	-H	-Br	-H	-H	191.3-192.1
918	-H	-H	$-OC_6H_5$	-H	-H	156.5-158.5

Table 129



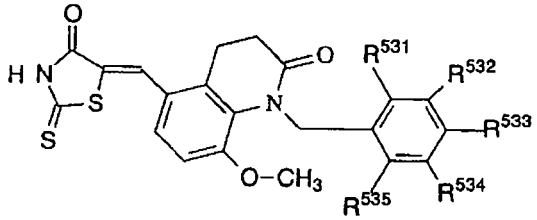
Ex.	R^{531}	R^{532}	R^{533}	R^{534}	R^{535}	1H NMR (DMSO-d6) δ ppm
919	-H	-H	-H	-H	-H	2.45-2.54(m, 2H), 2.75-2.85(m, 2H), 3.13(dd; J=9.5, 14.4Hz, 1H), 3.38(dd; J=4.7, 14.4Hz, 1H), 3.67(S, 3H), 4.92(dd; J=4.7, 9.5Hz, 1H), 5.19(S, 2H), 6.81(d, J=8.6Hz, 1H), 6.89(d, J=8.6Hz, 1H), 7.04(d, J=7.5Hz, 2H), 7.11(t, J=7.5Hz, 1H), 7.19(t, J=7.5Hz, 2H), 13.19(brs, 1H)
920	-H	-H	-H	$-C_6H_5$	-H	2.47-2.57(m, 2H), 2.80-2.88(m, 2H), 3.15(dd; J=9.9, 14.5Hz, 1H), 3.40(dd; J=4.5, 14.5Hz, 1H), 3.69(S, 3H), 4.91(dd; J=4.5, 9.9Hz, 1H), 5.26(s, 2H), 6.84(d, J=8.6Hz, 1H), 6.91(d, J=8.6Hz, 1H), 7.02(d, J=7.7Hz, 1H), 7.24-7.57(m, 8H), 13.22(brs, 1H)

Table 130



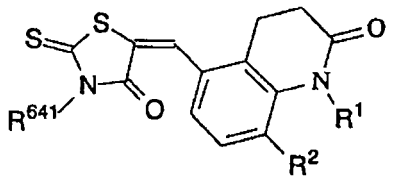
Ex.	R^{531}	R^{532}	R^{533}	R^{534}	R^{535}	1H NMR (DMSO-d6) dppm
921	-H	-H	-H	-H	-H	2.56(2H, t, J=6.9Hz), 2.97(2H, t, J=6.9Hz), 3.78(3H, s), 5.21(2H, s), 7.0-7.55(7H, m), 7.69(1H, s), 13.80(1H, br s)
922	-H	-H	$-C_6H_5$	-H	-H	2.58(2H, t, J=6.9Hz), 3.00(2H, t, J=6.9Hz), 3.81(3H, s), 5.24(2H, s), 7.0-7.6(11H, m), 7.80(1H, s), 13.85(1H, br s)
923	-H	-H	$-C(CH_3)_3$	-H	-H	1.20(9H, s), 2.54(2H, t, J=6.9Hz), 2.96(2H, t, J=6.9Hz), 3.81(3H, s), 5.20(2H, s), 7.00(2H, d, J=8.2Hz), 7,07(1H, d, J=8.8Hz), 7.15(1H, d, J=8.8Hz), 7.22(2H, d, J=8.2Hz), 769(1H, s), 13.8(1H, br s)

Table 131



Ex.	R^{531}	R^{532}	R^{533}	R^{534}	R^{535}	1H NMR (DMSO-d6) dppm
924	-H	-H	-H	$-C_6H_5$	-H	2.57(2H, t, J=6.9Hz), 3.00(2H, t, J=6.9Hz), 3.79(3H, s), 5.27(2H, s), 7.0-7.55(11H, m), 7.71(1H, s), 13.7(1H, br s)
925	-H	-H	-H	-H	$-C_6H_5$	2.49(2H, t, J=6.9Hz), 2.80(2H, t, J=6.9Hz), 3.44(3H, s), 5.20(2H, s), 6.91(1H, d, J=8.6Hz), 7.05-7.5(10H, m), 7.66(1H, s), 13.8(1H, br s)
926	-H	-H	-Cl	-H	-H	2.49-2.56 (2H, m), 2.84-3.08 (2H, m), 3.74 (3H, s), 5.14 (2H, s), 6.95-7.20 (4H, m), 7.20-7.33 (2H, m), 7.69 (1H, s), 13.79 (1H, brs).
927	-H	-H	-Br	-H	-H	2.51-2.62 (2H, m), 2.86-3.05 (2H, m), 3.74 (3H, s), 5.11 (2H, s), 6.98-7.10 (3H, m), 7.16 (1H, d, J = 8.8 Hz), 7.40 (2H, d, J = 8.3 Hz), 7.69 (1H, s), 13.79 (1H, s).
928	-H	-H	$-OC_6H_5$	-H	-H	2.42-2.61 (2H, m), 2.85-2.05 (2H, m), 3.80 (3H, s), 5.17 (2H, s), 6.84 (2H, d, J = 8.6 Hz), 6.91 (2H, d, J = 7.8 Hz), 7.05-7.17 (5H, m), 7.32-7.37 (2H, m), 7.69 (1H, s), 13.78 (1H, brs).

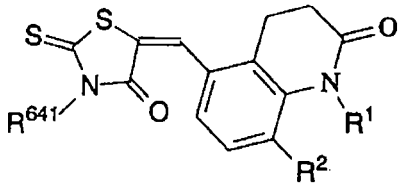
Table 132



Ex.	R^1	R^{641}	R^2	^1H NMR dppm
929	$-CH_3$	-H	$-OCH_3$	2.43(2H, t, J=6.9Hz), 2.91(2H, t, J=6.9Hz), 3.20(3H, s), 3.89(3H, s), 7,17(1H, d, J=8.8Hz), 7.20(1H, d, J=8.8Hz), 7.68(1H, s)
930	-H	-H	$-OCH_3$	2.48(2H, t, J=6.9Hz), 3.00(2H, t, J=6.9Hz), 3.85(3H, s), 6.95-7.2(2H, m), 9.22(1H, s), 13.77(1H, br s)
931	$-CH_3$	$-CH_3$	$-OCH_3$	$CDCl_3$: 2.5-2.6(2H, m), 2.95-3.0(2H, m), 3.37(3H, s), 3.53(3H, s), 3.93(3H, s), 6.95(1H, d, J=8.8Hz), 7.24(1H, d, J=8.8Hz), 7.89(1H, s)
932	$-C_4H_9$	-H	$-OCH_3$	0.81(3H, t, J=7.3Hz), 1.1-1.2(2H, m), 1.3-1.4(2H, m), 2.44(1H, t, J=6.9Hz), 2.90(2H, t, J=6.9Hz), 3.90(3H, s),3.92(2H, t, J=7.3Hz), 7,18(1H, d, J=8.8Hz), 7.22(1H, d, J=8.8Hz), 7.71(1H, s), 13.81(1H, br s)
933	$-(CH_2)_3C_6H_5$	-H	$-OCH_3$	1.65-1.8(2H, m), 2.35-2.5(4H, m), 2.92(2H, t, J=6.9Hz), 3.80(3H, s),3.91(2H, t, J=7.3Hz), 7.0-7.3(7H, m), 7.72(1H, s), 13.8(1H, br s)
934	$-(CH_2)_2C_6H_5$	-H	$-OCH_3$	2.36(2H, t, J=6.9Hz), 2.59(2H, t, J=4.5Hz), 2.73(2H, t, J=6.9Hz), 3.96(3H, s), 4.17(2H, t, J=4.5Hz), 7.00(1H, d, J=8.8Hz), 7.1-7.3(5H, m), 7.64(1H, s), 13.82(1H, br s)
935	$-C_2H_5$	-H	$-OCH_3$	1.07(3H, t, J=7.0Hz), 2.42(2H, t, J=6.9Hz), 2.92(2H, t, J=6.9Hz), 3.86(2H, q, J=7.0Hz), 3.91(3H, s), 7.19(1H, d, J=8.8Hz), 7.22(1H, d, J=8.8Hz), 7.71(1H, s), 12.82(1H, br s)
936	$-(CH_2)_2OC_6H_5$	-H	$-OCH_3$	2.47(2H, t, J=6.9Hz), 2.88(2H, t, J=6.9Hz), 3.88(3H, s), 4.06(2H, t, J=5.9Hz), 4.29(2H, t, J=5.9Hz), 6.77(2H, d, J=8.6Hz), 6.88(1H, t, J=8.6Hz), 7.1-7.3(4H, m), 7.68(1H, s), 13.8(1H, br s)
937	$-CH_2$-cyclo-C_6H_{11}	-H	$-OCH_3$	0.75-1.57(11H, m), 2.45(2H, t, J=6.9Hz), 2.92(2H, t, J=6.9Hz), 3.91(3H, s), 3.95-4.00(2H, m), 7,18(1H, d, J=8.8Hz), 7.23(1H, d, J=8.8Hz), 7.73(1H, s), 13.8(1H, br s)

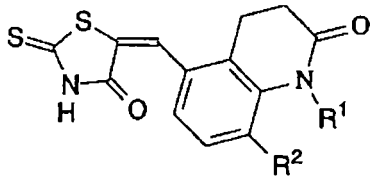
DMSO-d_6 is used for measuring NMR, unless otherwise specified.

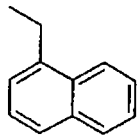
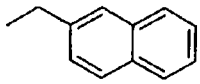
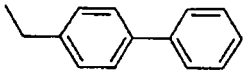
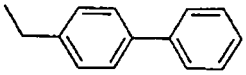
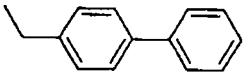
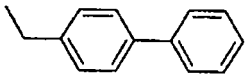
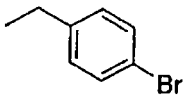
Table 133



Ex.	R^1	R^{641}	R^2	^1H NMR (DMSO-d_6) dppm
938	$-CH_2CH_2OCH_3$	-H	$-OCH_3$	2.50(2H, t, J=6.9Hz), 2.89(2H, t, J=6.9Hz), 3.10(3H, s), 3.35(2H, t, J=6.0Hz), 3.90(3H, s), 4.10(2H, t, J=6.0Hz), , 7.17(2H, d, J=8.6Hz), 7.24(1H, t, J=8.6Hz), 7.71(1H, s), 13.8(1H, br s)
939	$-CH(C_6H_5)_2$	-H	$-OCH_3$	2.4-2.5(2H, m), 2.8-2.95(2H, m), 3.41(3H, s), 6.29(2H, s), 6.95-7.35(12H, m), 7.73(1H, s), 13.8(1H, br s)
940	$-CH_2$-cyclo-C_3H_5	-H	$-OCH_3$	0.05-0.10(2H, m), 0.25-0.30(2H, m), 0.75-0.80(1H, m), 2.46(2H, t, J=6.9Hz), 2.93(2H, t, J=6.9Hz), 3.85-3.950(5H, m), 7.1-7.3(2H, m), 7.73(1H, s), 13.82(1H, br s)
941	$-C_6H_5$	-H	-H	2.71-2.76 (2H, m), 3.13-3.18 (2H, m), 6.32 (1H, d, J = 8.1 Hz), 7.10 (1H, d, J = 7.7 Hz), 7.19-7.27 (3H, m), 7.43-7.56 (3H, m), 7.83 (1H, s), 13.85 (1H, brs).
942	$-(CH_2)_4C_6H_5$	-H	$-OCH_3$	1.35-1.50(4H, m), 2.40-2.70(4H, m), 2.89(2H, t, J=6.9Hz), 3.83(3H, s), 3.85-3.95(2H, m), 7.05-7.3(7H, m), 7.71(1H, s), 13.8(1H, br s)
943	$-(CH_2)_5C_6H_5$	-H	$-OCH_3$	1.05-1.15(2H, m), 1.35-1.5(4H, m), 2.35-2.70(4H, m), 2.80(2H, t, J=6.9Hz), 3.85-4.0(5H, m), 7.05-7.3(7H, m), 7.69(1H, s), 13.82(1H, br s)

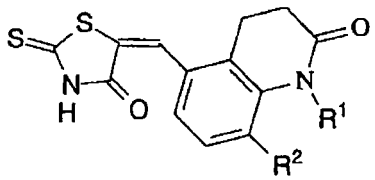
Table 134



Ex.	R^1	R^2	^1H NMR dppm
944		$-OCH_3$	2.61(2H, t, J=6.9Hz), 2.87(2H, t, J=6.9Hz), 3.71(3H, s), 5.64(2H, s), 7.0-8.05(9H, m), 13.8(1H, br s)
945		$-OCH_3$	2.60(2H, t, J=6.9Hz), 3.02(2H, t, J=6.9Hz), 3.77(3H, s), 5.37(2H, s), 6.95-7.85(9H, m), 13.8(1H, br s)
946		$-OC_4H_9$	0.82(3H, t, J=7.4Hz), 1.2-1.35(2H, m), 1.45-1.6(2H, m), 2.59(2H, t, J=6.9Hz), 3.01(2H, t, J=6.9Hz), 4.01(2H, t, J=6.4Hz), 5.21(2H, s), 7.0-7.65(11H, m), 7.71(1H, s), 13.8(1H, br s)
947		$-OCH_2CO_2C(CH_3)_3$	$CDCl_3$: 1.54(9H, s), 2.68(2H, t, J=6.8Hz), 2.98(2H, t, J=6.8Hz), 4.46(2H, s), 5.47(2H, s), 6.69(1H, d, J=8.5Hz), 7.1-7.6(10H, m), 7.78(1H, s), 9.25(1H, br s)
948		-OH	2.57(2H, t, J=6.9Hz), 2.97(2H, t, J=6.9Hz), 5.35(2H, s), 6.8-7.65(11H, m), 7.69(1H, s), 10.92(1H, s), 13.8(1H, br s)
949		-H	2.64-2.82 (2H, m), 3.07 (2H, t, J = 7.8 Hz), 5.21 (2H, brs), 7.00-7.13 (2H, m), 7.24-7.49 (6H, m), 7.54-7.70 (4H, m), 7.79 (1H, s), 13.82 (1H, s).
950		-H	2.64-2.80 (2H, m), 2.97-3.12 (2H, m), 5.13 (2H, s), 7.01 (1H, d, J = 8.1. Hz), 7.08 (1H, d, J = 7.7 Hz), 7.11-7.35 (3H, m), 7.44-7.55 (2H, m), 7.78 (1H, s), 13.84 (1H, s).

DMSO-d_6 is used for measuring NMR, unless otherwise specified.

Table 135



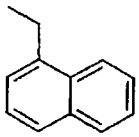
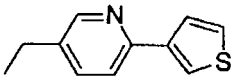
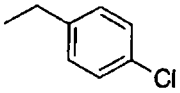
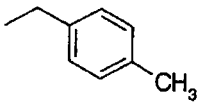
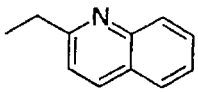
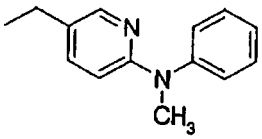
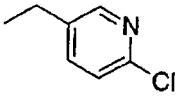
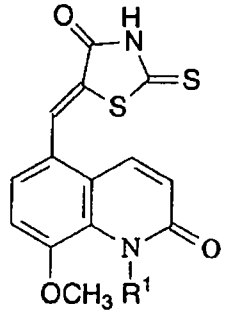
Ex.	R^1	R^2	^1H NMR (DMSO-d_6) dppm
951		-H	2.20-2.37 (2H, m), 2.49-2.69 (2H, m), 4.83 (2H, s), 6.49-6.62 (2H, m), 6.68-6.82 (1H, m), 6.87-7.05 (3H, m), 7.21 (1H, s), 7.25-7.49 (4H, m), 13.36 (1H, s).
952		$-OCH_3$	2.58-2.61 (2H, m), 2.98-3.01 (2H, m), 3.77 (3H, s), 5.17 (2H, s), 7.07 (1H, d, J=8.9Hz), 7.16 (1H, d, J=8.9Hz), 7.53-7.74 (5H, m), 8.09-8.10 (1H, m), 8.35 (1H, d, J=2.0Hz), 13.79 (1H, brs)
953		-H	2.65-2.80 (2H, m), 2.99-3.12 (2H, m), 5.16 (2H, s), 7.03 (1H, d, J = 8.1 Hz), 7.09 (1H, d, J = 7.7 Hz), 7.20-7.40 (5H, m), 7.79 (1H, s), 13.87 (1H, brs).
954		-H	2.24 (3H, s), 2.68-2.73 (2H, m), 3.01-3.07 (2H, m), 5.12 (2H, s), 7.02-7.18 (6H, m), 7.26 (1H, t, J = 8.0 Hz), 7.78 (1H, s), 13.86 (1H, brs).
955		$-OCH_3$	2.61-2.66 (2H, m), 3.16-3.21 (2H, m), 3.64 (3H, s), 5.33 (2H,s), 7.07 (1H, d, J=8.8Hz), 7.17 (1H, d, J=8.8Hz), 7.39 (1H, d, J=8.6Hz), 7.50-7.561 (1H, m), 7.67-7.73 (1H, m), 7.78 (1H, s), 7.87-7.93 (2H, m), 8.24 (1H, d, J=8.5Hz), 13.80 (1H, brs)
956		$-OCH_3$	2.47-2.52 (2H, m), 2.88-2.93 (2H, m), 3.30 (3H, s), 3.86 (3H, s), 5.11 (2H,s), 6.38 (1H, d, J=8.7Hz), 7.06-7.22 (6H, m), 7.35-7.41 (2H, m), 7.67 (1H, s), 7.89 (1H, d, J=2.1Hz), 13.75 (1H, brs)
957		-H	2.70-2.76 (2H, m), 3.03-3.09 (2H, m), 5.21 (2H,s), 7.07-7.12 (2H, m), 7.32 (1H, t, J=8.0Hz), 7.45 (1H, d, J=8.3Hz), 7.69 (1H, dd, J1=2.4Hz, J2=8.3Hz), 7.78 (1H, s), 8.36 (1H, d, J=2.4Hz), 13.81 (1H, brs)

Table 136



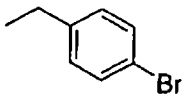
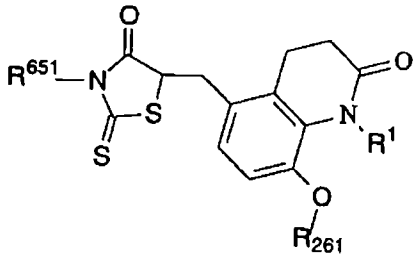
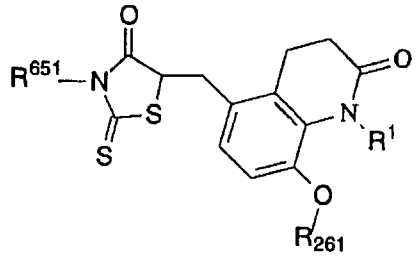
Ex.	R^1	^1H NMR (DMSO-d_6) dppm
958	$-CH_3$	4.02(3H, s), 4.07(3H, s), 6.77(1H, d, J=9.8Hz), 7.35-7.65(2H, m), 8.07(1H, s), 8.17(1H, d, J=9.8Hz),
959		3.66 (3H, s), 5.67 (2H, s), 6.82 (1H, d, J = 9.8 Hz), 7.04 (2H, d, J = 8.5 Hz), 7.28-7.38 (2H, m), 7.40-7.52 (2H, m), 8.05 (1H, s), 8.22 (1H, d, J = 10.0 Hz), 13.86 (1H, brs).

Table 137



Ex.	R^1	R^{651}	R^{261}	M.p.(°C)
960	$-CH_3$	-H	$-CH_3$	204-209
961	-H	-H	$-CH_3$	266(dec.)
962	$-CH_3$	$-CH_3$	$-CH_3$	196-198
963	$-C_2H_5$	-H	$-CH_3$	200.5-201.5
964	$-CH(C_6H_5)_2$	-H	$-CH_3$	233(dec.)
965	$-(CH_2)_2CH(CH_3)_2$	-H	$-CH_3$	139.5-141
966	$-C_3H_7$	-H	$-CH_3$	59-83
967	$-C_5H_{11}$	-H	$-CH_3$	143-145.5
968	$-CH(CH_3)_2$	-H	$-CH_3$	182-184
969	$-CH_2CH(CH_3)_2$	-H	$-CH_3$	208-211

Table 138



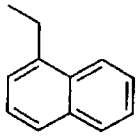
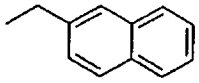
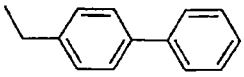
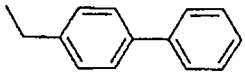
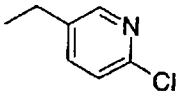
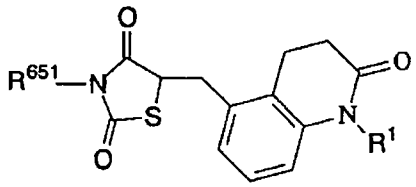
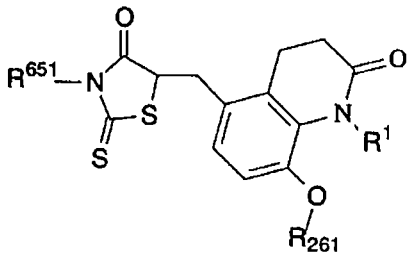
Ex.	R^1	R^{651}	R^{261}	M.p.(°C)
970		-H	$-CH_3$	238(dec.)
971		-H	$-CH_3$	133-136
972		-H	$-C_4H_9$	156-161
973		-H	$-CH_2CO_2H$	128-135
974		-H	$-CH_3$	177-181

Table 139



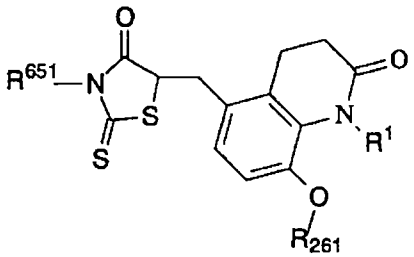
Ex.	R^1	R^{651}	^1H NMR δppm
975	$CH_3OCH_2O(CH_2)_3$-	-H	$CDCl_3$: 1.9-2.0(2H, m), 2.63(2H, t, J=7.1Hz), 2.75-3.05(2H,m), 3.16(1H, dd, J=13.3Hz, J=4.0Hz), 3.37(3H,s), 3.60(2H, t, J=6.2Hz), 3.6-3.75(1H, m), 4.0-4.2(2H,m), 4.48(1H, dd, J=10.3Hz, J=4.0Hz), 4.69(3H, s), 6.94(1H, d, J=7.6Hz), 7.08(1H, d, J=8.2Hz) , 7.5-9.0(1H, m)
976	$HO(CH_2)_3$-	-H	DMSO-d_6:1.6-1.9(2H, m), 2.7-3.0(2H,m), 3.13(1H, dd, J=14.4Hz, J=4.0Hz), 3.3-3.8(5H, m), 3.91(2H, t, J=8.4Hz), 4.55(1H, t, J=5.0Hz), 4.83(1H, dd, J=14.4Hz, J=4.0Hz), 6.92(1H, d, J=7.5Hz), 7.0-7.5(2H, m), 12.13(1H, br s)

Table 140



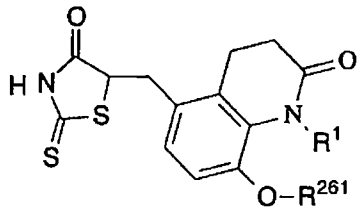
Ex.	R^1	R^{651}	R^{261}	^1H NMR (DMSO-d_6) dppm
977	$-(CH_2)_3C_6H_5$	-H	$-CH_3$	1.64-1.73(m, 2H), 2.32-2.42(m, 4H), 2.74-2.85(m, 2H), 3.10(dd; J=9.8, 14.4Hz, 1H), 3.14(dd; J=4.6, 14.4Hz, 1H), 3.69(S, 3H), 3.85-3.95(m, 2H), 4.93(dd; J=4.6, 9.8Hz, 1H), 6.93(d, J=8.6Hz, 1H), 6.98(d, J=8.6Hz, 1H), 7.04(d, J=7.5Hz, 2H), 7.14(t, J=7.5Hz, 1H), 7.23(t, J=7.5Hz, 2H), 13.22(brs, 1H)
978	$-(CH_2)_2C_6H_5$	-H	$-CH_3$	2.22-2.31(m, 2H), 2.32-2.55(m, 2H), 2.63-2.75(m, 2H), 3.12(dd; J=10.0, 14.4Hz, 1H), 3.68(dd; J=4.5, 14.4Hz, 1H), 3.87(S, 3H), 4.10-4.30(m, 2H), 4.83(dd; J=4.5, 10.0Hz, 1H), 6.90-7.05(m, 4H), 7.12-7.25(m, 3H), 13.25(brs, 1H)
979	$-C_4H_9$	-H	$-CH_3$	0.79(t; J=7.2Hz, 3H), 1.13(tt; J=7.2, 7.2Hz, 2H), 1.35(tt; J=7.2, 7.2Hz, 2H), 2.34-2.43(m, 2H), 2.70-2.80(m, 2H), 3.21(dd; J=9.5, 14.5Hz, 1H), 3.41(dd; J=4.7, 14.5Hz, 1H), 3.80(S, 3H), 3.93(t; J=7.2Hz, 2H), 4.94(dd; J=4.7, 9.5Hz, 1H), 6.95(d; J=8.8Hz, 1H), 6.97(d; J=8.8Hz, 1H), 13.20(brs, 1H)
980	$-CH_2$-cyclo-C_3H_5	-H	$-CH_3$	0-0.07(m, 2H), 0.20-0.26(m, 2H), 0.73-0.84(m, 1H), 2.30-2.42(m, 2H), 2.70-2.85(m, 2H), 3.18(dd; J=9.1, 14.5Hz, 1H), 3.42(dd; J=4.7, 14.5Hz, 1H), 3.81(S, 3H), 3.84-3.90(m, 2H), 4.95(dd; J=4.7, 9.1Hz, 1H), 6.94(d; J=8.6Hz, 1H), 6.97(d; J=8.6Hz, 1H), 13.19(brs, 1H)
981	$-(CH_2)_2OC_6H_5$	-H	$-CH_3$	2.39-2.47(m, 2H), 2.70-2.83(m, 2H), 3.14(dd; J=10.0, 14.5Hz, 1H), 3.40(dd; J=4.5, 14.5Hz, 1H), 3.79(S, 3H), 4.00-4.07(m, 2H), 4.20-4.30(m, 2H), 4.88(dd; J=4.5, 10.0Hz, 1H), 6.79(d, J=7.7Hz, 2H), 6.88(t, J=7.7Hz, 1H), 6.95(d, J=8.7Hz, 1H), 6.98(d, J=8.7Hz, 1H), 7.22(t, J=7.7Hz, 2H), 13.23(brs, 1H)

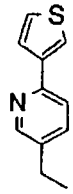
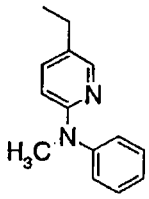
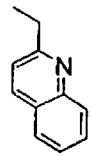
Table 141



Ex.	R^1	R^{651}	R^{261}	^{1}H NMR (DMSO-d_6) dppm
982	-CH_2-cyclo-C_6H_{11}	-H	-CH_3	0.71-0.80(m, 2H), 0.94-1.07(m, 3H), 1.20-1.27(m, 1H), 1.37-1.45(m, 2H), 1.45-1.59(m, 3H), 2.34-2.43(m, 2H), 2.70-2.80(m, 2H), 3.19(dd; J=9.2, 14.5Hz, 1H), 3.41(dd; J=4.9, 14.5Hz, 1H), 3.80(S, 3H), 3.88-3.99(m, 2H), 4.95(dd; J=4.9, 9.2Hz, 1H), 6.94(d, J=8.6Hz, 1H), 6.97(d, J=8.6Hz, 1H), 13.18(brs, 1H)
983	-$CH_2CH_2OCH_3$	-H	-CH_3	2.34-2.43(m, 2H), 2.69-2.79(m, 2H), 3.08(S, 3H), 3.17(dd; J=9.6, 14.5Hz, 1H), 3.25-3.36(m, 2H), 3.41(dd; J=4.6, 14.5Hz, 1H), 3.80(S, 3H), 4.03-4.12(m, 2H), 4.93(dd; J=4.6, 9.6Hz, 1H), 6.95(d, J=8.6Hz, 1H), 6.98(d, J=8.6Hz, 1H), 13.21(brs, 1H)
984	-$(CH_2)_4C_6H_5$	-H	-CH_3	1.38-1.45(m, 4H), 2.33-2.42(m, 2H), 2.43-2.53(m, 2H), 2.69-2.80(m, 2H), 3.16(dd; J=9.7, 14.6Hz, 1H), 3.40(dd; J=4.6, 14.6Hz, 1H), 3.74(S, 3H), 3.88-3.96(m, 2H), 4.93(dd; J=4.6, 9.7Hz, 1H), 6.93(d, J=8.6Hz, 1H), 6.97(d, J=8.6Hz, 1H), 7.10(d, J=7.3Hz, 2H), 7.14(t, J=7.3Hz, 1H), 7.24(t, J=7.3Hz, 2H), 13.20(brs, 1H)
985	-$(CH_2)_5C_6H_5$	-H	-CH_3	1.05-1.16(m, 2H), 1.34-1.51(m, 4H), 2.31-2.41(m, 2H), 2.43-2.53(m, 2H), 2.64-2.72(m, 2H), 3.14(dd; J=9.7, 14.5Hz, 1H), 3.40(dd; J=4.6, 14.5Hz, 1H), 3.78(S, 3H), 3.87-3.96(m, 2H), 4.91(dd; J=4.6, 9.7Hz, 1H), 6.94(d, J=8.6Hz, 1H), 6.97(d, J=8.6Hz, 1H), 7.12(d, J=7.4Hz, 2H), 7.15(t, J=7.4Hz, 1H), 7.24(t, J=7.5Hz, 2H), 13.22(brs, 1H)

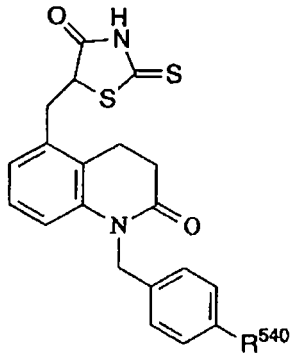
Table 142



Ex.	R^1	R^{261}	^1H NMR dppm
986		$-CH_3$	2.83-2.89 (2H, m), 3.20-3.10 (1H, m), 3.36-3.42 (2H, m), DMSO overlap (1H), 3.66 (3H, s), 4.93 (1H, dd, J1=4.5Hz, J2=9.5Hz), 5.15 (2H, s), 6.84 (1H, d, J=8.6Hz), 6.92 (1H, d, J=8.6Hz), 7.54-7.57 (1H, m), 7.61-7.77 (3H, m), 8.11-8.13 (1H, m), 8.36 (1H, d, J=1.8Hz), 13.19 (1H, brs)
987		$-CH_3$	2.84-2.78 (2H, m), 3.15-3.21(2H, m), DMSO overlap (3H, s), 3.72 (3H, s), 4.90-4.94 (1H, m), 5.01 (2H,s), 6.65 (1H, d, J=9.0Hz), 6.88-6.93 (2H, m), 7.36-7.39 (3H, m), 7.50-7.53 (3H, m), 7.85 (1H, s), 13.20 (1H, brs)
988		$-CH_3$	2.55-2.60 (2H, m), 3.05-3.10 (2H, m), 3.13-3.48 (2H, m), 3.53 (3H, s), 4.93-4.99 (1H, m), 5.31 (2H,s), 6.84 (1H, d, J=8.5Hz), 6.93 (1H, d, J=8.5Hz), 7.34 (1H, d, J=8.6Hz), 7.50-7.56 (1H, m), 7.66-7.72 (1H, m), 7.88-7.95 (2H, m), 8.22 (1H, d, J=8.6Hz), 12.77 (1H, brs)
989		$-CH_2CO_2C(CH_3)_3$	$CDCl_3$: 1.52(s, 9H), 2.6-2.7(m, 2H), 2.7-2.95(m, 2H), 3.1-3.2(m, 1H), 3.35-3.5(m, 1H), 4.39(s, 2H), 4.45-4.55(m, 1H), 5.4-5.55(m, 1H), 6.57(d, 1H, J=8.6Hz), 6.86(d, 1H, J=8.6Hz), 7.1-7.6(m, 9H), 8.96(br s)

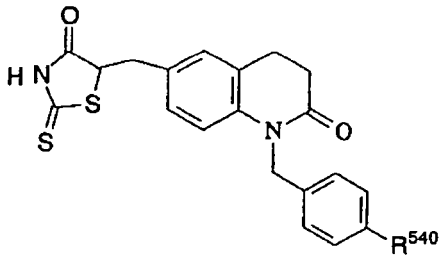
DMSO-d_6 is used for measuring NMR, unless otherwise specified.

Table 143



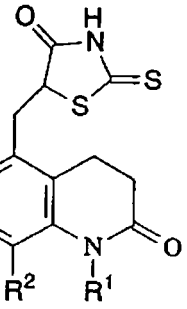
Ex.	R^{540}	M.p.(°C)
990	$-C_6H_5$	186.8-188.0
991	-Br	229.6-230.4
992	-Cl	214.6-215.4
993	$-CH_3$	188.7-189.5

Table 144



Ex.	R^{540}	M.p.(°C)
994	-Br	204.5-205.7
995	$-C_6H_5$	186.3-187.1

Table 145



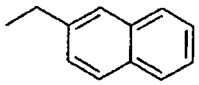
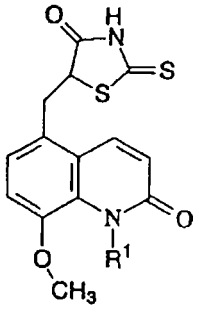
Ex.	R^1	R^2	M.p.(°C)
996		-H	204.1-205.9
997	$-C_6H_5$	-H	223.6-225.4
998	$-CH_2CH=CH_2$	$-OCH_3$	156.5-158.5
999	$-C_8H_{17}$	$-OCH_3$	114.0-114.5

Table 146



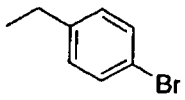
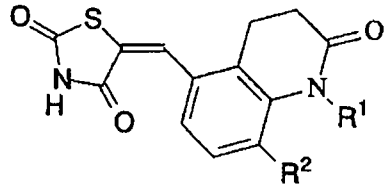
Ex.	R^1	M.p.(°C)
1000		249.5-250.2
1001	$-(CH_2)_2CH(CH_3)_2$	198.5-200.5

Table 147



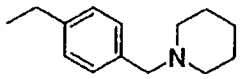
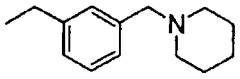
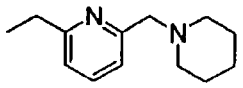
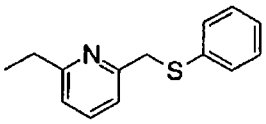
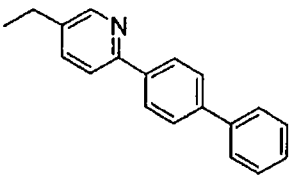
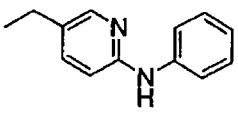
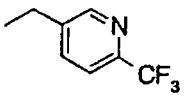
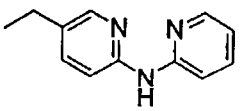
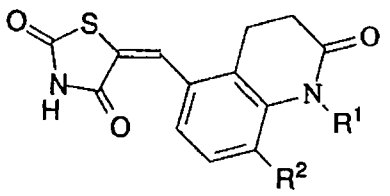
Ex.	R^1	R^2	^1H NMR (DMSO-d_6) dppm
1002		-H	1.40-1.48 (2H, m), 1.52-1.60 (4H, m), 2.64-2.74 (6H, m), 2.99-3.05 (2H, m), 3.76 (2H, s), 5.16 (2H, s), 6.92 (1H, d, J=7.0Hz), 7.14-7.33 (6H, m), 7.66 (1H, s)
1003		-H	1.23-1.29 (2H, m), 1.51-1.57 (4H, m), 2.57-2.61 (4H, m), 2.68-2.74 (2H, m), 3.00-3.06 (2H, m), 3.79 (2H, s), 5.19 (2H, s), 6.93 (1H, d, J=7.6Hz), 7.12-7.23 (5H, m), 7.30-7.33 (1H, m), 7.69 (1H, s)
1004		-H	1.36-1.44 (2H, m), 1.49-1.57 (4H, m), 2.57-2.64 (4H, m), 2.67-2.73 (2H, m), 3.00-3.06 (2H, m), 3.84 (2H, s), 5.21 (2H, s), 6.90 (1H, d, J=7.4Hz), 7.14-7.21 (3H, m), 7.32 (1H, d, J=7.7Hz), 7.68 (1H, s), 7.74 (1H, t, J=7.7Hz)
1005		-H	2.60-2.77 (2H, m), 2.97-3.07 (2H, m), 4.30 (2H, s), 5.16 (2H, s), 6.85 (1H, d, J=8.0Hz), 6.90 (1H, d, J=8.0Hz), 7.04-7.36 (8H, m), 7.65 (1H, t, J=7.7Hz), 7.92 (1H, s), 12.19 (1H, brs)
1006		$-OCH_3$	2.57-2.62 (2H, m), 2.98-3.02 (2H, m), 3.76 (3H, s), 5.20 (2H, s), 7.08 (1H, d, J=8.8Hz), 7.20 (1H, d, J=8.8Hz), 7.40 (1H, d, J=7.3Hz), 7.49 (2H, t, J=7.3Hz), 7.77 (1H, dd, J1=2.0Hz, J2=8.3Hz), 7.71-7.78 (4H, m), 7.86 (1H, s), 7.89 (1H, d, J=8.3Hz), 8.13 (2H, d, J=8.3Hz), 8.46-8.47 (1H, m), 12.58 (1H, brs)
1007		$-OCH_3$	2.47-2.52 (2H, m), 2.88-2.93 (2H, m), 3.85 (3H, s), 5.13 (2H, s), 6.66 (1H, d, J=8.8Hz), 6.84 (1H, t, J=7.3Hz), 7.06 (1H, d, J=8.8Hz), 7.15-7.29 (4H, m), 7.57-7.61 (2H, m), 7.83 (1H, s), 7.89 (1H, d, J=2.1Hz), 8.91 (1H, s), 12.55 (1H, brs)
1008		$-OCH_3$	2.58-2.63 (2H, m), 2.98-3.04 (2H, m), 3.61 (3H, s), 5.13 (2H, s), 7.08 (1H, d, J=8.8Hz), 7.22 (1H, d, J=8.8Hz), 7.78-7.84 (2H, m), 7.86 (1H, s), 8.60 (1H, s), 12.54 (1H, brs)
1009		$-OCH_3$	2.53-2.57 (2H, m), 2.92-2.96 (2H, m), 3.84 (3H, s), 5.15 (2H, s), 6.83 (1H, dd, J1=4.1Hz, J2=8.5Hz), 7.05 (1H, d, J=8.8Hz), 7.17 (1H, d, J=8.8Hz), 7.36 (1H, dd, J1=2.2Hz, J2=8.5Hz), 7.56-7.63 (3H, m), 7.83 (1H, s), 7.98 (1H, d, J=1.8Hz), 8.16-8.18 (1H, m), 9.59 (1H, s), 12.58 (1H, brs)

Table 148



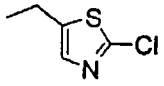
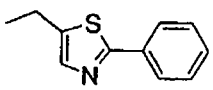
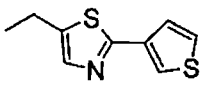
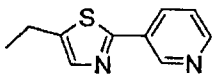
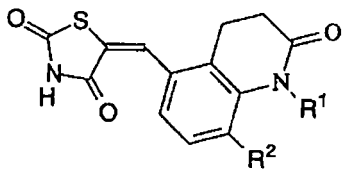
Ex.	R^1	R^2	^{1}H NMR (DMSO-d_6) dppm
1010		-OCH_3	2.50-2.55 (2H, m), 2.88-2.93 (2H, m), 3.89 (3H, s), 5.11 (2H, s), 7.19 (1H, d, J=8.8Hz), 7.26 (1H, d, J=8.8Hz), 7.55 (1H, s), 7.84 (1H, s), 12.51 (1H, brs)
1011		-OCH_3	2.51-2.56 (2H, m), 2.87-2.92 (2H, m),), 3.93 (3H, s), 5.36 (2H, s), 7.17 (1H, d, J=8.8Hz), 7.25 (1H, d, J=8.8Hz), 7.44-7.47 (3H, m), 7.69 (1H, s), 7.75 (1H, s), 7.83-7.87 (2H, m)
1012		-OCH_3	2.48-2.53 (2H, m), 2.86-2.91 (2H, m), 3.93 (3H, s), 5.33 (2H, s), 7.17 (1H, d, J=8.8Hz), 7.24 (1H, d, J=8.8Hz), 7.49 (1H, dd, J1=1.2Hz, J2=5.0Hz), 7.61 (1H, s), 7.66 (1H, dd, J1=2.9Hz, J2=5.0Hz), 7.81 (1H, s), 8.04 (1H, dd, J1=1.2Hz, J2=2.9Hz), 12.54 (1H, brs)
1013		-OCH_3	2.52-2.57 (2H, m), 2.89-2.94 (2H, m), 3.93 (3H, s), 5.34 (2H, s), 7.18 (1H, d, J=8.8Hz), 7.25 (1H, d, J=8.8Hz), 7.50 (1H, dd, J1=4.8Hz, J2=8.0Hz), 7.79 (1H, s), 7.80(1H, s), 8.19-8.23 (1H, m), 8.62 (1H, dd, J1=1.3Hz, J2=4.8Hz), 9.05 (1H, d, J=2.2Hz), 12.54 (1H, brs)

Table 149



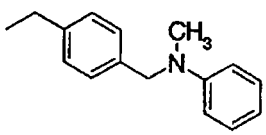
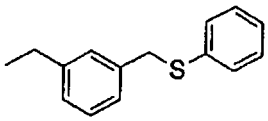
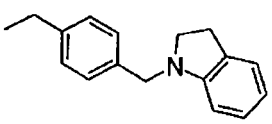
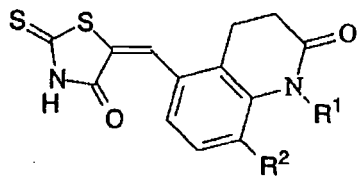
Ex.	R^1	R^2	^{1}H-NMR ($CDCl_3$) dppm
1014		-H	2.75-2.81 (2H, m), 2.99 (3H, s), 3.04-3.10 (2H, m), 4.49 (2H, s), 5.16 (2H, s), 6.67-6.74 (3H, m), 6.95 (1H, dd, J1=1.5Hz, J2=7.5Hz), 7.12-7.21 (8H, m), 7.96 (1H, s)
1015		-H	2.74-2.80 (2H, m), 3.03-3.09 (2H, m), 4.07 (2H, s), 5.14 (2H, s), 6.87 (1H, dd, J1=2.3Hz, J2=6.9Hz), 7.04-7.10 (2H, m), 7.13-7.25 (9H, m), , 7.98 (1H, s)
1016		-H	2.77-2.83 (2H, m), 2.92-2.99 (2H, m), 3.05-3.12 (2H, m), 3.25-3.32 (2H, m), 4.21 (2H, s), 5.18 (2H, s), 6.48 (1H, d, J=7,7Hz), 6.66 (1H, t, J=7.1Hz), 6.94-7.01 (1H, m), 7.07 (1H, t, J=7.7Hz), 7.15-7.33 (7H, m), 7.97 (1H, s)

Table 150



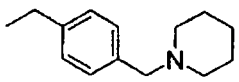
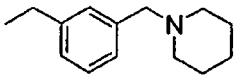
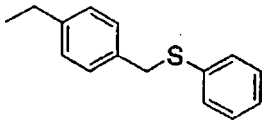
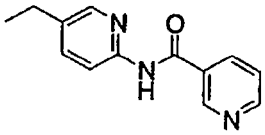
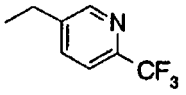
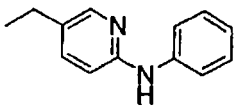
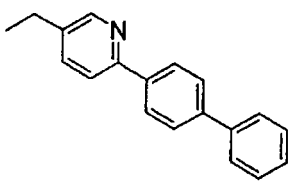
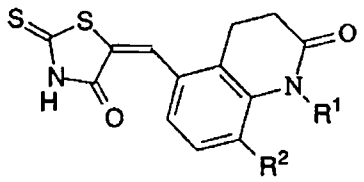
Ex.	R^1	R^2	^{1}H NMR (DMSO-d_6) dppm
1017		-H	1.44-1.52 (2H, m), 1.61-1.69 (4H, m), 2.69-2.75 (2H, m), 2.90-2.96 (4H, m), 3.02-3.08 (2H, m), 4.07 (2H, s), 5.19 (2H, s), 6.91 (1H, d, J=8.0Hz), 7.10 (1H, d, J=7.6Hz), 7.14-7.31 (4H, m), 7.37-7.40 (2H, m)
1018		-H	1.41-1.47 (2H, m), 1.57-1.63 (4H, m), 2.28-2.32 (4H, m), 2.70-2.74 (2H, m), 3.03-3.09 (2H, m), 4.08 (2H, s), 5.21 (2H, s), 6.89 (1H, d, J=8.1Hz), 7.08 (1H, d, J=7.6Hz), 7.14-7.25 (3H, m), 7.28-7.43 (3H, m)
1019		-H	2.68-2.74 (2H, m), 3.02-3.08 (2H, m), 4.19 (2H, s), 5.13 (2H, s), 7.00 (1H, d, J=8.0Hz), 7.07 (1H, d, J=8.0Hz), 7.13-7.19 (3H, m), 7.24-7.29 (7H, m), , 7.78 (1H, s), 13.89 (1H, brs)
1020		$-OCH_3$	2.48-2.52 (2H, m), 3.29-3.03 (2H, m), 3.79 (3H, s), 5.17 (2H, s), 7.07 (1H, d, J=8.8Hz), 7.17 (1H, d, J=8.8Hz), 7.50-7.55 (1H, m), 7.59 (1H, dd, J1=2.2Hz, J2=8.5Hz), 7.69 (1H, s), 8.04 (1H, d, J=8.5Hz), 8.17 (1H, d, J=2.0Hz), 8.30 (1H, dt, J1=2.0Hz, J2=8.0Hz), 8.73 (1H, dd, J1=1.6Hz, J2=4.8Hz), 9.08 (1H, d, J=1.6Hz), 10.98 (1H, s), 13.69 (1H, brs)
1021		$-OCH_3$	2.57-2.63 (2H, m), 3.00-3.05 (2H, m), 3.60 (3H, s), 5.12 (2H, s), 7.06 (1H, d, J=8.8Hz), 7.19 (1H, d, J=8.8Hz), 7.48 (1H, s), 7.77-7.85 (2H, m), 8.60 (1H, s), 11.98 (1H, brs)
1022		$-OCH_3$	2.47-2.52 (2H, m), 2.92-3.07 (2H, m), 3.86 (3H, s), 5.12 (2H, s), 6.66 (1H, d, J=8.5Hz), 6.84 (1H, t, J=7.5Hz), 7.05-7.29 (5H, m), 7.58 (2H, d, J=7.5Hz), 7.66 (1H, s), 7.89 (1H, d, J=2.2Hz), 8.92 (1H, s), 13.76 (1H, brs)
1023		$-OCH_3$	2.57-2.61 (2H, m), 2.99-3.05 (2H, m), 3.77 (3H, s), 5.20 (2H, s), 7.09 (1H, d, J=8.9Hz), 7.18 (1H, d, J=8.9Hz), 7.40 (1H, d, J=7.2Hz), 7.46-7.52 (2H, m), 7.61-7.65 (1H, m), 7.71-7.79 (5H, m), 7.90 (1H, d, J=8.3Hz), 8.13 (2H, d, J=8.3Hz), 8.46-8.47 (1H, m), 13.81 (1H, brs)

Table 151



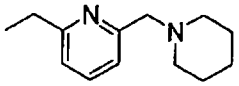
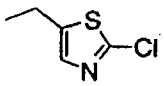
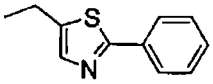
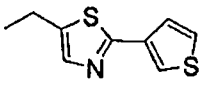
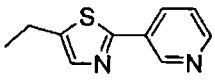
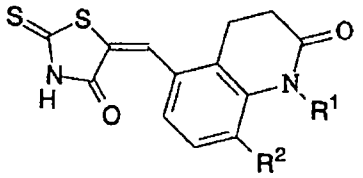
Ex.	R^1	R^2	^1H NMR (DMSO-d_6) dppm
1024		-H	1.40-1.48 (2H, m), 1.56-1.64 (4H, m), 2.68-2.74 (2H, m), 2.90-2.98 (4H, m), 3.04-3.09 (2H, m), 4.21 (2H, s), 5.27 (2H, s), 6.89 (1H, d, J=7.8Hz), 7.09-7.39 (4H, m), 7.42 (1H, s), 7.83 (1H, t, J=7.7Hz)
1025		$-OCH_3$	2.46-2.52 (2H, m), 2.91-97 (2H, m), 3.90 (3H, s), 5.11 (2H, s), 7.20 (1H, d, J=8.8Hz), 7.25 (1H, d, J=8.8Hz), 7.56 (1H, s), 7.69 (1H, s), 13.76 (1H, brs)
1026		$-OCH_3$	2.51-2.57 (2H, m), 2.90-2.96 (2H, m), 3.95 (3H, s), 5.36 (2H, s), 7.19 (1H, d, J=9.1Hz), 7.23 (1H, d, J=9.1Hz), 7.44-7.47 (3H, m), 7.68 (1H, s), 7.70 (1H, s), 7.83-7.86 (2H, m), 13.81 (1H, brs)
1027		$-OCH_3$	2.45-2.50 (2H, m), 2.89-2.94 (2H, m), 3.95 (3H, s), 5.33 (2H, s), 7.16-7.24 (2H, m), 7.49 (1H, dd, J1=1.0Hz, J2=5.0Hz), 7.61 (1H, s), 7.64-7.66 (1H, m), 7.67 (1H, s), 8.03-8.04 (1H, m), 13.80 (1H, brs)
1028		$-OCH_3$	2.47-2.52 (2H, m), 2.89-2.94 (2H, m), 3.94 (3H, s), 5.34 (2H, s), 7.17-7.25 (2H, m), 7.49 (1H, dd, J1=4.9Hz, J2=8.0Hz), 7.65 (1H, s), 7.79 (1H, s), 8.19-8.23 (1H, m), 8.61-8.63 (1H, m), 9.04-9.05 (1H, m), 13.80 (1H, brs)

Table 152



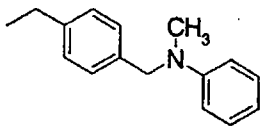
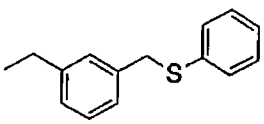
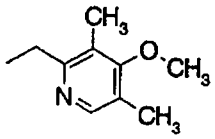
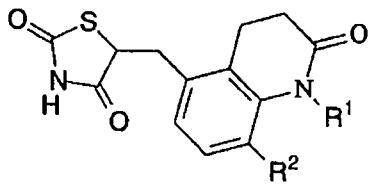
Ex.	R^1	R^2	^{1}H-NMR ($CDCl_3$) dppm
1029		-H	2.77-2.83 (2H, m), 2.94 (3H, s), 3.07-3.13 (2H, m), 4.49 (2H, s), 5.17 (2H, s), 6.50-6.74 (3H, m), 6.98 (1H, d, J=8.2Hz), 7.08-7.68 (8H, m), 7.86 (1H, s), 9.65 (1H, brs)
1030		-H	2.75-2.81 (2H, m), 3.05-3.11 (2H, m), 4.07 (2H, s), 5.14 (2H, s), 6.90 (1H, d, J=7.3Hz), 7.04-7.13 (3H, m), 7.14-7.33 (8H, m), 7.85 (1H, s), 9.41 (1H, brs)
1031		-H	2.21 (3H, s), 2.33 (3H, s), 2.75-2.81 (2H, m), 3.07-3.13 (2H, m), 3.78 (3H, s), 5.18 (2H, s), 6.97 (1H, d, J=8.1Hz), 7.08 (1H, d J=7.8Hz), 7.16-7.28 (1H, m), 7.81 (1H, s), 8.10 (1H, s)

Table 153



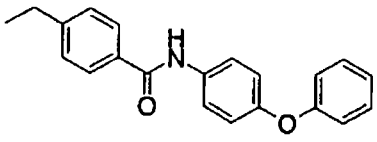
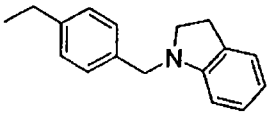
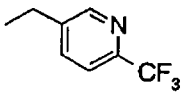
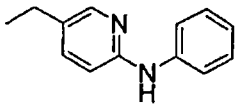
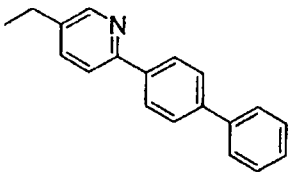
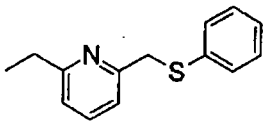
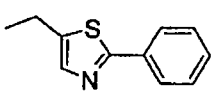
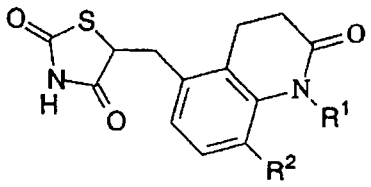
Ex.	R^1	R^2	M.p.(° C)
1032	$-(CH_2)_3CF_3$	$-OCH_3$	169-170
1033	$-(CH_2)_4F$	$-OCH_3$	136-138
1034		-H	153-157
1035		-H	114-115
1036		$-OCH_3$	170-171
1037		$-OCH_3$	227-229
1038		$-OCH_3$	269-272
1039		-H	113-114
1040		$-OCH_3$	185-188

Table 154



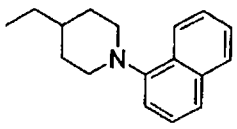
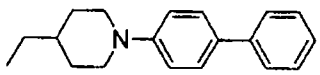
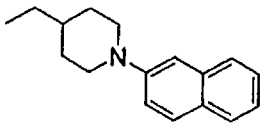
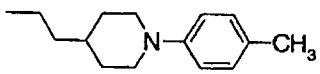
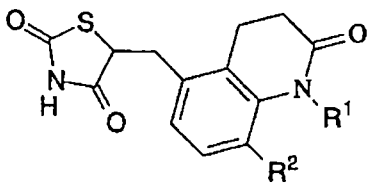
Ex.	R^1	R^2	M.p.(° C)
1041		-H	221-227
1042		-H	220(dec.)
1043		-H	177(dec.)
1044		-H	103-112

Table 155



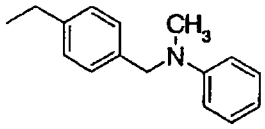
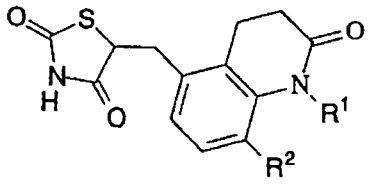
Ex.	R^1	R^2	^{1}H-NMR ($CDCl_3$) dppm
1045	$-(CH_2)_3OSi(CH_3)_2C(CH_3)_3$	-H	0.08 (6H, s), 0.91 (9H, s), 1.85-2.0 (2H, m), 2.55-2.75 (2H, m), 2.75-3.05 (2H, m), 3.13 (1H, dd, J=10.6Hz, J2=12.2Hz), 3.6-3.8 (3H, m), 3.95-4.1 (2H, m), 4.47(1H, dd, J=3.8Hz, J2=12.2Hz), 6.9-7.0 (1H, m), 7.1-7.3 (2H, m)
1046	$-(CH_2)_3OH$	-H	1.5-2.0 (4H, m), 2.6-2.7 (2H, m), 2.8-3.1 (2H, m), 3.16 (1H, dd, J=10.5Hz, J2=14.5Hz), 3.6-3.7 (2H, m), 3.67 (1H, dd, J=3.9Hz, J2=14.5Hz), 4.05-4.15 (2H, m), 4.47 (1H, dd, J=3.9Hz, J2=10.5Hz), 6.96 (1H, d, J=7.4Hz), 7.06 (1H, d, J=7.6Hz), 7.1-7.2 (1H, m)
1047	$-CH_2CO_2C(CH_3)_3$	$-OCH_3$	1.43 (9H, s), 2.5-2.65 (2H, m), 2.8-3.05 (2H, m), 3.10 (1H, dd, J1=10.3Hz, J2=14.5Hz), 3.61 (1H, dd, J1=4.0Hz, J2=14.5Hz), 3.82 (3H, s), 4.44 (1H, dd, J1=4.0Hz, J2=10.3Hz), 4.55-4.65 (2H, m), 6.80 (1H, d, J=8.5Hz), 6.94 (1H, d, J=8.5Hz)
1048		-H	2.74-2.79 (2H, m), 2.88-3.04 (5H, m), 3.15 (1H, dd, J1=10.4Hz, J2=14.5Hz), 3.68 (1H, dd, J1=3.9Hz, J2=14.5Hz), 4.42-4.51 (3H, m), 5.06-5.22 (2H, m), 6.70-6.74 (3H, m), 6.84-6.91 (2H, m), 7.06-7.23 (7H, m), 8.05 (1H, brs)

Table 156



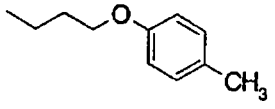
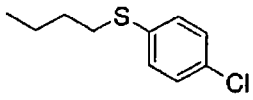
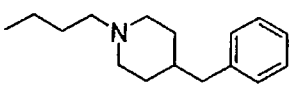
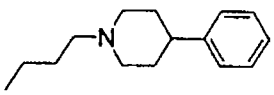
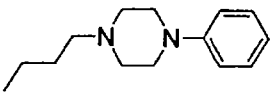
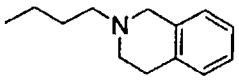
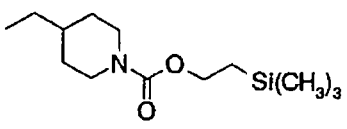
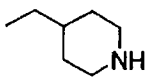
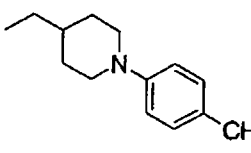
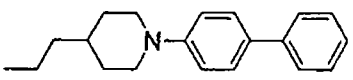
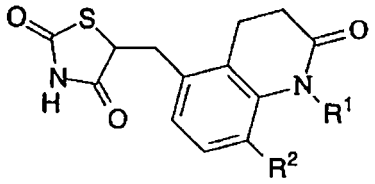
Ex.	R^1	R^2	^{1}H NMR (DMSO-d_6) dppm
1049		-H	2.0-2.2 (2H, m), 2.28 (3H, s), 2.55-3.25 (5H, m), 3.68 (1H, dd, J1=3.7Hz, J2=14.4Hz), 4.02 (2H, t, J=5.9Hz), 4.14 (2H, t, J=7.0Hz), 4.46 (1H, dd, J1=3.7Hz, J2=10.5Hz), 6.92 (2H, d, J=7.5Hz), 7.08 (1H, d, J=8.0Hz), 7.05-7.4 (4H, m)
1050		-H	1.6-1.9 (2H, m), 2.4-2.6 (2H, m), 2.75-3.25 (5H, m), 3.50 (1H, dd, J=4.0Hz, J2=14.3Hz), 3.9-4.1 (2H, m), 4.82 (1H, dd, J=4.0Hz, J2=10.8Hz), 6.9-7.05 (2H, m), 7.1-7.3 (1H, m), 7.35-7.5 (4H, m), 12.13 (1H, br s)
1051		-H	1.1-1.3 (2H, m), 1.85-2.1 (2H, m), 2.4-2.6 (2H, m), 2.75-4.1 (2H, m), 4.64 (1H, dd, J=3.1Hz, J2=10.3Hz), 6.91(1H, d, J=7.4Hz), 7.0-7.35 (7H, m)
1052		-H	1.75-2.1 (3H, m), 2.4-3.6 (16H, m), 3.9-4.05 (2H, m), 4.83 (1H, dd, J1=4.0Hz, J2=9.9Hz), 6.94 (1H, d, J=7.4Hz), 7.1-7.3 (7H, m), 9.79 (1H, br s), 12.13 (1H, br s)
1053		-H	1.9-2.1 (2H, m), 2.4-4.0 (18H, m), 4.85 (1H, dd, J1=3.9Hz, J2=9.8Hz), 6.8-7.4 (8H, m), 10.3 (1H, br s), 12.15 (1H, s)
1054		-H	1.9-5.2 (19H, m), 6.9-7.8 (7H, m), 10.6-11.0 (1H, m), 12.1-12.6 (1H, m)
1055		-H	0.03 (9H, s), 0.98 (2H, t, J=8.4Hz), 1.1-1.4(3H, m), 1.7-2.0 (3H, m), 2.6-3.3 (7H, m), 3.65 (1H, dd, J1=3.8Hz, J2=14.4Hz), 3.8-4.3 (6H, m), 4.49 (1H, dd, J1=3.8Hz, J2=10.2Hz),6.9-7.05 (2H, m), 7.21 (1H, d, J=7.9Hz)
1056		-H	1.2-1.45 (2H, m), 1.6-2.0 (3H, m), 2.6-4.2 (13H, m), 6.91 (1H, d, J=7.6Hz), 7.08 (1H, d, J=7.6Hz), 7.17 (1H, d, J=7.6Hz)
1057		-H	0.75-0.95 (1H, m), 1.15-1.4 (3H, m), 1.5-1.85 (3H, m), 2.17 (3H, s), 2.3-3.65 (8H, m), 3.8-4.0 (2H, m), 4.75-4.95 (1H, m), 6.78 (2H, d, J=8.7Hz), 6.8-7.0 (3H, m), 6.8-7.0 (3H, m), 7.1-7.3 (2H, m), 12.11 (1H, br s)
1058		-H	0.8-0.95 (1H, m), 1.1-1.7 (6H, m), 1.7-1.9 (2H, m), 2.3-4.1 (10H, m), 4.75-4.95 (1H, m),78 (2H, d, J=8.7Hz), 6.8-7.7 (1H, m), 12.11 (1H, br s)

Table 157



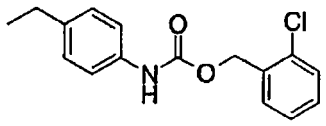
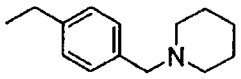
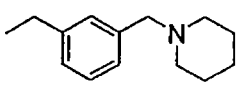
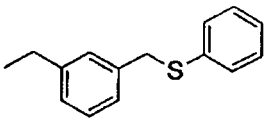
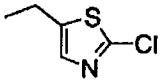
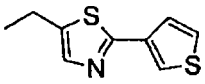
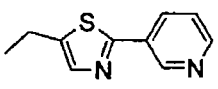
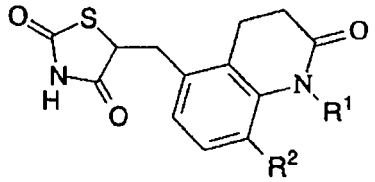
Ex.	R^1	R^2	^{1}H NMR (DMSO-d_6) dppm
1059		-OCH_3	2.46-2.51 (2H, m), 2.80-2.84 (2H, m), 3.00-3.10 (1H, m), 3.39-3.49 (1H, m), 3.70 (3H, s), 4.77 (1H, dd, J1=4.2Hz, J2=10.0Hz), 5.14 (2H, s), 5.19 (2H, s), 6.80 (1H, d, J=8.6Hz), 6.84 (1H, d, J=8.6Hz), 6.96 (2H, d, J=8.4Hz), 7.28 (2H, d, J=8.4Hz), 7.36-7.42 (2H, m), 7.47-7.56 (2H, m), 9.73 (1H, s), 12.07 (1H, s)
1060		-H	1.28-1.58 (6H, m), 2.26-2.46 (4H, m), 2.64-2.70 (2H, m), 2.96-3.03 (2H, m), 3.04-3.13 (1H, m), 3.31-3.40 (1H, m), 3.46 (2H, s), 4.74 (1H, dd, J1=3.8Hz, J2=10.2Hz), 5.11 (2H, d, J=4.5Hz), 6.83 (1H, d, J=7.9Hz), 6.88 (1H, d, J=7.9Hz), 7.08 (1H, t, J=7.9Hz), 7.15 (2H, d, J=7.8Hz), 7.23 (2H, d, J=7.8Hz)
1061		-H	1.35-1.71 (6H, m), 2.40-2.44 (4H, m), 2.65-2.73 (2H, m), 2.92-3.00 (2H, m), 3.07-3.17 (1H, m), 3.39-3.49 (1H, m), 3.57 (2H, s), 4.77-4.83 (1H, m), 5.07-5.22 (2H, m), 6.81-6.89 (2H, m), 7.03-7.30 (5H, m)
1062		-H	2.64--2.70 (2H, m), 2.93-2.99 (2H, m), 3.10-3.20 (1H, m), 3.53 (1H, dd, J1=3.7Hz, J2=14.3Hz), 4.18 (2H, s), 4.84 (1H, dd, J1=3.7Hz, J2=10.0Hz), 5.01-5.16 (2H, m), 6.77 (1H, d, J=7.8Hz), 6.89 (1H, d, J=7.8Hz), 7.03-7.43 (10H, m), 12.16 (1H, brs)
1063		-OCH_3	2.47-2.51 (2H, m), 2.77-2.81 (2H, m), 3.03-3.10 (1H, m), 3.39-3.46 (1H, m), 3.81 (3H, s), 4.79 (1H, dd, J1=4.3Hz, J2=10.0Hz), 5.12 (2H,s), 6.99 (2H, s), 7.52(1H, s), 12.10 (1H, brs)
1064		-OCH_3	2.36-2.57 (2H, m), 2.71-2.86 (2H, m), 3.01-3.17 (1H, m), 3.45-3.51 (1H, m), 3.84 (3H, s), 4.77 (1H, dd, J1=4.1Hz, J2=10.0Hz), 5.32 (2H, s), 6.97 (2H, s), 7.48 (1H, d, J=4.9Hz), 7.58 (1H, s), 7.63-7.67 (1H, m), 8.02 (1H, d, J=2.1Hz), 12.09 (1H, brs)
1065		-OCH_3	2.50-2.66 (2H, m), 2.73-2.89 (2H, m), 3.01-3.17 (1H, m), 3.35-3.51 (1H, m), 3.85 (3H, s), 4.78 (1H, dd, J1=4.2Hz, J2=9.9Hz), 5.34 (2H, s), 6.98 (2H, s), 7.48 (1H, dd, J1=4.1Hz, J2=7.8Hz), 7.76 (1H, s), 8.20 (1H, d, J=7.8Hz), 8.62 (1H, d, J=4.1Hz), 9.04 (1H, s), 12.06 (1H, brs)

Table 158



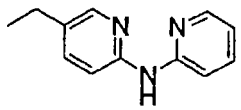
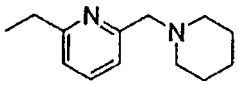
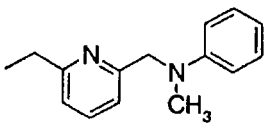
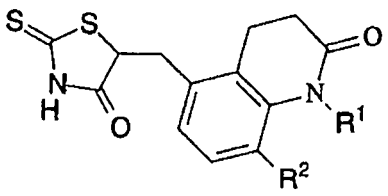
Ex.	R^1	R^2	^{1}H NMR (DMSO-d_6) dppm
1066		$-OCH_3$	2.48-2.52 (2H, m), 2.79-2.83 (2H, m), 3.00-3.10 (1H, m), 3.34-3.44 (1H, m), 3.74 (3H, s), 4.77 (1H, dd, J1=4.1Hz, J2=10.2Hz), 5.12 (2H, s), 6.79-6.85 (2H, m), 6.91 (1H, d, J=8.6Hz), 7.31 (1H, dd, J1=2.1Hz, J2=8.6Hz), 7.54-7.62 (3H, m), 7.95 (1H, d, J=2.1Hz), 8.14-8.18 (1H, m), 9.55 (1H, s), 12.09 (1H, brs)
1067		-H	1.37-1.52 (6H, m), 2.42-2.46 (4H, m), 2.64-2.71 (2H, m), 2.81-2.95 (2H, m), 3.17 (2H, s), 3.34-3.42 (1H, m), 3.50-3.56 (1H, m), 4.75-4.80 (1H, m), 5.07-5.23 (2H, m), 6.81 (1H, d, J=7.9Hz), 6.89 (1H, d, J=7.9Hz), 7.01-7.10 (2H, m), 7.29 (1H, d, J=7.6Hz), 7.69 (1H, t, J=7.6Hz)
1068		-H	2.64 (2H, t, J=6.5Hz), 2.98 (2H, t, J=6.5Hz), 3.04 (3H, s), 3.15 (1H, dd, J1=10.3Hz, J2=14.3Hz), 3.53 (1H, dd, J1=4.0Hz, J2=14.3Hz), 4.59 (2H, s), 4.84 (1H, dd, J1=4.0Hz, J2=10.3Hz), 5.08-5.23 (2H, m), 6.59 (1H, t, J=7.6Hz), 6.66 (2H, d, J=8.2Hz), 6.83 (1H, d, J=7.6Hz), 6.90 (1H, d, J=7.6Hz), 6.99-7.14 (5H, m), 7.61 (1H, t, J=7.7Hz), 12.15 (1H, brs)

Table 159



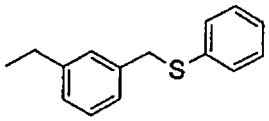
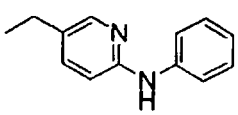
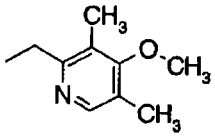
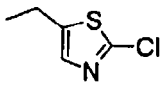
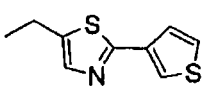
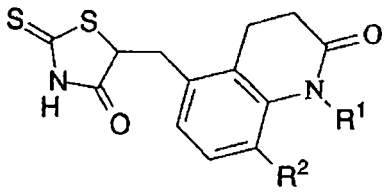
Ex.	R^1	R^2	M.p.(° C)
1069	$-(CH_2)_3CF_3$	$-OCH_3$	186-193
1070	$-(CH_2)_4F$	$-OCH_3$	181-183
1071		-H	91-96
1072		$-OCH_3$	241-245
1073		-H	146-149
1074		$-OCH_3$	206-208
1075		$-OCH_3$	108-113

Table 160



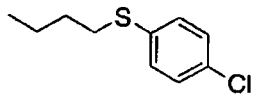
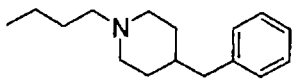
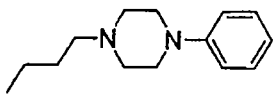
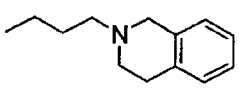
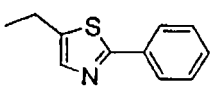
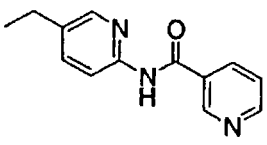
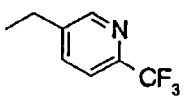
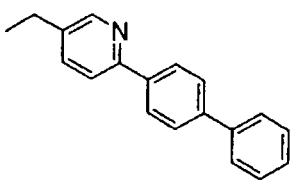
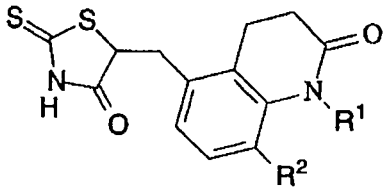
Ex.	R^1	R^2	^{1}H NMR (DMSO-d_6) dppm
1076		-H	1.7-1.95 (2H, m), 2.3-3.6 (8H, m), 3.95-4.1 (2H, m), 4.9-5.1 (1H, m), 6.8-7.5 (7H, m), 13.25 (1H, br s)
1077		-H	1.15-1.45 (2H, m), 1.5-2.0 (5H, m), 2.75-3.05 (5H, m), 3.9-4.05 (2H, m), 4.4-4.5 (1H, m), 6.91 (1H, d, J=7.2Hz), 7.06 (1H, d, J=7.8Hz), 7.1-7.4 (6H, m)
1078		-H	1.9-2.1 (2H, m), 2.4-4.1 (18H, m), 4.98 (1H, dd, J1=4.3Hz, J2=9.8Hz), 6.75-7.3 (8H, m), 10.12 (1H, br s), 13.28 (1H, br s)
1079		-H	1.1-1.7 (3H, m), 2.0-2.2 (2H, m), 2.4-4.6 (13H, m), 4.95-5.05 (1H, m), 6.96 (1H, d, J=7.2Hz), 7.0-7.3 (6H, m), 10.75 (1H, br s), 13.28 (1H, br s)
1080		-OCH_3	2.47-2.51 (2H, m), 2.76-2.80 (2H, m), 3.04-3.14 (1H, m), 3.45-3.55 (1H, m), 3.85 (3H, s), 4.85 (1H, dd, J1=4.5Hz, J2=10.0Hz), 5.12 (2H, s), 6.97 (2H, s), 7.43-7.46 (3H, m), 7.67(1H, s), 7.82-7.86 (2H, m), 13.16 (1H, brs)
1081		-OCH_3	2.44-2.48 (2H, m), 2.82-2.86 (2H, m), 3.08-3.18 (1H, m), 3.33-3.43 (1H, m), 3.69 (3H, s), 4.90 (1H, dd, J1=4.5Hz, J2=9.5Hz), 5.14 (2H, s), 6.85 (1H, d, J=8.6Hz), 6.92 (1H, d, J=8.6Hz), 7.50-5.55 (2H, m), 8.04 (1H, d, J=8.5Hz), 8.15 (1H, d, J=1.9Hz), 8.28-8.33 (1H, m), 8.73 (1H, dd, J1=1.5Hz, J2=4.9Hz), 9.09 (1H, d, J=1.9Hz), 10.98 (1H, s), 13.20 (1H, s)
1082		-OCH_3	2.69-2.73 (2H, m), 2.91-2.87 (2H, m), 3.07-3.22 (1H, m), 3.39-3.50 (1H, m), 3.53 (3H, s), 4.94 (1H, dd, J1=4.5Hz, J2=9.5Hz), 5.12 (2H, s), 6.87 (1H, d, J=8.5Hz), 6.95 (1H, d, J=8.5Hz), 7.78 (2H, dd, J1=1.0Hz, J2=3.8Hz), 8.58 (1H, s), 13.22 (1H, brs)
1083		-OCH_3	2.52-2.56 (2H, m), 2.86-2.90 (2H, m), 3.12-3.22 (1H, m), 3.35-3.44 (1H, m), 3.66 (3H, s), 4.94 (1H, dd, J1=4.5Hz, J2=9.4Hz), 5.18 (2H, s), 6.87 (1H, d, J=8.6Hz), 6.94 (1H, d, J=8.6Hz), 7.36-7.52 (3H, m), 7.65 (1H, dd, J1=2.4Hz, J2=8.0Hz), 7.73-7.81 (4H, m), 7.93 (1H, d, J=8.3Hz), 8.13 (2H, d, J=8.3Hz), 8.48 (1H, d, J=2.4Hz), 13.21 (1H, brs)

Table 161



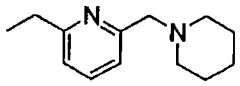
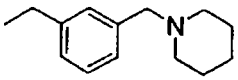
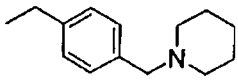
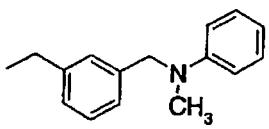
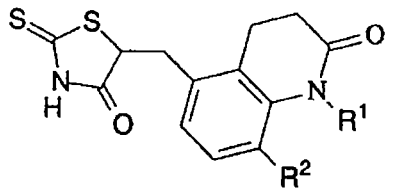
Ex.	R^1	R^2	^{1}H NMR (DMSO-d_6) dppm
1084		-H	1.38-1.52 (6H, m), 2.65-2.75 (6H, m), 2.96-3.04 (3H, m), 3.46-3.51 (1H, m), 3.93 (2H, s), 4.61-4.67 (1H, m), 5.10-5.26 (2H, m), 6.78 (1H, d, J=7.6Hz), 6.87 (1H, d, J=7.6Hz), 7.05 (1H, t, J=7.6Hz), 7.14 (1H, d, J=7.3Hz), 7.34 (1H, d, J=7.3Hz), 7.75 (1H, t, J=7.3Hz)
1085		-H	1.30-1.66 (6H, m), 2.57-2.61 (4H, m), 2.64-2.70 (2H, m), 2.93-2.99 (2H, m), 3.03-3.48 (2H, m), 3.77 (2H, s), 4.58-4.62 (1H, m), 5.07-5.23 (2H, m), 6.80 (1H, d, J=7.8Hz), 6.86 (1H, d, J=7.8Hz), 7.05 (1H, t, J=7.8Hz), 7.16-7.35 (4H, m)
1086		-H	1.32-1.42 (2H, m), 1.43-1.47 (4H, m), 2.24-2.35 (4H, m), 2.63-2.70 (2H, m), 2.90-3.03 (2H, m), 3.07 (1H, dd, J1=10.4Hz, J2=14.4Hz), 3.43 (2H, s), 3.51 (1H, dd, J1=4.0Hz, J2=14.4Hz), 4.71 (1H, dd, J1=4.0Hz, J2=10.4Hz), 5.08-5.19 (2H, m), 6.82 (1H, d, J=8.2Hz), 6.87 (1H, d,J=7.5Hz), 7.04-7.14 (4H, m), 7.24 (1H, t)
1087		-H	2.54-2.60 (2H, m), 2.85-2.92 (5H, m), 3.19 (1H, dd, J1=9.9Hz, J2=14.5Hz), 3.44-3.52 (1H, m), 4.50 (2H, s), 4.95 (1H, dd, J1=4.3Hz, J2=9.9Hz), 5.08-5.23 (2H, m), 6.58-6.64 (3H, m), 6.78 (1H, d, J=8.2Hz), 6.86 (1H, d, J=7.6Hz), 6.95-7.26 (7H, m), 13.30 (1H, brs)

Table 162



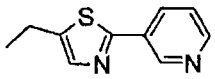
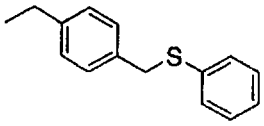
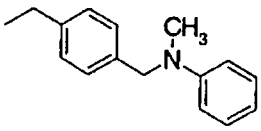
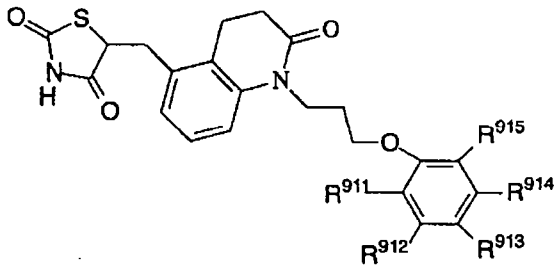
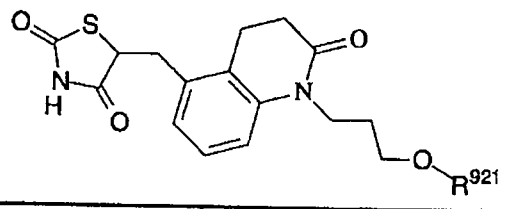
Ex.	R^1	R^2	^{1}H-NMR ($CDCl_3$) dppm
1088		$-OCH_3$	2.57-2.67 (2H, m), 2.77-2.87 (2H, m), 3.13 (1H, dd, J1=10.0Hz, J2=14.7Hz), 3.44-3.56 (1H, m), 3.90 (3H, s), 4.49 (1H, dd, J1=4.1Hz, J2=10.0Hz), 5.47 (2H, s), 6.82 (1H, d, J=8.5Hz), 6.97 (1H, d, J=8.5Hz), 7.36 (1H, dd, J1=4.8Hz, J2=8.0Hz), 7.66 (1H, s), 8.18 (1H, ddd, J1=1.7Hz, J2=4.8Hz), 8.62 (1H, dd, J1=1.7Hz, J2=4.8Hz), 9.09 (1H, d, J=1.7Hz)
1089		-H	2.74-2.80 (2H, m), 2.94-3.09 (2H, m), 3.18 (1H, dd, J1=10.6Hz, J2=14.5Hz), 3.67 (1H, dd, J1=3.9Hz, J2=14.5Hz), 4.08 (2H, s), 4.55 (1H, dd, J1=3.9Hz, J2=10.6Hz), 5.06-5.22 (2H, m), 6.81-6.90 (2H, m), 7.06-7.30 (10H, m), 9.09 (1H, brs)
1090		-H	2.75-2.80 (2H, m), 2.87-3.09 (5H, m), 3.16 (1H, dd, J1=10.7Hz, J2=14.4Hz), 3.65 (1H, dd, J1=3.8Hz, J2=14.4Hz), 4.46-4.57 (3H, m), 5.07-5.23 (2H, m), 6.67-6.73 (3H, m), 6.84-6.90 (2H, m), 7.05-7.26 (7H, m), 9.73 (1H, brs)

Table 163



Ex.	R^{911}	R^{912}	R^{913}	R^{914}	R^{915}	MS(M+1)
1091	-H	-H	$-OCH_3$	-H	-H	441
1092	-H	-H	-H	-H	-H	411
1093	-Cl	-H	-H	-H	-H	445
1094	-H	-Cl	-H	-H	-H	445
1095	-H	-H	-Cl	-H	-H	445
1096	-Cl	-Cl	-H	-H	-H	479
1097	-H	-Cl	-Cl	-H	-H	479
1098	-H	-F	-F	-H	-H	447
1099	-H	-H	$-CF_3$	-H	-H	479
1100	-H	-H	$-C_3H_7$	-H	-H	453
1101	-H	-F	-Cl	-H	-H	463
1102	$-OCH_3$	-H	$-CH_2CH=CH_2$	-H	-H	481
1103	-Cl	-H	$-OCH_3$	-H	-H	475
1104	-H	-H	-cyclo-C_5H_9	-H	-H	479
1105	-H	-H	$-NO_2$	-H	-H	456
1106	$-CH_3$	$-CH_3$	-H	-H	-H	439
1107	-H	-H	$-C_6H_5$	-H	-H	487

Table 164



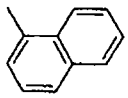
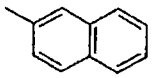
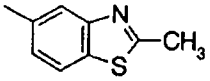
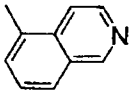
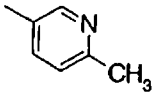
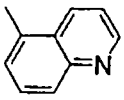
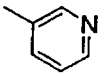
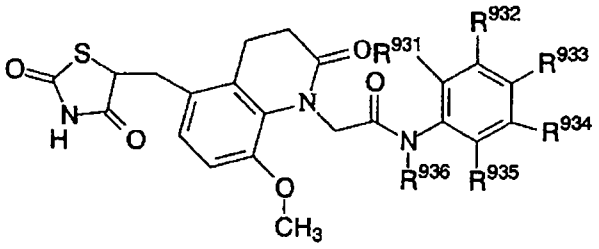
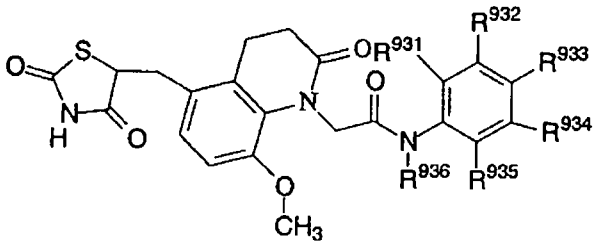
Ex.	R^{921}	MS(M+1)
1108		461
1109		461
1110		482
1111		462
1112		426
1113		462
1114		412

Table 165



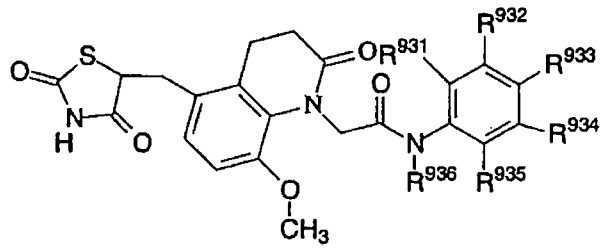
Ex.	R^{936}	R^{931}	R^{932}	R^{933}	R^{934}	R^{935}	MS(M+1)
1115	-H	-H	-H	-H	$-SCH_3$	-H	486
1116	-H	-H	-H	$-OCF_3$	-H	-H	524
1117	-H	-H	-H	$-C_4H_9$	-H	-H	496
1118	-H	-H	-H	-Cl	-H	-H	474
1119	-H	-H	-H	-H	-H	-Cl	474
1120	-H	-H	-H	-H	-Cl	-H	474
1121	-H	-H	-H	-H	-H	$-C_6H_5$	516
1122	-H	-H	-H	-H	-H	-F	458
1123	-H	-H	-H	-H	-F	-H	458
1124	-H	-H	-H	-F	-H	-H	458
1125	-H	-H	-H	-H	$-N(CH_3)_2$	-H	483
1126	-H	-CN	-H	-H	-H	-H	465
1127	$-CH_3$	-H	-H	-H	$-CH_3$	-H	468
1128	-H	-H	-H	-H	-H	$-OC_6H_5$	532
1129	-H	-H	-H	-H	$-OC_6H_5$	-H	532
1130	-H	-H	-H	$-OC_6H_5$	-H	-H	532
1131	-H	-H	-H	$-CF_3$	-H	-H	508
1132	-H	-H	-H	$-CH_3$	$-CH_3$	-H	468
1133	-H	-H	$-CH_3$	-H	$-CH_3$	-H	468
1134	-H	$-CH_3$	-H	$-CH_3$	-H	$-CH_3$	482
1135	-H	-H	-H	-F	-H	-F	476
1136	-H	-H	-H	-F	-F	-H	476
1137	-H	-H	-H	$-CH_3$	-H	-Cl	488
1138	-H	-H	-H	-CN	-H	-H	465
1139	-H	-H	-H	$-SCH_3$	-H	-H	486
1140	-H	-H	-H	-H	-H	$-CH(CH_3)_2$	482
1141	-H	-H	-H	$-CH(CH_3)_2$	-H	-H	482
1142	-H	-H	-H	$-C_6H_{13}$	-H	-H	524
1143	-H	-H	-H	-cyclo-C_6H_{11}	-H	-H	522
1144	-H	-H	-H	-H	$-OCH_2C_6H_5$	-H	546
1145	-H	-H	-H	$-OCH_2C_6H_5$	-H	-H	546
1146	-H	-H	-H	$-NHSO_2CH_3$	-H	-H	533
1147	-H	-H	-H	-H	-H	$-OCH_2C_6H_5$	546
1148	-H	-H	-H	$-NHC_6H_5$	-H	-H	531
1149	$-CH_2C_6H_5$	-H	-H	-H	-H	-H	530
1150	$-CH_2CH_2OH$	-H	-H	-H	-H	-H	484

Table 166



Ex.	R^{936}	R^{931}	R^{932}	R^{933}	R^{934}	R^{935}	MS(M+1)
1151	-H	-H	-H	-H	$-OCH_3$	-H	470
1152	-H	-H	-H	$-CH_3$	-H	-H	454
1153	-H	-H	$-OCH_3$	-H	$-OCH_3$	-H	500
1154	-H	-H	-H	-H	$-C_2H_5$	-H	468
1155	-H	-H	-H	$-N(CH_3)_2$	-H	-H	483
1156	-H	-H	-H	$-C_2H_5$	-H	-H	468
1157	-H	-H	-H	-H	-H	$-CF_3$	508
1158	-H	-H	-CN	-H	-H	-H	465
1159	$-CH_3$	-H	-H	-H	-Cl	-H	488
1160	$-C_2H_5$	-H	-H	-H	-H	$-OCH_3$	498
1161	-H	-H	-H	-H	-F	-F	476
1162	-H	-H	-H	$-OCH_3$	-Cl	-H	504
1163	-H	-H	-H	$-CH_3$	-Cl	-H	488
1164	-H	-H	$-OCH_3$	-H	$-CF_3$	-H	538
1165	-H	-Cl	-H	-H	$-CF_3$	-H	542
1166	-H	-H	-H	-F	-H	-Cl	492
1167	-H	-H	-CN	-H	-H	-Cl	499
1168	-H	-Cl	-H	-H	$-CONH_2$	-H	517
1169	-H	-H	-H	$-C_5H_{11}$	-H	-H	510
1170	-H	-H	-H	$-CH_2C_6H_5$	-H	-H	530

Table 167



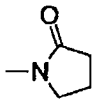
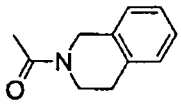
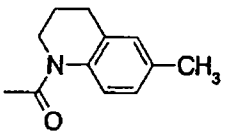
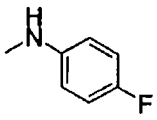
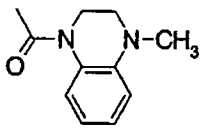
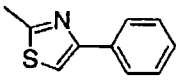
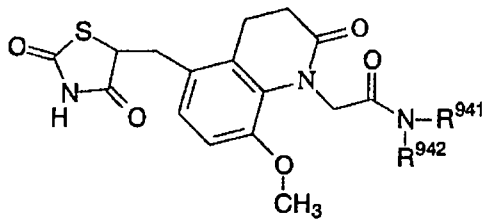
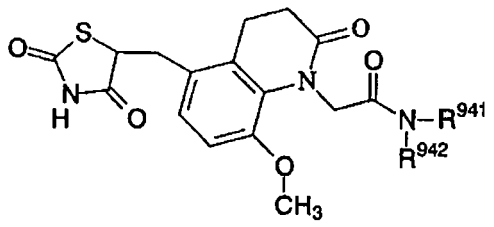
Ex.	R^{936}	R^{931}	R^{932}	R^{933}	R^{934}	R^{935}	MS(M+1)
1171	-H	-H	-H		-H	-H	523
1172	-H	-H	-H		-H	-H	599
1173	-H	-H	-H		-H	-H	613
1174	-H	-H	-F	-H	-H		567
1175	-H	-H	-H		-H	-H	614
1176	-H	-H	-H		-H	-H	599

Table 168



Ex.	R^{941}	R^{942}	MS(M+1)
1177	-cyclo-C_6H_{11}	-CH_3	460
1178	-cyclo-C_6H_{11}	-H	446
1179	-C_4H_9	-C_4H_9	476
1180	-$CH_2CH(CH_3)_2$	-$CH_2CH(CH_3)_2$	476
1181	-cyclo-C_7H_{13}	-H	460
1182	-cyclo-C_5H_9	-H	432
1183	-CH_2-cyclo-C_6H_{11}	-H	460
1184	-CH_2CONH_2	-H	421
1185	-$(CH_2)_2C_6H_5$	-H	468
1186	-$(CH_2)_3C_6H_5$	-C_5H_{11}	552
1187	-C_6H_5	-C_2H_5	468
1188	-$CH(CH_3)C_6H_5$	-H	468
1189	-$CH_2C_6H_5$	-cyclo-C_6H_{11}	536
1190	-$CH_2C_6H_5$	-CH_3	468
1191	-$CH_2C_6H_5$	-C_5H_{11}	524
1192	-$CH_2C_6H_5$	-$CH_2C_6H_5$	544
1193	-cyclo-C_6H_{11}	-C_2H_5	474

Table 169



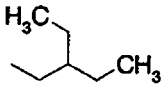
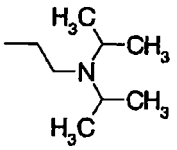
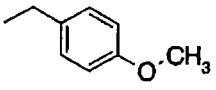
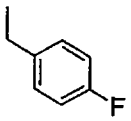
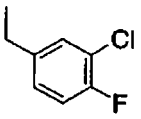
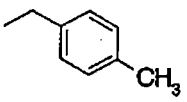
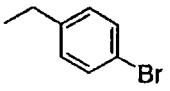
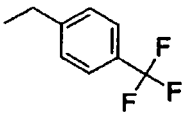
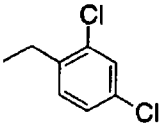
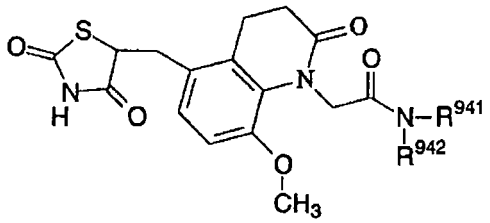
Ex.	R^{941}	R^{942}	MS(M+1)
1194		-H	448
1195		-H	491
1196		-H	484
1197		-H	472
1198		-H	506
1199		$-CH_3$	482
1200		$-C_2H_5$	560
1201		$-CH_3$	536
1202		$-C_2H_5$	550

Table 170



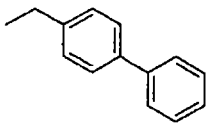
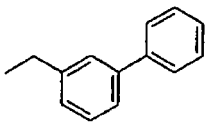
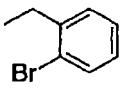
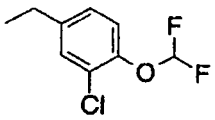
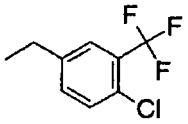
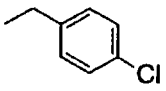
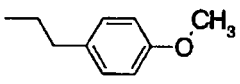
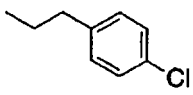
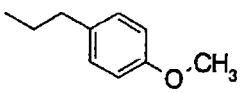
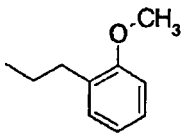
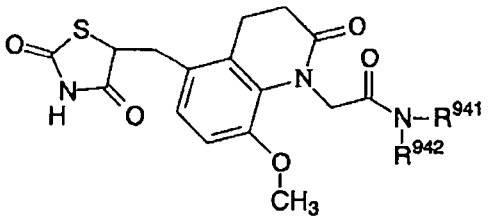
Ex.	R^{941}	R^{942}	MS(M+1)
1203		$-C_2H_5$	558
1204		$-C_2H_5$	558
1205		$-C_2H_5$	560
1206		-H	554
1207		-H	556
1208		-H	488
1209		-H	498
1210		$-C_2H_5$	530
1211		$-CH_2C_6H_5$	588
1212		$-CH_2C_6H_5$	588

Table 171



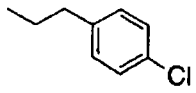
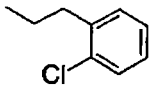
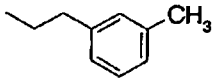
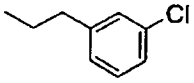
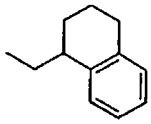
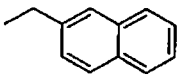
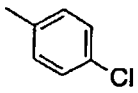
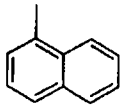
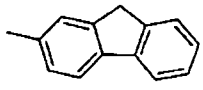
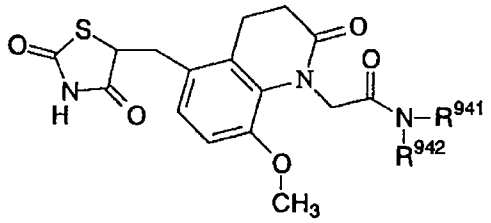
Ex.	R^{941}	R^{942}	MS(M+1)
1213		-H	502
1214		-H	502
1215		-H	482
1216		-H	502
1217		$-C_2H_5$	536
1218		-H	504
1219		$-CH_3$	488
1220		-H	490
1221		-H	528

Table 172



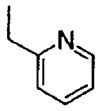
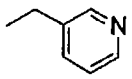
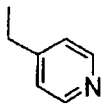
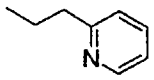
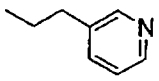
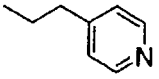
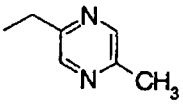
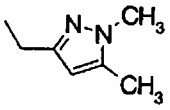
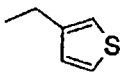
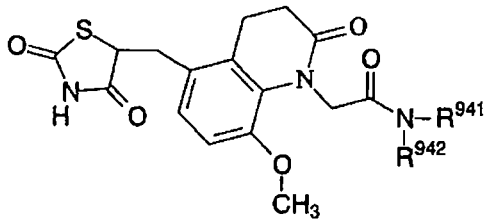
Ex.	R^{941}	R^{942}	MS(M+1)
1222	-4-PYRIDYL	-H	441
1223		-H	455
1224		-H	455
1225		-H	455
1226		-H	469
1227		-H	469
1228		-H	469
1229		-H	442
1230		-H	470
1231		-H	447
1232		-H	472
1233		-H	460

Table 173



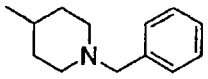
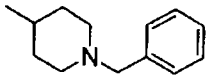
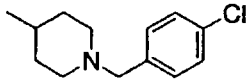
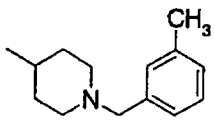
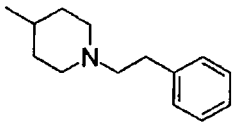
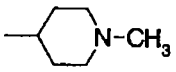
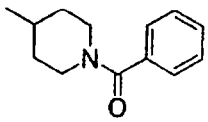
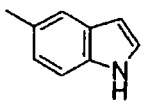
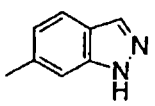
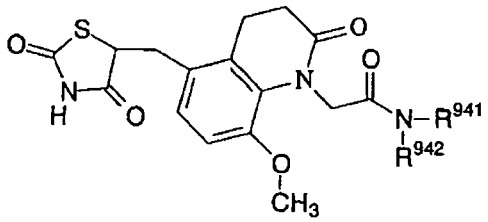
Ex.	R^{941}	R^{942}	MS(M+1)
1234		-H	537
1235		$-CH_3$	551
1236		$-C_2H_5$	599
1237		$-C_2H_5$	579
1238		$-C_2H_5$	579
1239		$-CH_3$	475
1240		$-CH_3$	565
1241		-H	479
1242		-H	480

Table 174



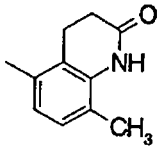
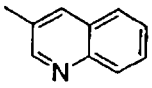
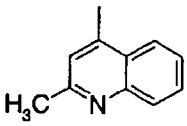
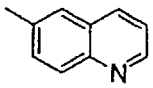
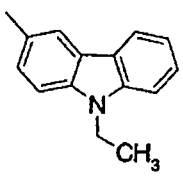
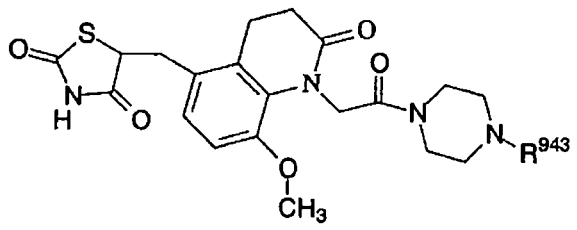
Ex.	R^{941}	R^{942}	MS(M+1)
1243		-H	523
1244		-H	491
1245		-H	505
1246		-H	491
1247		-H	557

Table 175



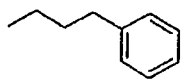
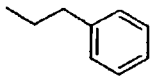
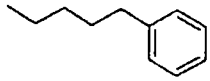
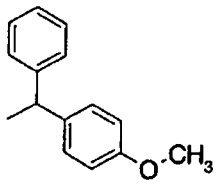
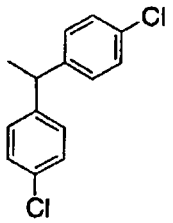
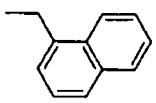
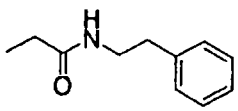
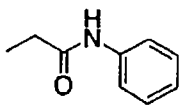
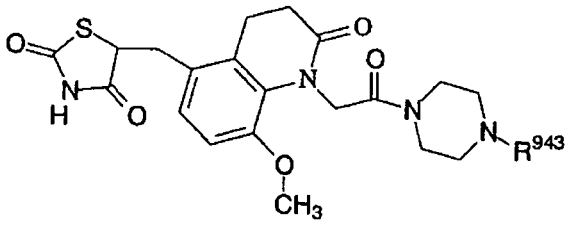
Ex.	R^{943}	MS(M+1)
1248	$-C_2H_5$	461
1249	$-C_3H_7$	475
1250		551
1251		537
1252		565
1253		629
1254		667
1255		573
1256		594
1257		566

Table 176



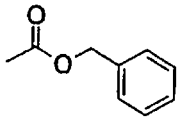
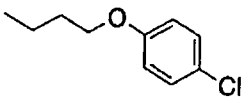
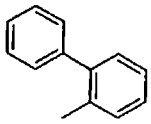
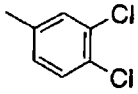
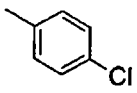
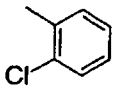
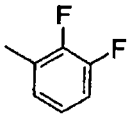
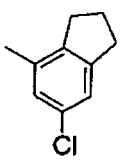
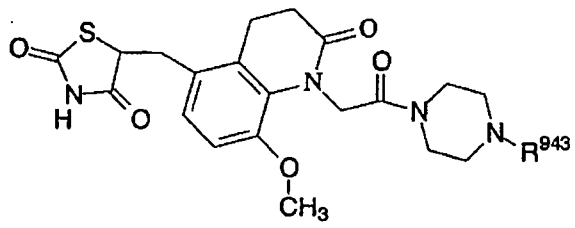
Ex.	R^{943}	MS(M+1)
1258		567
1259		601
1260		585
1261		509
1262		577
1263		543
1264		543
1265		545
1266		583

Table 177



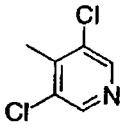
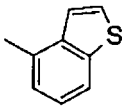
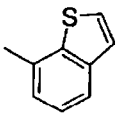
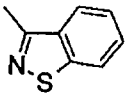
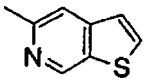
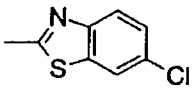
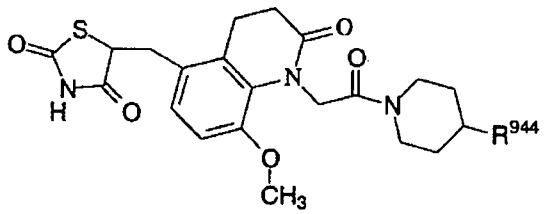
Ex.	R^{943}	MS(M+1)
1267	-2-BENZTHIAZOLYL	566
1268	-3-PYRIDYL	510
1269		510
1270		578
1271		565
1272		565
1273		566
1274		566
1275		600

Table 178



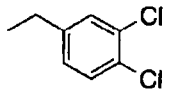
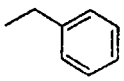
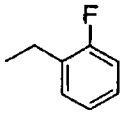
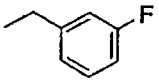
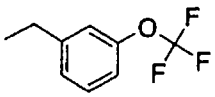
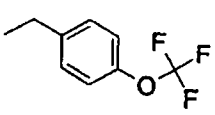
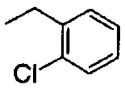
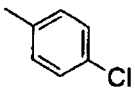
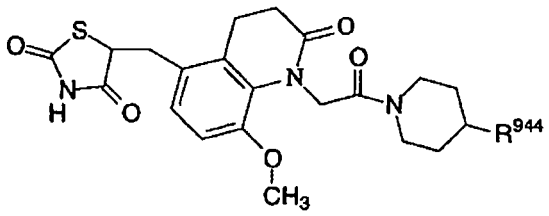
Ex.	R^{944}	MS(M+1)
1276	$-CONH_2$	475
1277		590
1278		522
1279		540
1280		540
1281		606
1282		606
1283		556
1284		542
1285		508

Table 179



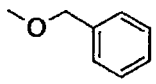
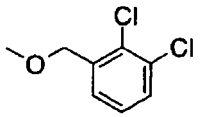
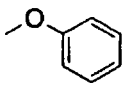
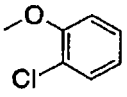
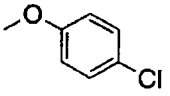
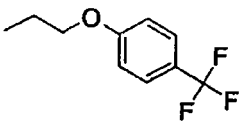
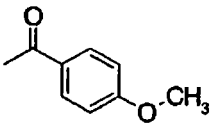
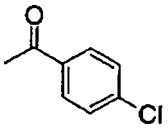
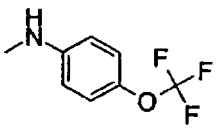
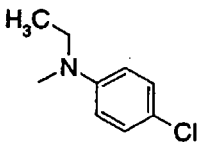
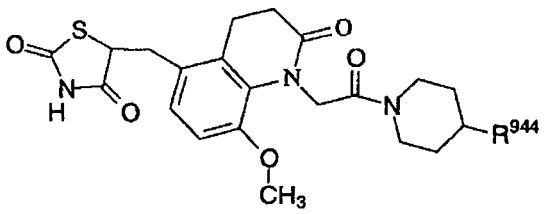
Ex.	R^{944}	MS(M+1)
1286		538
1287		606
1288		524
1289		558
1290		558
1291		620
1292		566
1293		570
1294		607
1295		585

Table 180



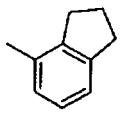
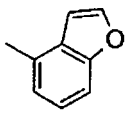
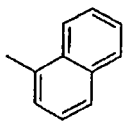
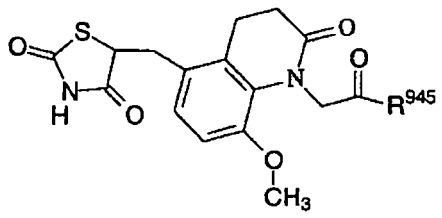
Ex.	R^{944}	MS(M+1)
1296		548
1297		548
1298		558

Table 181



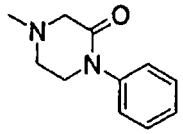
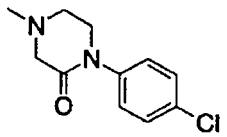
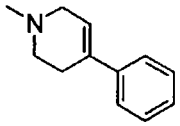
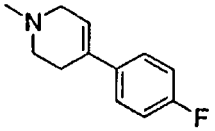
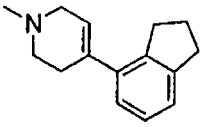
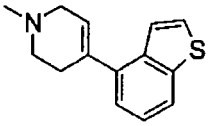
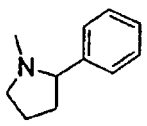
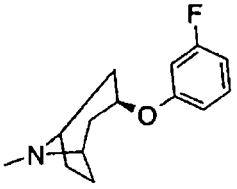
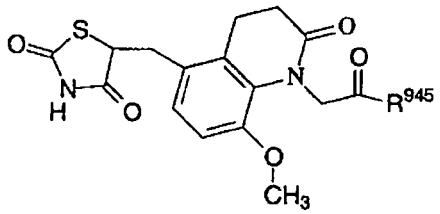
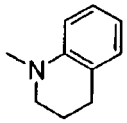
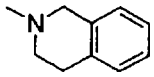
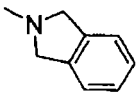
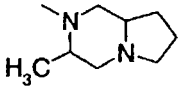
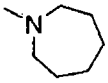
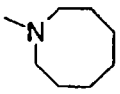
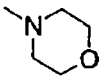
Ex.	R^{945}	MS(M+1)
1299		523
1300		557
1301		506
1302		524
1303		546
1304		562
1305		494
1306		568

Table 182



Ex.	R^{945}	MS(M+1)
1307		480
1308		480
1309		466
1310		487
1311		446
1312		460
1313		436
1314		434

Example 1315

Synthesis of 8-methoxy-1-(3-methylbutyl)-5-(4-oxo-2-thioxothiazolidin-5-ylmethyl)-3,4-dihydro-1H-quinolin-2-one

3.0 g of 8-methoxy-1-(3-methylbutyl)-4-ylmethyl-2-oxo-1,2,3,4-tetrahydroquinoline-5-carboxaldehyde and 1.53 g of 2-thioxo-1,3-thiazolidin-4-one were suspended in 30 ml of toluene. Five drops of piperidine and five drops of acetic acid were added, followed by heating and refluxing for overnight. After allowing to cool, the solid thus precipitated was collected by filtration, and dried, and then suspended in 16 ml of toluene. 2.29 g of diethyl 1,4-dihydro-2,6-dimethyl-3,5-pyridine dicarboxylate and 4.0 g of silica gel were added to the suspension, followed by heating and refluxing overnight. The solvent was distilled off from the reaction mixture, and the residue was purified by silica gel column chromatography (n-hexane:ethyl acetate=3:1 → 1:1). The purified product was recrystallized from an ethyl acetate-n-hexane mixed solvent, giving 2.11 g (55.2% yield) of 8-methoxy-1-(3-methylbutyl)-5-(4-oxo-2-thioxothiazolidin-5-ylmethyl)-3,4-dihydro-1H-quinolin-2-one as a yellow powder. Melting point: 139.5°C to 141°C

Example 1316

Synthesis of 5-[1-(3-hydroxypropyl)-2-oxo-1,2,3,4-tetrahydroquinolin-5-ylmethyl]-3-tritylthiazolidine-2,4-dione

A DMF solution (10 ml) of 1.0 g (2.99 mmol) of 5-[1-(3-hydroxypropyl)-2-oxo-1,2,3,4-tetrahydroquinolin-5-ylmethyl]thiazolidine-2,4-dione and 0.455 g (3.29 mmol) of potassium carbonate was cooled with ice, and 0.876 g (3.04 mmol) of triphenylmethylchloride was added thereto, followed by stirring at room temperature overnight. Water was added to the reaction liquid and the mixture was extracted with ethyl acetate. The organic layer was washed twice with water and once with saturated sodium chloride solution, and concentrated under reduced pressure. The residue was

purified by silica gel column chromatography (n-hexane:ethyl acetate=2:1 → ethyl acetate). The purified product was concentrated under reduced pressure and evaporated to dryness, giving 700 mg (40.6% yield) of 5-[1-(3-hydroxypropyl)-2-oxo-1,2,3,4-tetrahydroquinolin-5-ylmethyl]-3-tritylthiazolidine-2,4-dione as a colorless amorphous solid.

Example 1317

Synthesis of 5-{1-[3-(4-methylphenoxy)propyl]-2-oxo-1,2,3,4-tetrahydroquinolin-5-ylmethyl}thiazolidine-2,4-dione

A THF solution (2 ml) of 100 mg (0.18 mmol) of 5-[1-(3-hydroxypropyl)-2-oxo-1,2,3,4-tetrahydroquinolin-5-ylmethyl]-3-trityl thiazolidine-2,4-dione, 0.0363 ml(0.347 mmol) of p-cresol, and 91.1 mg (0.35 mmol) of triphenylphosphine was cooled with ice. 0.158 ml of azodicarboxylic acid diethyl (2.2 M toluene solution) was added to the solution in an argon atmosphere. The mixture was stirred at room temperature for two hours, and ethyl acetate was added to the reaction liquid. After washing with water, the organic layer was concentrated under reduced pressure, and the residue was purified by preparative silica gel thin layer chromatography (n-hexane:ethyl acetate=1:1). The purified product was concentrated under reduced pressure, and 2 ml of a solution of 4N-hydrogen chloride/ethyl acetate was added to the residue. The mixture was stirred at room temperature overnight, and further stirred at 70°C for 1.5 hours. The mixture was concentrated under reduced pressure, and the residue was purified by preparative silica gel thin layer chromatography (n-hexane:ethyl acetate=1:1). The purified product was concentrated under reduced pressure and evaporated to dryness, giving 27.1 mg (34.4% yield) of 5-{1-[3-(4-methylphenoxy)propyl]-2-oxo-1,2,3,4-tetrahydroquinolin-5-ylmethyl}thiazolidine-2,4-dione as a colorless amorphous solid.

^{1}H-NMR(DMSO-d_6) dppm:

2.0-2.2 (2H, m), 2.28 (3H, s), 2.55-3.25 (5H, m), 3.68 (1H, dd, J_1=3.7Hz, J_2=14.4Hz), 4.02 (2H, t, J=5.9Hz), 4.14 (2H, t, J=7.0Hz), 4.46 (1H, dd, J_1=3.7Hz, J_2=10.5Hz), 6.92 (2H, d, J=7.5Hz), 7.08 (1H, d, J=8.0Hz), 7.05-7.4 (4H, m)

Preparation Example 1

1-Methyl-8-methoxy-5-(4-oxo-2-thioxo-5-thiazolidinyl) methyl-3,4-dihydro-1H-quinolin-2-one	5 mg
Starch	132 mg
Magnesium stearate	18 mg
Lactose	45 mg
Total	200 mg

Tablets containing the above composition per tablet are prepared in the conventional manner.

Preparation Example 2

1-(2-Phenylethyl)-8-methoxy-5-(4-oxo-2-thioxo-5-thiazolidinyl)methyl-3,4-dihydro-1H-quinolin-2-one	5 g
Polyethyleneglycol (molecular weight: 4000)	0.3 g
Sodium chloride	0.9 g
Polyoxyethylenesorbitan monooleate	0.4 g
Sodium metabisulfite	0.1 g
Methyl-paraben	0.18 g
Propyl-paraben	0.02 g
Distilled water for injection	100 ml

The above parabens, sodium metabisulfite and sodium chloride are dissolved into distilled water at 80°C with agitation. The obtained solution is cooled to 40°C, and the compound of the invention, polyethyleneglycol and polyoxyethylenesorbitan monooleate are dissolved into the

above solution. Further distilled water for injection is then added to the solution to adjust the solution to the final amount. The resultant solution is subjected to filter sterilization using an appropriate filter paper, and 1 ml of the filtered solution is dispensed into ampules to prepare injectable solutions.

Test Example 1

Transcription promoting activity on human Trefoil Factor 2 (hTFF2) gene of test compounds was evaluated by means of an hTFF2 gene reporter assay.

(1)Preparation of hTFF2 gene reporter vector pGL3-hTFF2pro

DNA was extracted from HeLa cells (CCL-2, DAINIPPON PHARMACEUTICAL CO., LTD.) using a deoxyribonucleic acid (DNA) extraction kit (DNeasy™ Tissue Kit, manufactured by QIAGEN). The hTFF2 promoter region was amplified using the extracted DNA as a template by means of the polymerase chain reaction (PCR). The oligomers 5'-CACGCGTCAGACTGGCAACCCCCTGTC-3' and 5'-GAAGCTTCTAGCTCAGCTGCACCCCAG-3' were selected as PCR primers to be amplified, based on the report by Beck et al. (Beck S., Sommer P., Blin N., Gott P., 5'-flanking motifs control cell-specific expression of trefoil factor genes (TFF), Int. J. Mol. Med. 2(3), 353-361 (1998)). Platinum® Pfx DNA polymerase was used as DNA polymerase. The PCR was performed under the conditions of denaturing for 30 seconds at 95°C, annealing for 30 seconds at 55°C and extending for 75 seconds at 68°C, and the procedures were repeated for 32 cycles.

The PCR products were separated and purified by 1 % agarose gel electrophoresis, and cloned to a pCR-BluntII-TOPO vector attached to a cloning kit (Zero Blunt® TOPO® PCR Cloning Kit, manufactured by Invitrogen Corporation). The produced plasmid pCR-Blunt-TFF2pro was introduced into *E.coli* for transformation (TOP 10 Ultracomp™ Cells, manufactured by Invitrogen Corporation), and transformant strain pCR-Blunt-TFF2pro/TOP10 was selectively cultured in LB agar medium containing 30μg/ml of Zeocin (Zeocin, manufactured by Invitrogen Corporation). The pCR-Blunt-TFF2pro/TOP10 was subjected to shaking culture in 50 ml of LB medium containing 30μg/ml of Zeocin at 37°C over night, and a plasmid was prepared using a plasmid preparation kit (Concert™ High Purity Midiprep System, manufactured by GIBCO BRL).

The nucleotide sequence of the PCR product cloned to the plasmid pCR-Blunt-TFF2pro was determined. The determined nucleotide sequence was compared with the counterpart of hTFF2 promoter region reported in a gene bank (GenBank accession AB038162). The nucleotide sequence of the MluI-HindIII region cloned in pCR-Blunt-TFF2pro was identical to GenBank accession AB038162 (Fig. 1).

Fig. 1 shows in the upper register the nucleotide sequence and nucleotide numbering of the hTFF2 promoter region reported in GenBank (accession AB038162). The lower register shows the nucleotide sequence (see appended Sequence Number 1 shown in Sequence Listing) of the PCR product cloned in the plasmid pCR-Blunt-TFF2pro. The underlined portions indicate the recognition sequence (ACGCGT) of the restriction enzyme MluI and the recognition sequence (AAGCTT) of the

restriction enzyme HindIII. The nucleotide sequences of the MluI-HindIII region are identical between the hTFF2 promoter region reported in GenBank and the PCR product cloned to the plasmid pCR-Blunt-TFF2pro. ATG enclosed in the box is the translation start codon and the arrow shows the transcription initiation site.

The plasmid pCR-Blunt-hTFF2pro was cleaved by the restriction enzymes MluI and HindIII, fractionated by 1% agarose gel electrophoresis, and the hTFF2 promoter region was purified using a nucleic acid purification kit (Concert™ Matrix Gel Extraction System, manufactured by GIBCO BRL). The hTFF2 promoter region was inserted into the MluI-HindIII region of a commercial plasmid pGL-Basic (manufactured by Promega Corporation) using a ligation kit (Ligation high, manufactured by TOYOBO CO., LTD.) to produce pGL3-hTFF2pro. The plasmid pGL3-hTFF2pro was introduced into *E. coli* for transformation (DH5α Competent Cell, manufactured by TOYOBO CO., LTD.) and transformant strain pGL3-hTFF2pro/DH5α was selectively cultured in LB agar medium containing 100μg/ml of ampicillin.

The pGL3-hTFF2pro/DH5α was inoculated into a 2-liter Erlenmeyer flask containing 400ml of LB medium containing 100μg/ml ampicillin, and subjected to 200 rpm shaking culture at 37°C in a rotary shaker overnight. The plasmid pGL3-hTFF2pro was extracted and purified from the cultured cells using a plasmid preparation kit (EndoFree Plasmid Maxi Kit, manufactured by QIAGEN).

A commercial vector, pWLneo (manufactured by

Stratagene), containing a drug-selection marker was introduced into *E. coli* for transformation (DH5α Competent Cell, manufactured by TOYOBO CO., LTD.) and transformant strain pWLneo/DH5α was selectively cultured in LB agar medium containing 100μg/ml of ampicillin. The pWLneo/DH5α was inoculated into a 1-liter Erlenmeyer flask containing 150ml of LB medium containing 100μg/ml of ampicillin, and subjected to 200 rpm shaking culture at 37°C in a rotary shaker overnight. The plasmid pWLneo was extracted and purified from the cultured cells using a plasmid preparation kit (EndoFree Plasmid Maxi Kit, manufactured by QIAGEN).

(2)Preparation of cell line pGL3-hTFF2pro·pWL-neo/MKN-45 #6-2 for hTFF2 gene reporter assay

Human gastric cancer cell line MKN-45 (JCRB0254, Health Science Research Resources Bank) was cultured in medium (IMDM medium) composed of 500 ml of medium (Iscove's Modified Dulbecco's Medium, manufactured by SIGMA), 50 ml of fetal bovine serum (manufactured by SIGMA) immobilized by heating at 56°C for 30 minutes, 5 ml of Penicillin-Streptomycin liquid (manufactured by SIGMA) and 20 ml of 200 mM L-glutamin (manufactured by SIGMA), using a culture dish having a diameter of 10 cm (CORNING Incorporated) placed in a 5% CO_2 incubator at 37°C. The cells were washed with buffer (Dulbecco's Phosphate Buffered Saline, manufactured by SIGMA) and subjected to trypsin (0.25% Tripsin-1mM EDTA·4Na, manufactured by SIGMA) treatment for suspension. The cells were suspended in the IMDM medium, stained using Trypan Blue Stain, 0.4% (tradename, Invitrogen Corporation) and the number of cells which did not stain was counted as live cells using a hemocytometer. The cells were washed once with

buffer (Dulbecco's Phosphate Buffered Saline, manufactured by SIGMA) and 10^6 live cells were suspended in a solution for gene transfer (0.25 M Mannitol/0.1 mM $CaCl_2$/0.1 mM $MgCl_2$/0.2 mM Tris-HCl, pH7.2 to 7.4) to which 10 μg of the prepared plasmid pGL3-hTFF2pro and 2 μg of the plasmid pWLneo were added. The plasmid-added cell suspension was transferred to a 1mm cuvette (manufactured by Bio-Rad Laboratories, Inc.) and gene introduction into cells was performed by means of electroporation using an SSH-1 cell fusion apparatus (Shimadzu Corporation). The cells were suspended in the IMDM medium, inoculated in a culture dish having a diameter of 10 cm (CORNING Incorporated) and cultured in a 5% CO_2 incubator at 37°C for 2 days. Selective culturing was then carried out using IMDM medium containing 400 μg/ml of Geneticin (manufactured by Invitrogen Corporation). 100 μl of the culture medium was then first inoculated into each well of a 96-well plate (manufactured by BD Falcon), and proliferated cells were sequentially subjected to passaged culturing in a 24-well plate (manufactured by BD Falcon) and further in a 6-well plate (manufactured by BD Falcon) to prepare pGL3-hTFF2pro·pWL-neo/MKN-45 #6 cells. The obtained pGL3-hTFF2pro·pWL-neo/MKN-45 #6 cells were suspended in IMDM medium containing 400 μg/ml of Geneticin, inoculated into a 96-well plate by means of limiting dilution for cloning to obtain single clone pGL3-hTFF2pro·pWL-neo/MKN-45 #6-2 cells. The pGL3-hTFF2prod·pWL-neo/MKN-45 #6-2 cells were proliferated in a 10 cm culture dish, harvested and cryopreserved.

(3) The hTFF2 genetic reporter assay using pGL3-hTFF2pro · pWL-neo/MKN-45 #6-2 cell line

pGL3-hTFF2pro · pWL-neo/MKN-45 #6-2 was thawed from the frozen state for use. The cells were inoculated into IMDM medium containing 400 μg/ml of Geneticin in a 10 cm culture dish and sequentially passaged every 3 to 5 days. During the passage culturing, the cells were washed with buffer (Dulbecco's Phosphate Buffered Saline, manufactured by SIGMA), and tripsin (0.25% Tripsin-1mM EDTA·4Na, manufactured by SIGMA) was added to separate the cells by treatment for 5 minutes at 37°C. The cell suspension was collected by adding IMDM medium, and the cells were stained using Trypan Blue Stain, 0.4% (tradename, Invitrogen Corporation) and the number of cells which did not stain was counted as live cells using a hemocytometer. A cell survival rate of 90 % or higher was confirmed prior to the live cells being used for the hTFF2 genetic reporter assay.

A day before test compounds were added, 100 μl of the cell suspension containing about 7.5×10^4 cells was inoculated into each well of 96-well plates (manufactured by COSTAR) and cultured in a 5 % CO_2 incubator at 37 °C. The test compounds were prepared to have a concentration 200 times the final measurement concentration with dimethylsulfoxide (Wako Pure Chemical Industries, Ltd.). The test compounds having a predetermined concentration were respectively diluted 100 times with IMDM medium, and 100 μl of the diluted compounds was dispensed into wells of the 96-well plates. Demethylsulfoxide was diluted 100 times with IMDM medium and added to those wells to which test compounds were not added. After the test compounds were added, the cells were cultured in a 5 % CO_2 incubator at 37 °C for 24 hours. When the culturing was completed, the culture

supernatant was removed and the 96-well plates were frozen in a deep freezer (manufactured by SANYO Electric Co., Ltd.). The 96-well plates were thawed at room temperature when the luciferase activity was measured, and 100 µl of PicaGene LT2.0 (Wako Pure Chemical Industries, Ltd.) diluted two times with buffer (Dulbecco's Phosphate Buffered Saline, manufactured by SIGMA) was added to each well. The plates were allowed to stand at room temperature for at least 30 minutes and the luciferase activity was measured using a Labsystems Luminoskan (manufactured by ICN Biomedicals Inc.).

Taking the average measurement of the dimethylsulfoxide-added well groups in each plate as 100%, a percentage for each test compound to the demethylsulfoxide-added well groups (control %) was calculated.

The results are shown in the table below.

Table 183

Test Compound	TFF2 Production Promoting Activity
Compound of Example 22	++
Compound of Example 25	++
Compound of Example 32	+
Compound of Example 116	++
Compound of Example 122	++
Compound of Example 127	++
Compound of Example 133	++
Compound of Example 154	++
Compound of Example 157	++
Compound of Example 158	++
Compound of Example 164	++
Compound of Example 166	++
Compound of Example 171	++
Compound of Example 176	++
Compound of Example 184	++
Compound of Example 226	++
Compound of Example 233	++
Compound of Example 316	++
Compound of Example 349	++
Compound of Example 438	+
Compound of Example 607	+
Compound of Example 662	+
Compound of Example 685	++
Compound of Example 700	++
Compound of Example 740	+
Compound of Example 963	++
Compound of Example 965	++
Compound of Example 974	++
Compound of Example 981	++
Compound of Example 986	++

Table 183 (Continued)

Test Compound	TFF2 Production Promoting Activity
Compound of Example 992	++
Compound of Example 1032	++
Compound of Example 1034	++
Compound of Example 1040	++
Compound of Example 1042	++
Compound of Example 1050	++
Compound of Example 1052	++
Compound of Example 1057	++
Compound of Example 1076	++
Compound of Example 1315	++

In the above table, a TFF2 production promoting activity of 1000% or higher at a test compound concentration of 10^{-6} M is indicated as "++" and a TFF2 production promoting activity of 300% or higher at a test compound concentration of 10^{-6} M as "+".

The above results show that the concentration of compound of the present invention for showing 300 % or higher TFF2 production promoting activity is less than 10^{-5} M, and more preferably less than 10^{-6} M.

Test Example 2

Healing effects on rat models with acetic acid-induced gastric ulcers

(1) Production of gastric ulcer by acetic acid

Rats were fasted from the previous day. A celiotomy was done in each rat under ether anesthesia, and the stomach was exteriorized. Subsequently, 20 μL of a 30 % acetic acid solution was injected into the submucosa at the junction of the body of the glandular stomach and the

pyloric antrum using a disposable syringe to produce a gastric ulcer.

(2) Test compound administration

Each test compound was suspended in a 0.5% carboxymethylcelullose (CMC) solution at concentrations of 0.75 or 2.5 mg/ml. The rats were orally administrated once a day for 8 days starting with the forth day from operation at doses of 3 or 10 mg/kg. A gastric tube and a syringe were used for the oral administration. The volumes of each test compound and vehicle (0.5% CMC) were 4 ml/kg.

(3) Dissection

On the next day the vehicle and the test compound were finally administrated to the rats, the rats were sacrificed by exsanguination under anesthesia with ether, and each stomach was removed. The removed stomachs were fixed in 1 % formalin for 15 minutes, dissected along the greater curvature of stomach to expose the ulcer, and the ulcerated area was measured.

(4) Measurement of the ulcerated area

The ulcerated area was measured under a stereo microscope (10 x) with an ocular micrometer (1 mm^2/grid), and the percentage healing ratio was calculated. The test results were shown in the Table 184. The percentage healing ratio was calculated by the following formula.

$$\text{Healing ratio (\%)} = \frac{\text{average ulcerated area of control group} - \text{average ulcerated area of test compound group}}{\text{average ulcerated area of control group}} \times 100$$

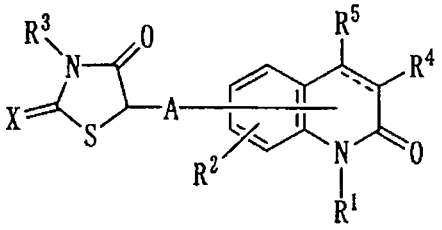
Table 184

Test Compound	Dose(mg/kg)	Healing Ratio(%)
Example 1	10	>20
Example 115	3	>20
Example 122	3	>20
Example 123	3	>20
Example 155	10	>20
Example 913	3	>20
Example 919	3	>20
Example 960	10	>20
Example 961	10	>20
Example 965	3	>20
Example 966	3	>20
Example 968	3	>20
Example 969	3	>20
Example 978	10	>20

The Table 184 demonstrates that the compounds of the present invention are effective in preventing and/or treating mucosal injury.

CLAIMS

1. A carbostyril compound represented by General Formula (1)



(1)

or a salt thereof,

wherein A is a direct bond, a lower alkylene group, or a lower alkylidene group;

X is an oxygen atom or a sulfur atom;

the bond between the 3 and 4 positions of the carbostyril skeleton is a single bond or a double bond;

R^4 and R^5 each represent a hydrogen atom, with the proviso that when the bond between the 3 and 4 positions of the carbostyril skeleton is a double bond, R^4 and R^5 instead may be linked together in the form of a -CH=CH-CH=CH- group;

R^1 is one of the following (1-1) to (1-29):

(1-1) a hydrogen atom,

(1-2) a lower alkyl group,

(1-3) a phenyl lower alkyl group optionally substituted on the phenyl ring with one or more members selected from the group consisting of a phenyl group, lower alkyl groups, lower alkoxy groups, halogen atoms, $-(B)_1NR^6R^7$ groups, a nitro group, a carboxy group, lower alkoxycarbonyl groups, a cyano group, phenyl lower alkoxy groups, a phenoxy group, a piperidinyl lower alkoxycarbonyl groups, amino lower alkoxycarbonyl groups optionally substituted with one or more cycloalkyl groups, 2-imidazolinylcarbonyl groups optionally substituted on the 2-imidazoline ring with one or more lower alkylthio groups, 3-pyrrolinylcarbonyl groups optionally substituted on

the 3-pyrroline ring with one or more lower alkyl groups, thiazolidinylcarbonyl groups optionally substituted on the thiazolidine ring with a phenyl group, 3-azabicyclo[3.2.2]nonylcarbonyl groups, piperidinyl lower alkyl groups, anilino lower aklyl groups optionally substituted on the amino group with one or more lower alkyl groups, phenylthio lower alkyl groups, indolinyl lower alkyl groups, and piperidinylcarbonyl groups optionally substituted on the piperidine ring with one or more lower alkyl groups,

(1-4) a cycloalkyl lower alkyl group,

(1-5) a phenoxy lower alkyl group,

(1-6) a naphthyl lower alkyl group,

(1-7) a lower alkoxy lower alkyl group,

(1-8) a carboxy lower alkyl group,

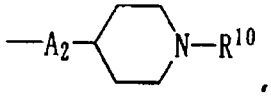
(1-9) a lower alkoxycarbonyl lower alkyl group,

(1-10) a pyridyl lower alkyl group optionally substituted on the pyridine ring with one or more members selected from the group consisting of halogen atoms; piperidinyl groups; a morpholino group; piperazinyl groups optionally substituted on the piperazine ring with one or more members selected from the group consisting of a phenyl group and lower alkyl group; thienyl groups; a phenyl group; pyridyl groups; piperidinyl lower alkyl groups; phenylthio lower alkyl groups; biphenyl groups; lower alkyl groups optionally substituted with one or more halogen atoms; pyridylamino groups; pyridylcarbonylamino groups; lower alkoxy groups; anilino lower alkyl groups optionally substituted on the amino group with one or more lower alkyl groups; and anilino groups optionally substituted on the amino group with one or more lower alkyl groups,

(1-11) a cyano lower alkyl group,

(1-12) an $-A_1-CONR^8R^9$ group,

(1-13) a group of the following formula



(1-14) a phenyl group,

(1-15) a quinolyl lower alkyl group,

(1-16) a lower alkoxy lower alkoxy-substituted lower alkyl group,

(1-17) a hydroxy-substituted lower alkyl group,

(1-18) a thiazolyl lower alkyl group optionally substituted on the thiazole ring with one or more members selected from the group consisting of halogen atoms, a phenyl group, thienyl groups, and pyridyl groups,

(1-19) a lower alkyl group optionally substituted with one or more halogen atoms,

(1-20) a lower alkylsilyloxy lower alkyl group,

(1-21) a phenoxy lower alkyl group optionally substituted on the phenyl ring with one or more members selected from the group consisting of lower alkyl groups optionally substituted with one or more halogen atoms; lower alkoxy groups; halogen atoms; lower alkenyl groups; cycloalkyl groups; a nitro group; and a phenyl group,

(1-22) a phenylthio lower alkyl group optionally substituted on the phenyl ring with one or more halogen atoms,

(1-23) a piperidinyl lower alkyl groups optionally substituted on the piperidine ring with one or more members selected from the group consisting of phenyl lower alkyl groups and a phenyl group,

(1-24) a piperazinyl lower alkyl group optionally substituted on the piperazine ring with one or more phenyl groups,

(1-25) a 1,2,3,4-tetrahydroisoquinolyl lower alkyl group,

(1-26) a naphthyloxy lower alkyl group,

(1-27) a benzothiazolyloxy lower alkyl group optionally substituted on the benzothiazole ring with one or more alkyl groups,

(1-28) a lower alkyl group substituted with one or more members selected from the group consisting of quinolyloxy groups and isoquinolyloxy groups,

(1-29) a pyridyloxy lower alkyl group optionally substituted on the pyridine ring with one or more lower alkyl groups;

R^2 is one of the following (2-1) to (2-33):

(2-1) a hydrogen atom,

(2-2) a lower alkoxy group,

(2-3) a lower alkyl group,

(2-4) a carboxy lower alkoxy group,

(2-5) a lower alkoxycarbonyl lower alkoxy group,

(2-6) a hydroxy group,

(2-7) a phenyl lower alkoxy group optionally substituted on the phenyl ring with one or more members selected from the group consisting of halogen atoms; lower alkyl groups optionally substituted with one or more halogen atoms; lower alkylthio groups optionally substituted with one or more halogen atoms; lower alkoxy groups; a nitro group; lower alkylsulfonyl groups; lower alkoxycarbonyl groups; phenyl lower alkenyl groups; lower alkanoyloxy groups; and 1,2,3-thiadiazolyl groups,

(2-8) a piperidinyl lower alkoxy group optionally substituted on the piperidine ring with one or more lower alkyl groups,

(2-9) an amino-substituted lower alkoxy group optionally substituted with one or more lower alkyl groups,

(2-10) a lower alkenyloxy group,

(2-11) a pyridyl lower alkoxy group optionally substituted on the pyridine ring with one or more lower alkyl groups, each lower alkyl substituent optionally being substituted with one or more halogen atoms,

(2-12) a lower alkynyloxy group,

(2-13) a phenyl lower alkynyloxy group,

(2-14) a phenyl lower alkenyloxy group,

(2-15) a furyl lower alkoxy group optionally substituted on the furan ring with one or more lower alkoxycarbonyl groups,

(2-16) a tetrazolyl lower alkoxy group optionally substituted on the tetrazole ring with one member selected from the group consisting of a phenyl group, phenyl lower alkyl groups, and

cycloalkyl lower alkyl groups,

(2-17) a 1,2,4-oxadiazolyl lower alkoxy group optionally substituted on the 1,2,4-oxadiazole ring with a phenyl group, the phenyl substituent optionally being substituted on the phenyl ring with one or more lower alkyl groups,

(2-18) an isoxazolyl lower alkoxy group optionally substituted on the isoxazole ring with one or more lower alkyl groups,

(2-19) a 1,3,4-oxadiazolyl lower alkoxy group optionally substituted on the 1,3,4-oxadiazole ring with a phenyl group, the phenyl substituent optionally being substituted on the phenyl ring with one or more lower alkyl groups,

(2-20) a lower alkanoyl lower alkoxy group,

(2-21) a thiazolyl lower alkoxy group optionally substituted on the thiazole ring with one or more members selected from the group consisting of lower alkyl groups and a phenyl group, each phenyl substituent optionally being substituted on the phenyl ring with one or more halogen atoms,

(2-22) a piperidinyloxy group optionally substituted on the piperidine ring with one or more benzoyl groups, each benzoyl substituent optionally being substituted on the phenyl ring with one or more halogen atoms,

(2-23) a thienyl lower alkoxy group,

(2-24) a phenylthio lower alkoxy group,

(2-25) a carbamoyl-substituted lower alkoxy group optionally substituted with one or more lower alkyl groups,

(2-26) a benzoyl lower alkoxy group,

(2-27) a pyridylcarbonyl lower alkoxy group,

(2-28) an imidazolyl lower alkoxy group optionally substituted on the imidazole ring with one or more phenyl lower alkyl groups,

(2-29) a phenoxy lower alkoxy group,

(2-30) a phenyl lower alkoxy-substituted lower alkoxy group,

(2-31) a 2,3-dihydro-1H-indenyloxy group,

(2-32) an isoindolinyl lower alkoxy group optionally

substituted on the isoindoline ring with one or more oxo groups,

(2-33) a phenyl group;

R^3 is one of the following (3-1) to (3-19):

(3-1) a hydrogen atom,

(3-2) a lower alkyl group,

(3-3) a hydroxy-substituted lower alkyl group,

(3-4) a cycloalkyl lower alkyl group,

(3-5) a carboxy lower alkyl group,

(3-6) a lower alkoxycarbonyl lower alkyl group,

(3-7) a phenyl lower alkyl group optionally substituted on the phenyl ring with one or more members selected from the group consisting of halogen atoms; lower alkyl groups optionally substituted with one or more halogen atoms; lower alkoxy groups optionally substituted with one or more halogen atoms; a phenyl group; lower alkoxycarbonyl groups; a phenoxy group; lower alkylthio groups; lower alkylsulfonyl groups; phenyl lower alkoxy groups; and amino groups optionally substituted with one or more lower alkanoyl groups,

(3-8) a naphthyl lower alkyl group,

(3-9) a furyl lower alkyl group optionally substituted on the furan ring with one or more lower alkoxycarbonyl groups,

(3-10) a thiazolyl lower alkyl group optionally substituted on the thiazole ring with one or more members selected from the group consisting of lower alkyl groups and a phenyl group, each phenyl substituent optionally being substituted on the phenyl ring with one or more optionally halogen-substituted lower alkyl groups,

(3-11) a tetrazolyl lower alkyl group optionally substituted on the tetrazole ring with one or more lower alkyl groups,

(3-12) a benzothienyl lower alkyl group optionally substituted on the benzothiophene ring with one or more halogen atoms,

(3-13) a lower alkynyl group,

(3-14) a lower alkenyl group,

(3-15) a phenyl lower alkenyl group,

(3-16) a benzoimidazolyl lower alkyl group,

(3-17) a pyridyl lower alkyl group,

(3-18) an imidazolyl lower alkyl group optionally substituted on the imidazole ring with one or more phenyl lower alkyl groups,

(3-19) a quinolyl lower alkyl group;

B is a carbonyl group or an -NHCO- group;

l is 0 or 1;

R^6 and R^7 each independently represent one of the following (4-1) to (4-79):

(4-1) a hydrogen atom,

(4-2) a lower alkyl group,

(4-3) a lower alkanoyl group,

(4-4) a lower alkylsulfonyl group optionally substituted with one or more halogen atoms,

(4-5) an alkoxycarbonyl group optionally substituted with one or more halogen atoms,

(4-6) a hydroxy-substituted lower alkyl group,

(4-7) a pyridylcarbonyl group optionally substituted on the pyridine ring with one or more members selected from the group consisting of pyrrolyl groups and halogen atoms,

(4-8) a pyridyl group optionally substituted on the pyridine ring with one or more members selected from the group consisting of lower alkyl groups and lower alkoxy groups,

(4-9) a pyridyl lower alkyl group,

(4-10) a phenyl group optionally substituted on the phenyl ring with one or more members selected from the group consisting of halogen atoms; lower alkyl groups optionally substituted with one or more halogen atoms; a phenoxy group; lower alkoxy groups optionally substituted with one or more halogen atoms; lower alkylthio groups; lower alkylsulfonyl groups; amino groups optionally substituted with one or more members selected from the group consisting of lower alkyl groups and lower alkanoyl groups; pyrrolidinyl groups

optionally substituted on the pyrrolidine ring with one or more oxo groups; piperidinyl groups optionally substituted on the piperidine ring with one or more lower alkyl groups; lower alkenyl groups; an aminosulfonyl group; a hydroxy group; carbamoyl groups optionally substituted with one or more lower alkyl groups; phenyl lower alkoxy groups; and a cyano group,

(4-11) a cycloalkyl group optionally substituted on the cycloalkyl ring with one or more lower alkyl groups,

(4-12) a benzoyl group optionally substituted on the phenyl ring with one or more members selected from the group consisting of halogen atoms; a phenoxy group; a phenyl group; lower alkyl groups optionally substituted with one or more halogen atoms; lower alkoxy groups; lower alkanoyl groups; a nitro group; a cyano group; amino groups optionally substituted with one or more members selected from the group consisting of a phenyl group and lower alkyl groups; pyrrolidinyl groups optionally substituted on the pyrrolidine ring with one or more oxo groups; pyrrolyl groups; pyrazolyl groups; 1,2,4-triazolyl groups; and imidazolyl groups,

(4-13) a benzoyl group substituted on the phenyl ring with one or more lower alkylenedioxy groups,

(4-14) a cycloalkylcarbonyl group,

(4-15) a furylcarbonyl group,

(4-16) a naphthylcarbonyl group,

(4-17) a phenoxycarbonyl group optionally substituted on the phenyl ring with one or more members selected from the group consisting of lower alkoxy groups, lower alkyl groups, halogen atoms, and a nitro group,

(4-18) a phenyl lower alkoxycarbonyl group optionally substituted on the phenyl ring with one or more members selected from the group consisting of halogen atoms and a nitro group,

(4-19) a piperidinyl group optionally substituted on the piperidine ring with one or more members selected from the

group consisting of lower alkyl groups; lower alkanoyl groups; benzoyl groups optionally substituted on the phenyl ring with one or more halogen atoms; and phenyl groups optionally substituted on the phenyl ring with one or more halogen atoms,

(4-20) a tetrahydropyranyl lower alkyl group,

(4-21) a cycloalkyl lower alkyl group,

(4-22) a lower alkenyl group,

(4-23) a phenyl lower alkyl group optionally substituted on the alkyl group with one or more lower alkoxycarbonyl groups; and optionally substituted on the phenyl ring with one or more members selected from the group consisting of halogen atoms, lower alkyl groups optionally substituted with one or more halogen atoms, lower alkoxy groups optionally substituted with one or more halogen atoms, and a hydroxy group,

(4-24) a lower alkylenedioxy-substituted phenyl lower alkyl group,

(4-25) a furyl lower alkyl group,

(4-26) a carbamoyl lower alkyl group optionally substituted with one or more members selected from lower alkyl groups and a phenyl group, each phenyl substituent optionally being substituted on the phenyl ring with one or more lower alkyl groups,

(4-27) a lower alkoxy lower alkyl group,

(4-28) an imidazolyl lower alkyl group optionally substituted on the lower alkyl group with one or more members selected from the group consisting of a carbamoyl group and lower alkoxycarbonyl groups,

(4-29) an amino-substituted lower alkyl group optionally substituted with one or more lower alkyl groups,

(4-30) a 2,3,4,5-tetrahydrofuryl group optionally substituted on the 2,3,4,5-tetrahydrofuran ring with one or more oxo groups,

(4-31) a lower alkoxycarbonyl lower alkyl group,

(4-32) a pyrrolidinyl lower alkyl group optionally substituted on the pyrrolidine ring with one or more lower alkyl groups,

(4-33) a phenoxy lower alkanoyl group,

(4-34) a morpholino lower alkyl group,

(4-35) a indolyl group,

(4-36) a thiazolyl group,

(4-37) a 1,2,4-triazolyl group,

(4-38) a pyridyl lower alkanoyl group,

(4-39) a thienylcarbonyl group,

(4-40) a thienyl lower alkanoyl group,

(4-41) a cycloalkyl lower alkanoyl group,

(4-42) an isoxazolylcarbonyl group optionally substituted on the isoxazole ring with one or more lower alkyl groups,

(4-43) a pyrazylcarbonyl group,

(4-44) a piperidinylcarbonyl group optionally substituted on the piperidine ring with one or more members selected from a benzoyl group and lower alkanoyl groups,

(4-45) a chromanylcarbonyl group,

(4-46) an isoindolinyl lower alkanoyl group optionally substituted on the isoindoline ring with one or more oxo groups,

(4-47) a thiazolidinyl lower alkanoyl group optionally substituted on the thiazolidine ring with one or more members selected from an oxo group and a thioxo group,

(4-48) a piperidinyl lower alkanoyl group,

(4-49) a phenyl lower alkenylcarbonyl group optionally substituted on the phenyl ring with one or more halogen atoms,

(4-50) a phenyl lower alkenylcarbonyl group substituted on the phenyl ring with one or more alkylenedioxy groups,

(4-51) a pyridyl lower alkenyl carbonyl group,

(4-52) a pyridylthio lower alkanoyl group,

(4-53) an indolylcarbonyl group,

(4-54) a pyrrolylcarbonyl group,

(4-55) a pyrrolidinylcarbonyl group optionally substituted on

the pyrrolidine ring with one or more oxo groups,
(4-56) a benzofurylcarbonyl group,
(4-57) an indolyl lower alkanoyl group,
(4-58) a benzothienylcarbonyl group,
(4-59) a phenyl lower alkanoyl group optionally substituted on the phenyl ring with one or more halogen atoms,
(4-60) a phenylsulfonyl group optionally substituted on the phenyl ring with one or more members selected from the group consisting of lower alkoxycarbonyl groups; a cyano group; a nitro group; amino groups optionally substituted with one or more alkanoyl groups; a hydroxy group; a carboxyl group; lower alkoxycarbonyl lower alkyl groups; halogen atoms; lower alkyl groups optionally substituted with one or more halogen atoms; and lower alkoxy groups optionally substituted with one or more halogen atoms,
(4-61) a thienylsulfonyl group optionally substituted on the thiophene ring with one or more members selected from the group consisting of halogen atoms and lower alkoxycarbonyl groups,
(4-62) a quinolylsulfonyl group,
(4-63) an imidazolylsulfonyl group optionally substituted on the imidazole ring with one or more lower alkyl groups,
(4-64) a phenylsulfonyl group optionally substituted on the phenyl ring with one or more lower alkylenedioxy groups,
(4-65) a lower alkenylsulfonyl group,
(4-66) a cycloalkyl lower alkylsulfonyl group,
(4-67) a 3,4-dihydro-2H-1,4-benzoxazinylsulfonyl group optionally substituted on the 3,4-dihydro-2H-1,4-benzoxazine ring with one or more lower alkyl groups,
(4-68) a pyrazolylsulfonyl group optionally substituted on the pyrazole ring with one or more members selected from halogen atoms and lower alkyl groups,
(4-69) an isoxazolylsulfonyl group optionally substituted on the isoxazole ring with one or more lower alkyl groups,
(4-70) a thiazolylsulfonyl group optionally substituted on

the thiazole ring with one or more members selected from the group consisting of lower alkyl groups and an amino group, each amino substituent optionally being substituted with one or more alkanoyl groups,

(4-71) a phenyl lower alkylsulfonyl group,

(4-72) a phenyl lower alkenylsulfonyl group,

(4-73) a naphthyloxycarbonyl group,

(4-74) a lower alkynyloxycarbonyl group,

(4-75) a lower alkenyloxycarbonyl group,

(4-76) a phenyl lower alkoxy-substituted lower alkoxycarbonyl group,

(4-77) a cycloalkyloxycarbonyl group optionally substituted on the cycloalkyl ring with one or more lower alkyl groups,

(4-78) a tetrazolyl group,

(4-79) an isoxazolyl group optionally substituted on the isoxazole ring with one or more lower alkyl groups; or instead,

R^6 and R^7 may be linked together to form, together with the nitrogen atom to which they are bound, a 1,2,3,4-tetrahydroisoquinolyl group, an isoindolinyl group, or a 5- to 7-membered saturated heterocyclic group, the heterocyclic group optionally containing one or more additional heteroatoms and optionally being substituted with one to three members from the following (5-1) to (5-28):

(5-1) lower alkyl groups,

(5-2) lower alkoxy groups,

(5-3) an oxo group,

(5-4) a hydroxy group,

(5-5) pyridyl lower alkyl groups,

(5-6) phenyl groups optionally substituted on the phenyl ring with one or more members selected from the group consisting of halogen atoms; lower alkoxy groups optionally substituted with one or more halogen atoms; lower alkyl groups optionally substituted with one or more halogen atoms; a cyano group; and a hydroxy group,

(5-7) lower alkylenedioxy-substituted phenyl lower alkyl groups,

(5-8) phenyl lower alkyl groups optionally substituted on the phenyl ring with one or more halogen atoms,

(5-9) pyrimidyl groups,

(5-10) pyrazyl groups,

(5-11) cycloalkyl groups,

(5-12) phenyl lower alkoxy groups optionally substituted on the phenyl ring with one or more halogen atoms,

(5-13) benzoyl groups optionally substituted on the phenyl ring with one or more halogen atoms,

(5-14) benzoyl groups substituted on the phenyl ring with one or more lower alkylenedioxy groups,

(5-15) carbamoyl lower alkyl groups optionally substituted with one or more members selected from the group consisting of a phenyl group and lower alkyl groups,

(5-16) benzoxazolyl groups,

(5-17) lower alkoxycarbonyl groups,

(5-18) a carbamoyl group,

(5-19) phenyl lower alkylidene groups optionally substituted on the phenyl ring with one or more halogen atoms,

(5-20) phenyl lower alkoxycarbonyl groups,

(5-21) pyridyl groups optionally substituted on the pyridine ring with one or more members selected from the group consisting of a cyano group and lower alkyl groups,

(5-22) furyl lower alkyl groups,

(5-23) tetrahydropyranyl groups,

(5-24) imidazolyl lower alkyl groups,

(5-25) naphthyl groups,

(5-26) 2,3-dihydro-1H-indenyl groups,

(5-27) 1,3-dioxolanyl lower alkyl groups,

(5-28) $-(A_3)_mNR^{11}R^{12}$ groups;

A_1 is a lower alkylene group;

R^8 and R^9 each independently represent one of the following (6-1) to (6-25):

(6-1) a hydrogen atom,

(6-2) a lower alkyl group,

(6-3) a phenyl group optionally substituted on the phenyl ring with one or more members selected from the group consisting of lower alkyl groups optionally substituted with one or more halogen atoms; lower alkylthio groups; lower alkoxy groups optionally substituted with one or more halogen atoms; halogen atoms; a phenyl group; lower alkylamino groups; a cyano group; a phenoxy group; cycloalkyl groups; pyrrolidinyl groups optionally substituted with one or more oxo groups; 1,2,3,4-tetrahydroisoquinolylcarbonyl groups; 1,2,3,4-tetrahydroquinolylcarbonyl groups optionally substituted with one or more lower alkyl groups; 1,2,3,4-tetrahydroquinoxalinylcarbonyl groups optionally substituted with one or more lower alkyl groups; thiazolyl groups optionally substituted with one or more phenyl groups; a carbamoyl group; phenyl lower alkoxy groups; lower alkylsulfonylamino groups; anilino groups optionally substituted with one or more halogen atoms; phenyl lower alkyl groups; and hydroxy-substituted lower alkyl groups,

(6-4) a cycloalkyl group,

(6-5) a cycloakyl lower alkyl group,

(6-6) a carbamoyl lower alkyl group,

(6-7) a phenyl lower alkyl group optionally substituted on the phenyl ring with one or more members selected from the group consisting of lower alkyl groups optionally substituted with one or more halogen atoms; lower alkoxy groups optionally substituted with one or more halogen atoms; halogen atoms; and a phenyl group,

(6-8) lower alkyl-substituted amino lower alkyl group,

(6-9) a naphthyl group,

(6-10) a naphthyl lower alkyl group,

(6-11) a tetrahydronaphthyl lower alkyl group,

(6-12) a fluorenyl group,

(6-13) a pyridyl group,

(6-14) a pyridyl lower alkyl group,

(6-15) a pyrimidinyl group,

(6-16) a pyrazinyl lower alkyl group optionally substituted on the pyrazine ring with one or more lower alkyl groups,

(6-17) a thiazolyl group,

(6-18) a pyrazolyl lower alkyl group optionally substituted on the pyrazole ring with one or more lower alkyl groups,

(6-19) a thienyl lower alkyl group

(6-20) a piperidinyl group optionally substituted on the piperidine ring with one or more members selected from the group consisting of lower alkyl groups; a benzoyl group; and phenyl lower alkyl groups optionally substituted on the phenyl ring with one or more members selected from the group consisting of halogen atoms and lower alkyl groups,

(6-21) an indolyl group,

(6-22) an indazolyl group,

(6-23) a 3,4-dihydrocarbostyril optionally substituted with one or more lower alkyl groups,

(6-24) a quinolyl group optionally substituted with one or more lower alkyl groups,

(6-25) a carbazolyl group optionally substituted with one or more lower alkyl groups; or

R^8 and R^9 may be linked together to form, together with the nitrogen atom to which they are bound, a 5- to 8-membered saturated heterocyclic group optionally containing one or more additional heteroatoms and optionally substituted on the heterocyclic ring with one or more members selected from the group consisting of the following (6-28-1) to (6-28-24):

(6-28-1) lower alkyl groups,

(6-28-2) phenyl lower alkyl groups optionally substituted on the phenyl ring with one or more members selected from halogen atoms and lower alkoxy groups optionally substituted with one or more halogen atoms,

(6-28-3) naphthyl lower alkyl groups,

(6-28-4) phenyl lower alkylcarbamoyl lower alkyl groups,
(6-28-5) phenylcarbamoyl lower alkyl groups,
(6-28-6) phenyl lower alkoxycarbonyl groups,
(6-28-7) phenoxy lower alkyl groups optionally substituted on the phenyl ring with one or more members selected from the group consisting of halogen atoms and lower alkyl groups optionally substituted with one or more halogen atoms,
(6-28-8) biphenyl groups,
(6-28-9) phenyl groups optionally substituted on the phenyl ring with one or more halogen atoms,
(6-28-10) 2,3-dihydroindenyl groups optionally substituted with one or more halogen atoms,
(6-28-11) benzothiazolyl groups optionally substituted with one or more halogen atoms,
(6-28-12) pyridyl groups optionally substituted with one or more halogen atoms,
(6-28-13) benzothienyl groups,
(6-28-14) benzoisothiazolyl groups,
(6-28-15) thienopyridyl groups,
(6-28-16) a carbamoyl group,
(6-28-17) phenyl lower alkoxy groups optionally substituted on the phenyl ring with one or more halogen atoms,
(6-28-18) phenoxy groups optionally substituted with one or more halogen atoms,
(6-28-19) benzoyl groups optionally substituted on the phenyl ring with one or more members selected from halogen atoms and lower alkoxy groups,
(6-28-20) anilino groups optionally substituted on the phenyl ring with one or more lower alkyl groups, each lower alkyl substituent optionally being substituted with one or more halogen atoms,
(6-28-21) anilino groups substituted on the amino group with one or more lower alkyl groups, and optionally further substituted on the phenyl ring with one or more halogen atoms,
(6-28-22) benzofuryl groups,

(6-28-23) naphthyl groups,

(6-28-24) an oxo group; or

R^8 and R^9 may be linked together to form, together with the nitrogen atom to which they are bound, a 5- or 6-membered unsaturated heterocyclic group, the unsaturated heterocyclic group optionally being substituted on the heterocyclic ring with one or more members selected from the group consisting of the following (6-29-1) to (6-29-3):

(6-29-1) phenyl groups optionally substituted with one or more halogen atoms,

(6-29-2) 2,3-dihydroindenyl groups,

(6-29-3) benzothienyl groups; or instead,

R^8 and R^9 may be linked together to form, together with the nitrogen atom to which they are bound, a 1,2,3,4-tetrahydroquinolyl group; a 1,2,3,4-tetrahydroisoquinolyl group, a 1,3-dihydroisoindolyl group; an octahydropyrrolo[1,2-*a*]pyrazinyl group optionally substituted on the pyrazine ring with one or more lower alkyl groups; or an 8-azabicyclo[3.2.1]octyl group optionally substituted on the 8-azabicyclo[3.2.1]octyl group with one or more phenoxy groups, each phenoxy substituent optionally being substituted on the phenyl ring with one or more halogen atoms;

A_2 is a lower alkylene group;

R^{10} is one of the following (7-1) to (7-44):

(7-1) a hydrogen atom,

(7-2) a lower alkyl group,

(7-3) an alkoxycarbonyl group optionally substituted with one or more halogen atoms,

(7-4) a benzoyl group optionally substituted on the phenyl ring with one or more members selected from the group consisting of lower alkyl groups optionally substituted with one or more halogen atoms; a phenyl group; halogen atoms; a cyano group; a phenoxy group; lower alkoxycarbonyl groups; pyrazolyl groups; and lower alkoxy groups optionally substituted with one or more halogen atoms,

(7-5) an alkanoyl group,

(7-6) a phenyl lower alkanoyl group optionally substituted on the phenyl ring with one or more members selected from the group consisting of halogen atoms and lower alkyl groups,

(7-7) a cycloalkyl lower alkanoyl group,

(7-8) a phenyl group optionally substituted on the phenyl ring with one or more lower alkyl groups,

(7-9) a phenoxy lower alkanoyl group optionally substituted on the phenyl ring with one or more halogen atoms,

(7-10) a phenyl lower alkenylcarbonyl group,

(7-11) a pyridylcarbonyl group optionally substituted on the pyridine ring with one or more members selected from the group consisting of halogen atoms and lower alkyl groups, each lower alkyl substituent optionally being substituted with one or more halogen atoms,

(7-12) a furylcarbonyl group,

(7-13) a thienylcarbonyl group,

(7-14) a piperidinylcarbonyl group optionally substituted on the piperidine ring with one or more lower alkanoyl groups,

(7-15) a pyrrolidinylcarbonyl group optionally substituted on the pyrrolidine ring with one or more oxo groups,

(7-16) a tetrahydropyranylcarbonyl group,

(7-17) a naphthylcarbonyl group,

(7-18) an indolylcarbonyl group,

(7-19) a benzofurylcarbonyl group,

(7-20) a benzothienylcarbonyl group optionally substituted on the benzothiophene ring with one or more halogen atoms,

(7-21) a furyl lower alkyl group,

(7-22) a pyridyl lower alkyl group optionally substituted on the pyridine ring with one or more members selected from the group consisting of halogen atoms and lower alkyl groups, each lower alkyl substituent optionally being substituted with one or more halogen atoms,

(7-23) a thienyl lower alkyl group optionally substituted on the thiophene ring with one or more halogen atoms,

(7-24) a phenyl lower alkyl group optionally substituted on the phenyl ring with one or more members selected from the group consisting of lower alkoxy groups optionally substituted with one or more halogen atoms; a cyano group; lower alkyl groups optionally substituted with one or more halogen atoms; amino groups optionally substituted with one or more members selected from the group consisting of lower alkyl groups and lower alkanoyl groups; halogen atoms; lower alkoxycarbonyl groups; lower alkanoyloxy groups; lower alkylsulfonyl groups; lower alkylthio groups; and pyrrolidinyl groups,

(7-25) a thiazolyl lower alkyl group,

(7-26) an imidazolyl lower alkyl group optionally substituted on the imidazole ring with one or more lower alkyl groups,

(7-27) a pyrrolyl lower alkyl group optionally substituted on the pyrrole ring with one or more lower alkyl groups,

(7-28) a cycloalkyl lower alkyl group,

(7-29) a lower alkylthio lower alkyl group,

(7-30) a phenoxycarbonyl group optionally substituted on the phenyl ring with one or more members selected from the group consisting of halogen atoms, lower alkyl groups, and lower alkoxy groups,

(7-31) a phenyl lower alkoxycarbonyl group optionally substituted on the phenyl ring with one or more halogen atoms,

(7-32) a naphthyloxycarbonyl group,

(7-33) a lower alkynyloxycarbonyl group,

(7-34) a cycloalkylcarbonyl group,

(7-35) a quinoxalinylcarbonyl group,

(7-36) a $-CO-NR^{13}R^{14}$ group,

(7-37) a piperidinyl group optionally substituted on the piperidine ring with one or more lower alkyl groups,

(7-38) a cycloalkyl group,

(7-39) a tetrahydropyranyl group,

(7-40) a lower alkoxy lower alkyl group,

(7-41) a tetrahydro-2H-thiopyranyl group,

(7-42) a naphthyl group,

(7-43) a biphenyl group,

(7-44) a lower alkylsilyl lower alkoxycarbonyl group;

A^3 is a lower alkylene group;

m is 0 or 1;

R^{11} and R^{12} each independently represent one of the following (8-1) to (8-5):

(8-1) a hydrogen atom,

(8-2) a lower alkyl group,

(8-3) a lower alkanoyl group,

(8-4) a phenyl lower alkanoyl group,

(8-5) a phenyl group optionally substituted on the phenyl ring with one or more halogen atoms; or instead,

R^{11} and R^{12} may be linked together to form, together with the nitrogen atom to which they are bound, a 5- or 6-membered saturated heterocyclic group which optionally contains one or more additional heteroatoms, the heterocyclic group optionally being substituted with one to three members selected from the group consisting of the following (9-1) and (9-2):

(9-1) lower alkyl groups,

(9-2) a phenyl group; and

R^{13} and R^{14} each independently represent one of the following (10-1) to (10-3):

(10-1) a hydrogen atom,

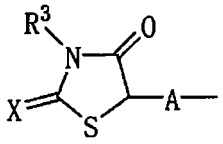
(10-2) a lower alkyl group,

(10-3) a phenyl group, or instead

R^{13} and R^{14} may be linked together to form, together with the nitrogen atom to which they are bound, a 5- or 6-membered saturated heterocyclic group which optionally contains one or more additional heteroatoms.

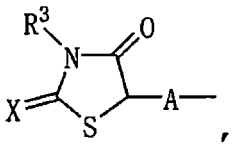
2. A carbostyril compound or a salt thereof according to Claim 1, wherein the bond between the 3 and 4 positions of the carbostyril skeleton is a single bond or a double bond, and R^4 and R^5 each represent a hydrogen atom.

3. A carbostyril compound or a salt thereof according to Claim 2, wherein a group of the formula



in which R^3, A and X are as defined in Claim 1 above, is bound to the 3, 4, 5, 6, 7 or 8 position of the carbostyril skeleton.

4. A carbostyril compound or a salt thereof according to Claim 3, wherein the bond between the 3 and 4 positions of the carbostyril skeleton is a single bond, and the group of the formula,

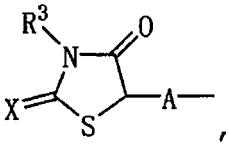


in which R^3, A and X are as defined in Claim 1 above, is bound to the 5 or 6 position of the carbostyril skeleton.

5. A carbostyril compound or a salt thereof according to Claim 3 or 4, wherein A is a lower alkylene group or a lower alkylidene group.

6. A carbostyril compound or a salt thereof according to Claim 5, wherein R^1 is one of (1-2), (1-3), (1-4), (1-6), (1-10), (1-12), (1-13), (1-18) and (1-21) as defined in Claim 1 above.

7. A carbostyril compound or a salt thereof according to Claim 6, wherein the group of the formula



in which R^3, A and X are as defined in Claim 1 above, is bound to the 5 position of the carbostyril skeleton.

8. A carbostyril compound or a salt thereof according to Claim 7, wherein R^1 is a phenyl lower alkyl group optionally substituted on the phenyl ring with one or more members selected from the group consisting of a phenyl

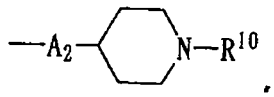
ring, halogen atoms, $-(B)_lNR^6R^7$ groups wherein B, l, R^6 and R^7 are as defined in Claim 1, lower alkoxycarbonyl groups, and phenyl lower alkoxy groups.

9. A carbostyril compound or a salt thereof according to Claim 8, wherein A is a lower alkylene group, R^2 is a hydrogen atom or a lower alkoxy group, R^3 is a hydrogen atom, and X is an oxygen atom or a sulfur atom.

10. A carbostyril compound or a salt thereof according to Claim 7, wherein A is a lower alkylene group, R^1 is a lower alkyl group, R^2 is a hydrogen atom or a lower alkoxy group, R^3 is a hydrogen atom, and X is an oxygen atom or a sulfur atom.

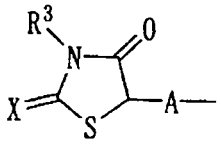
11. A carbostyril compound or a salt thereof according to Claim 7, wherein A is a lower alkylene group, R^1 is a naphthyl lower alkyl group, R^2 is a hydrogen atom or a lower alkoxy group, R^3 is a hydrogen atom, and X is an oxygen atom or a sulfur atom.

12. A carbostyril compound or a salt thereof according to Claim 7, wherein A is a lower alkylene group, R^1 is a group of the formula



in which R^{10} and A_2 are as defined in Claim 1 above, R^2 is a hydrogen atom or a lower alkoxy group, R^3 is a hydrogen atom, and X is an oxygen atom or a sulfur atom.

13. A carbostyril compound or a salt thereof according to Claim 3, wherein the bond between the 3 and 4 positions of the carbostyril skeleton is a double bond, and a group of the formula



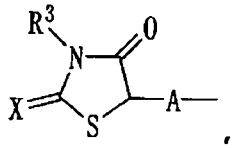
in which R^3, A and X are as defined in Claim 1 above, is bound to the 3, 4 or 5 position of the carbostyril sleketon.

14. A carbostyril compound or a salt thereof according to Claim 13, wherein R^1 is one of (1-2) and (1-3) as defined in Claim 1.

15. A carbostyril compound or a salt thereof according to Claim 14, wherein A is a lower alkylene group or a lower alkylidene group, and R^2 is a hydrogen atom or a lower alkoxy group.

16. A carbostyril compound or a salt thereof according to Claim 1, wherein the bond between the 3 and 4 positions of the carbostyril skeleton is a double bond, and R^4 and R^5 are linked together in the form of a -CH=CH-CH=CH- group.

17. A carbostyril compound or a salt thereof according to Claim 16, wherein a group of the formula



in which R^3, A and X are as defined in Claim 1 above, is bound to the 7 position of the carbostyril skeleton.

18. A carbostyril compound or a salt thereof according to Claim 17, wherein R^1 is one of (1-2) and (1-3) as defined in Claim 1 above.

19. A carbostyril compound or a salt thereof according to Claim 18, wherein A is a lower alkylene group or a lower alkylidene group, R^2 and R^3 are both hydrogen atoms, and X is an oxygen atom or a sulfur atom.

20. A carbostyril compound or a salt thereof according to Claim 1, wherein A is a direct bond.

21. A carbostyril compound or a salt thereof according to Claim 1, wherein A is a lower alkylene group.

22. A carbostyril compound or a salt thereof according to Claim 1, wherein A is a lower alkylidene group.

23. A carbostyril compound or a salt thereof according to any one of Claims 20 to 22, wherein the bond between the 3 and 4 positions of the carbostyril skeleton is

a single bond or a double bond, and R^4 and R^5 each represent a hydrogen atom.

24. A carbostyril compound or a salt thereof according to any one of Claims 20 to 22, wherein the bond between the 3 and 4 positions of the carbostyril skeleton is a double bond, and R^4 and R^5 are linked together in the form of a -CH=CH-CH=CH- group.

25. A carbostyril compound selected from the group consisting of the following compounds:

5-[1-(biphenyl-4-ylmethyl)-8-methoxy-2-oxo-1,2,3,4-tetrahydroquinolin-5-ylmethyl]thiazolidine-2,4-dione,

5-[1-(4-chlorobenzyl)-8-methoxy-2-oxo-1,2,3,4-tetrahydroquinolin-5-ylmethyl]thiazolidine-2,4-dione,

5-[1-(4-bromobenzyl)-8-methoxy-2-oxo-1,2,3,4-tetrahydroquinolin-5-ylmethyl]thiazolidine-2,4-dione,

5-[1-(2-naphthylmethyl)-8-methoxy-2-oxo-1,2,3,4-tetrahydroquinolin-5-ylmethyl]thiazolidine-2,4-dione,

5-{1-[4-(heptyloxycarbonylamino)benzyl]-8-methoxy-2-oxo-1,2,3,4-tetrahydroquinolin-5-ylmethyl}thiazolidine-2,4-dione,

5-[1-(1-biphenyl-4-ylpiperidin-4-ylmethyl)-2-oxo-1,2,3,4-tetrahydroquinolin-5-ylmethyl]thiazolidine-2,4-dione,

5-{1-[1-(4-methylphenyl)piperidin-4-ylmethyl]-2-oxo-1,2,3,4-tetrahydroquinolin-5-ylmethyl}thiazolidine-2,4-dione,

5-{1-[4-(2-chlorobenzyloxycarbonylamino)benzyl]-8-methoxy-2-oxo-1,2,3,4-tetrahydroquinolin-5-ylmethyl}thiazolidine-2,4-dione,

1-(biphenyl-4-ylmethyl)-8-methoxy-5-(4-oxo-2-thioxothiazolidin-5-ylmethyl)-3,4-dihydro-1H-quinolin-2-one,

8-methoxy-1-methyl-5-(4-oxo-2-thioxothiazolidin-5-ylmethyl)-3,4-dihydro-1H-quinolin-2-one,

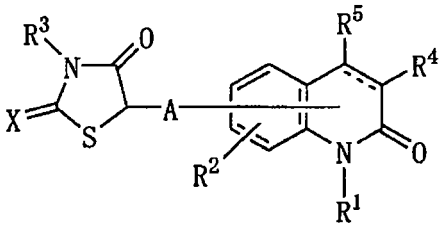
8-methoxy-1-(3-methylbutyl)-5-(4-oxo-2-thioxothiazolidin-5-ylmethyl)-3,4-dihydro-1H-quinolin-2-one,

1-propyl-8-methoxy-5-(4-oxo-2-thioxothiazolidin-5-ylmethyl)-3,4-dihydro-1H-quinolin-2-one,

1-isobutyl-8-methoxy-5-(4-oxo-2-thioxothiazolidin-5-

ylmethyl)-3,4-dihydro-1H-quinolin-2-one,
8-methoxy-1-phenethyl-5-(4-oxo-2-thioxothiazolidin-5-ylmethyl)-3,4-dihydro-1H-quinolin-2-one, and
1-(4-phenylthiomethyl)benzyl-5-(4-oxo-2-thioxothiazolidin-5-ylmethyl)-3,4-dihydro-1H-quinolin-2-one; or a salt thereof.

26. A process for the production of a carbostyril compound (1) of the following formula:

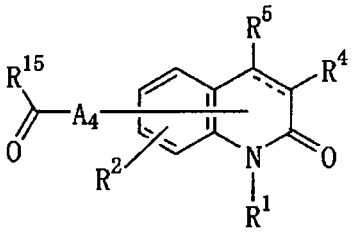


(1)

or a salt thereof, wherein R^1, R^2, R^3, R^4, R^5, A, X, and the bond between the 3 and 4 positions of the carbostyril skeleton are as defined in Claim 1,

which comprises

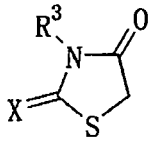
(i) reacting a compound (2) of the formula:



(2)

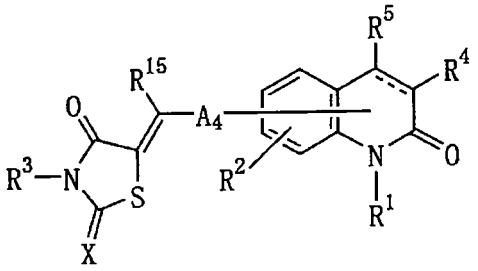
or a salt thereof, wherein R^1, R^2, R^4, R^5, and the bond between the 3 and 4 positions of the carbostyril skeleton are as defined above, and R^{15} is a hydrogen atom or lower alkyl group, and A_4 represents a direct bond or lower alkylene group,

with a compound (3) of the formula:



(3)

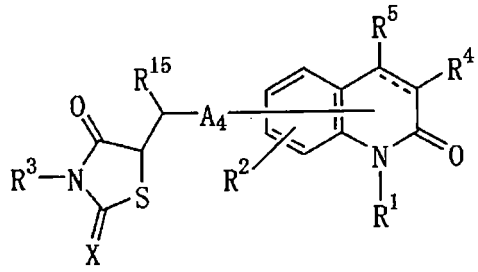
or a salt thereof, wherein R^3 and X are as defined above, to give a compound (1a) of the formula:



(1a)

or a salt thereof, wherein R^1, R^2, R^3, R^4, R^5, R^{15}, A_4 and the bond between the 3 and 4 positions of the carbostyril skeleton are as defined above, and

(ii) reducing the compound (1a) defined above or a salt thereof, to give a compound (1b) of the formula:



(1b)

or a salt thereof, wherein R^1, R^2, R^3, R^4, R^5, R^{15}, A_4 and the bond between the 3 and 4 positions of the carbostyril skeleton are as defined above.