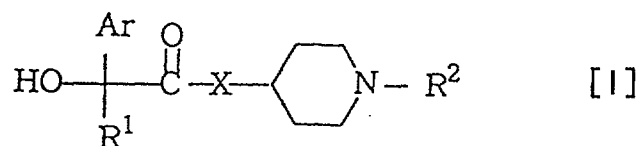


ABSTRACT

This invention relates to novel fluorine-containing 1,4-disubstituted piperidine derivatives represented by a general formula [I]



and pharmaceutically acceptable salts thereof,

[wherein:

Ar represents an aryl group or a heteroaryl group having 1 to 2 hetero atoms selected from a group consisting of nitrogen, oxygen and sulfur (any 1 to 3 hydrogen atoms on the ring of said aryl or heteroaryl group may be substituted with lower alkyl, etc.);

R¹ represents C₃-C₈ cycloalkyl whose any 1-4 hydrogen atoms may be substituted with fluorine atom(s);

R² represents C₅-C₁₅ saturated or unsaturated aliphatic hydrocarbon groups whose any 1 to 6 hydrogen atoms may be substituted with fluorine atom(s), aralkyl, arylalkenyl, heteroarylalkyl or heteroarylalkenyl group having 1 to 2 hetero atoms selected from a group consisting of nitrogen, oxygen and sulfur (optionally any 1 to 3 hydrogen atoms on the ring in said aralkyl, arylalkenyl, heteroarylalkyl or heteroarylalkenyl group may be substituted with lower alkyl, trifluoromethyl, cyano, hydroxyl, nitro, lower alkoxy, carbonyl, halogen, lower alkoxy or amino, etc.; and

X stands for O or NH,

provided that at least either one of R¹ and R² contains

one or more fluorine atoms].

The compounds of the present invention have selective antagonistic activity for muscarinic M_3 receptors, and exhibit excellent oral activity, duration of action and pharmacokinetics, so that they have little side effects and are safe and effective. Therefore they are useful for treatment or prophylaxis of respiratory diseases, urinary diseases and digestive diseases.