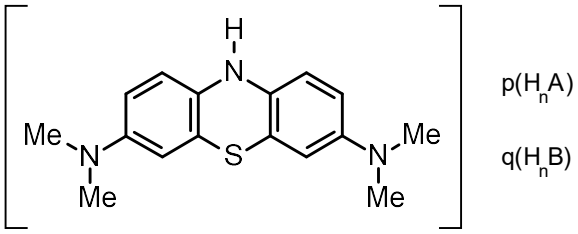
Nevertheless it is well known that there is inter-individual variability between subjects in respect of how a given dosage of a drug will translate into the concentration of the drug in the subject's body fluids. It is advantageous that any dosing regimen which is to be applied to populations of such subjects can as far as possible take such variability into account, in order to ensure maximal therapeutic benefit for all subjects, without the need for personalised regimes, and while nevertheless maintaining a desirable clinical profile.

Summary of Invention

The present disclosure refers to a use of an methylthioninium ("MT")-containing compound in the manufacture of a medicament for therapeutic or prophylactic treatment of a neurodegenerative disorder in a human subject, wherein the subject is to be orally administered the MT-containing compound, ~~which treatment~~wherein said administration provides a total daily dose of between 20.5 and 60 mg of MT to the subject per day, optionally split into 2 or more doses, wherein the MT-containing compound is an LMTX compound of the following formula:



wherein each of H_nA and H_nB (where present) are protic acids which may be the same or different, and wherein p = 1 or 2; q = 0 or 1; n = 1 or 2; (p + q) × n = 2,
and wherein the disorder is selected from the list consisting of: Alzheimer's disease; Pick's disease, progressive supranuclear palsy; disinhibition-dementia-parkinsonism-amyotrophy complex, pallido-ponto-nigral degeneration, Guam-ALS syndrome, pallido nigro luysian degeneration, cortico-basal degeneration, dementia with argyrophilic grains, dementia pugilistica or chronic traumatic encephalopathy, Down's syndrome, subacute sclerosing panencephalitis, Niemann-Pick disease, type C, Sanfilippo syndrome type B, or a myotonic dystrophy DM1 or DM2.

Disclosure of the invention

The present inventors have devised a novel pharmacokinetic (PK) model for dosing MT compounds in patient populations. This versatile model was derived from a Phase 1 study in elderly volunteers, and is described in the Examples hereinafter.

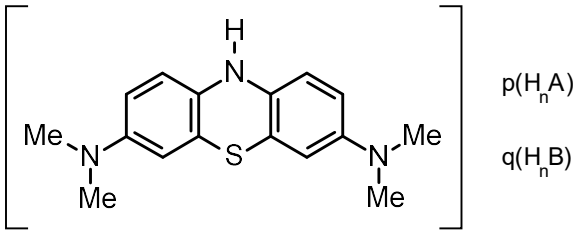
The novel population PK model was then used to estimate Cmax of parent MT in patients who received LMTM in the two phase 3 trials of AD studies described in WO2018/019823 (Studies "005" and "015", for treatment of mild, or mild to moderate, AD patients respectively). Once the Cmax was estimated in each of the subjects, a distribution of Cmax estimates for each of the treated population could be derived.

Claims

1 Use of an methylthioninium (“MT”)-containing compound in the manufacture of a medicament for therapeutic or prophylactic treatment of a neurodegenerative disorder in a human subject,

wherein the subject is to be orally administered the MT-containing compound, ~~which treatment~~wherein said administration provides a total daily dose of between 20.5 and 60 mg of MT to the subject per day, optionally split into 2 or more doses,

wherein the MT-containing compound is an LMTX compound of the following formula:



wherein each of H_nA and H_nB (where present) are protic acids which may be the same or different,

and wherein p = 1 or 2; q = 0 or 1; n = 1 or 2; (p + q) × n = 2,

and wherein the disorder is selected from the list consisting of: Alzheimer’s disease; Pick’s disease, progressive supranuclear palsy; disinhibition-dementia-parkinsonism-amyotrophy complex, pallido-ponto-nigral degeneration, Guam-ALS syndrome, pallido nigro luysian degeneration, cortico-basal degeneration, dementia with argyrophilic grains, dementia pugilistica or chronic traumatic encephalopathy, Down’s syndrome, subacute sclerosing panencephalitis, Niemann-Pick disease, type C, Sanfilippo syndrome type B, and a myotonic dystrophy DM1 or DM2.

2 The use as claimed in claim 1 wherein the total daily dosage is 21 to 40mg; 21 to 32 mg; or 24 to 32 mg.

3 The use as claimed in claim 1 wherein the total daily dose is about 20.5, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37, 38, 39, 40 mg.

4 The use as claimed in any one of claims 1 to 3 wherein the total daily dose of the MT-containing compound is once a day, or a split dose twice a day or three times a day.

***

5 The use as claimed in any one of claims 1 to 4 wherein the subject:

(a) has not historically received treatment with an acetylcholinesterase inhibitor or an N-methyl-D-aspartate receptor antagonist, or

(b) has historically received treatment an acetylcholinesterase inhibitor or an N-methyl-D-aspartate receptor antagonist, but ceased that treatment at least 1, 2, 3, 4, 5, 6, 7 days, or 2, 3, 4, 5, 6, 7, 8, weeks prior to treatment with the MT-containing compound, or

(c) is selected as one who is receiving treatment with an acetylcholinesterase inhibitor or an N-methyl-D-aspartate receptor antagonist, wherein said treatment is discontinued prior to treatment with the MT-containing compound.

6 The use as claimed in any one of claims 1 to 5 wherein the therapeutic treatment is not combined with an acetylcholinesterase inhibitor or an N-methyl-D-aspartate receptor antagonist.

***

7 The use as claimed in any one of claims 1 to 5 wherein the therapeutic treatment is combined with an acetylcholinesterase inhibitor or an N-methyl-D-aspartate receptor antagonist.

***

8 The use as claimed in any one of claims 5 to 7, wherein the acetylcholinesterase inhibitor is selected from the list consisting of donepezil; rivastigmine; and galantamine and/or the N-methyl-D-aspartate receptor (NMDA) receptor antagonist is memantine.

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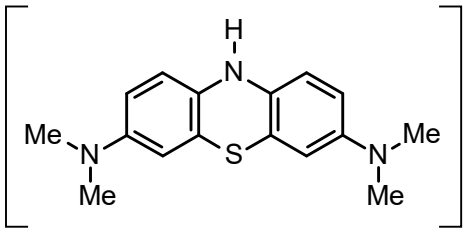
9 The use as claimed in any one of claims 1 to 8 wherein the disorder is Alzheimer's disease.

10 The use as claimed in claim 9, wherein the treatment is a combination treatment of a first agent which is the MT-containing compound at the specified dosage in combination with a second agent which is an inhibitor of the processing of amyloid precursor protein to beta-amyloid.

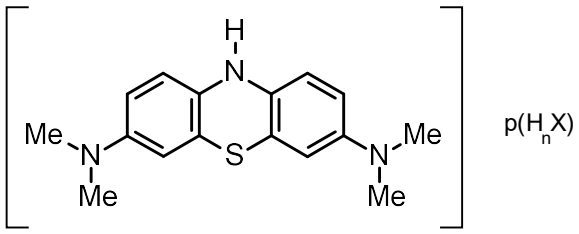
11 The use as claimed in claim 9 or claim 10 wherein the treatment is part of a treatment regimen which comprises:
(i) treatment of said subject with the MT-containing compound for a first period of time wherein said subject is to be orally administered the MT-containing compound, wherein said administration provides a total daily dose of between 1 and 10 mg of MT to the subject per day;
(ii) treatment of said subject with the MT-containing compound for a further period of time wherein said subject is to be orally administered the MT-containing compound, wherein said administration provides a total daily dose of between 20.5 and 60 mg of MT to the subject per day.

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12 The use as claimed in any one of claims 1 to 11 wherein the MT-containing compound has the following formula, where HA and HB are different mono-protic acids:

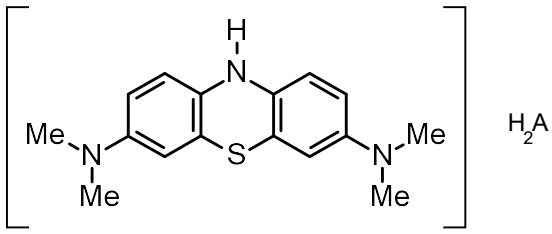


13 The use as claimed in any one of claims 1 to 11 wherein the MT-containing compound has the following formula:

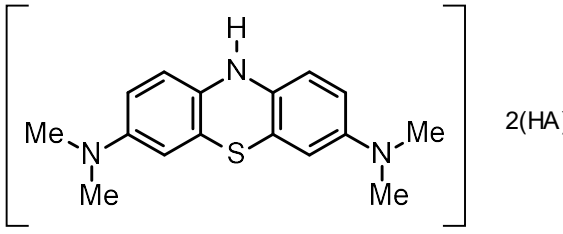


wherein each of H_nX is a protic acid.

14 The use as claimed in any one of claims 1 to 11 wherein the MT-containing compound has the following formula and H_2A is a di-protic acid:



15 The use as claimed in any one of claims 1 to 11 wherein the MT-containing compound has the following formula and is a bis-monoprotic acid:



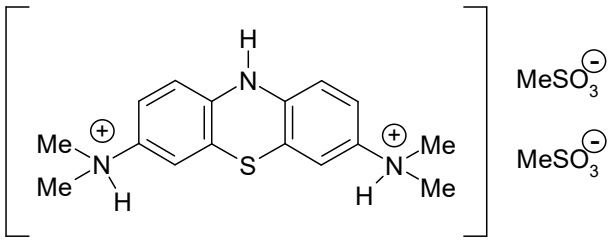
16 The use as claimed in any one of claims 12 to 15 wherein the or each protic acid is an inorganic acid.

17 The use as claimed in claim 16 wherein each protic acid is a hydrohalide acid.

18 The use as claimed in any one of claims 12 to 15 wherein the or each protic acid is an organic acid.

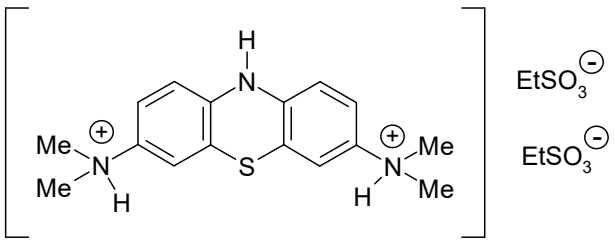
19 The use as claimed in claim 17 or claim 18 wherein the or each protic acid is selected from H_2CO_3; CH_3COOH; methanesulfonic acid, 1,2-ethanedisulfonic acid, ethansulfonic acid, naphthalenedisulfonic acid, and p-toluenesulfonic acid.

20 The use as claimed in any one of claims 1 to 11, or claim 19 wherein the MT-containing compound is LMTM:

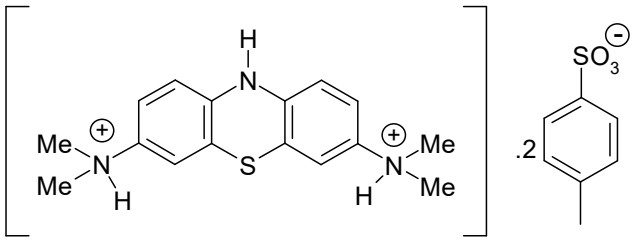


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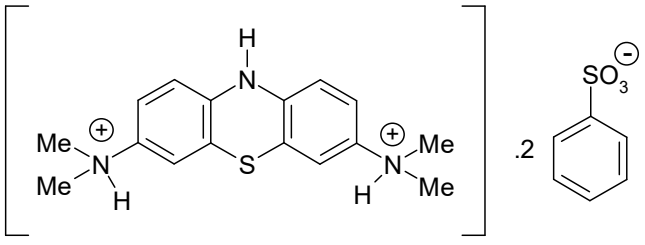
21 The use as claimed in any one of claims 1 to 11 wherein the MT-containing compound is selected from the list consisting of:



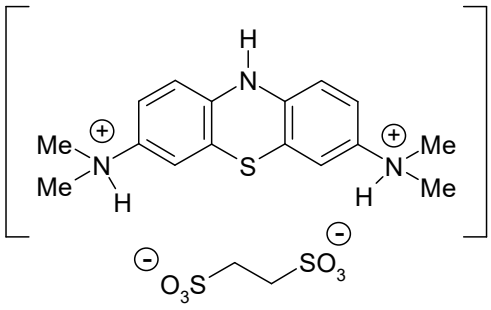
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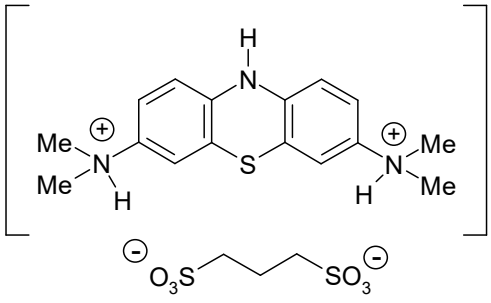
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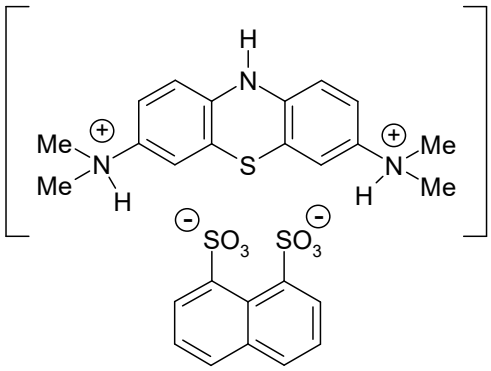
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