[0083] As used herein, "cycloalkylalkyl" refers to C_{1-6} alkyl substituted by cycloalkyl. Example cycloalkylalkyl groups include, but are not limited to, C_{1-6} alkyl substituted by C_{3-10} cycloalkyl or C_{3-7} cycloalkyl (e.g. cyclopropylmethyl).

[0084] As used herein, "amino" refers to NH_2.

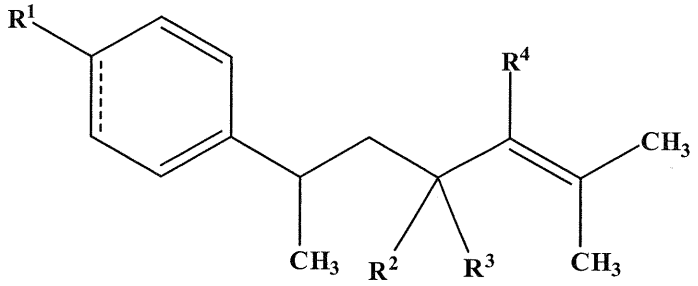
[0085] As used herein, the term "optionally substituted" means that substitution is optional and therefore includes both unsubstituted and substituted atoms and moieties. A "substituted" atom or moiety indicates that any hydrogen on the designated atom or moiety can be replaced with a selection from the indicated substituent group, provided that the normal valency of the designated atom or moiety is not exceeded, and that the substitution results in a stable compound. For example, if a methyl group (i.e., CH_3) is optionally substituted, then 3 hydrogen atoms on the carbon atom can be replaced with substituent groups.

[0086] The compounds described in the embodiments herein can be asymmetric (*e.g.*, having one or more stereocenters). All stereoisomers, such as enantiomers and diastereomers, are intended unless otherwise indicated. Compounds of the present invention that contain asymmetrically substituted carbon atoms can be isolated in optically active or racemic forms. Methods on how to prepare optically active forms from optically active starting materials are known in the art, such as by resolution of racemic mixtures or by stereoselective synthesis. Many geometric isomers of olefins, C=N double bonds, and the like can also be present in the compounds described herein, and all such stable isomers are contemplated in the present invention. *Cis* and *trans* geometric isomers of the compounds of the present invention are described and may be isolated as a mixture of isomers or as separated isomeric forms. Where a compound capable of stereoisomerism or geometric isomerism is designated in its structure or name without reference to specific R/S or cis/trans configurations, it is intended that all such isomers are contemplated.

[0087] Resolution of racemic mixtures (or mixture of diastereoisomers) of compounds can be carried out by any of numerous methods known in the art. An example method includes fractional recrystallizaion using a chiral resolving acid which is an optically active, salt-forming organic acid. Suitable resolving agents for fractional recrystallization methods are, for example, optically active acids, such as the D and L forms of tartaric acid, diacetyltartaric acid, dibenzoyltartaric acid, mandelic acid, malic acid, lactic acid or the various optically active camphorsulfonic acids such as ~~β~~-D-camphorsulfonic acid. Other resolving agents suitable for fractional crystallization methods include stereoisomerically pure forms of α--methylbenzylamine (*e.g.*, *S* and *R* forms, or diastereomerically pure forms),

What is claimed:

1. A compound of Formula I-0:



I-0

or pharmaceutically acceptable salt thereof, wherein:

~~R1~~ R^1 is H, CH3, CF3, F, Cl, Br, or –OCF3;

~~R2~~ R^2 is H, C1-6 alkyl, C1-6 haloalkyl, C3-7 cycloalkyl, or C6-10 aryl, wherein each of the C1-6 alkyl, C1-6 haloalkyl, C3-7 cycloalkyl, or C6-10 aryl is substituted by 0, 1, 2, 3, 4, or 5 substituents each independently selected from OH, amino, halo, C1-6 alkyl, C1-6 haloalkyl, C1-6 alkoxy, and C1-6 haloalkoxy;

~~R3~~ R^3 is ~~OH or~~ $NR^{3a}R^{3b}$;

~~R3a~~ R^{3a} is H, C1-6 alkyl, C1-6 haloalkyl, cycloalkylalkyl, C3-7 cycloalkyl, arylalkyl, or C6-10 aryl, wherein each of the C1-6 alkyl, C1-6 haloalkyl, cycloalkylalkyl, C3-7 cycloalkyl, or C6-10 aryl is substituted by 0, 1, 2, 3, 4, or 5 substituents each independently selected from OH, amino, halo, C1-6 alkyl, C1-6 haloalkyl, C1-6 alkoxy, and C1-6 haloalkoxy;

~~R3b~~ R^{3b} is H, C1-6 alkyl, C1-6 haloalkyl, cycloalkylalkyl, cycloalkylalkyl, C3-7 cycloalkyl, arylalkyl, or C6-10 aryl, wherein each of the C1-6 alkyl, C1-6 haloalkyl, cycloalkylalkyl, C3-7 cycloalkyl, arylalkyl, or C6-10 aryl is substituted by 0, 1, 2, 3, 4, or 5

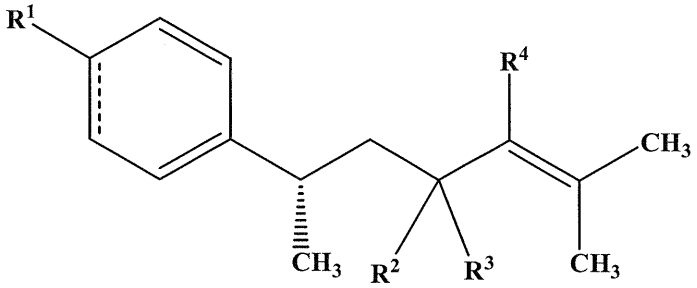
substituents each independently selected from OH, amino, halo, C1-6 alkyl, C1-6 haloalkyl, C1-6 alkoxy, and C1-6 haloalkoxy;

or R^{3a} and R^{3b} together with the N atom to which they are attached form a 4-, 5-, 6- or 7-membered heterocycloalkyl group that is substituted with 0, 1, 2, 3, 4, or 5 substituents each independently selected from OH, amino, halo, C_{1-6} alkyl, C_{1-6} haloalkyl, C_{1-6} alkoxy, C_{1-6} haloalkoxy, aryl, arylalkyl, heteroaryl, heteroarylalkyl, cycloalkyl, and heterocycloalkyl; and

R^4 is H, C_{1-6} alkyl, C_{1-6} haloalkyl, C_{3-7} cycloalkyl, or C_{6-10} aryl, wherein each of the C_{1-6} alkyl, C_{1-6} haloalkyl, C_{3-7} cycloalkyl, or C_{6-10} aryl is substituted by 0, 1, 2, 3, 4, or 5 substituents each independently selected from OH, amino, halo, C_{1-6} alkyl, C_{1-6} haloalkyl, C_{1-6} alkoxy, and C_{1-6} haloalkoxy~~;~~

~~provided that when ======== is a double bond and R^3 is OH, then at least one of R^1, R^2, and R^4 is other than H~~.

2. The compound of claim 1 or pharmaceutically acceptable salt thereof, wherein the compound or pharmaceutically acceptable salt thereof is a compound of Formula I:



I

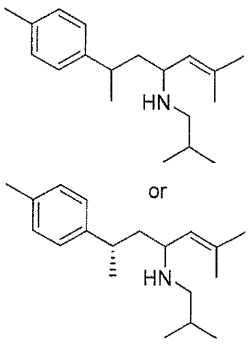
or pharmaceutically acceptable salt thereof.

9. A method of forming a compound or pharmaceutically acceptable salt thereof, the method comprising:

(a) reacting a turmeric oil with 4-isobutylamine under reactive amination condition to produce a crude product, wherein the ratio of the turmeric oil to 4-isobutylamine ~~about~~ 3.4 :1 by weight; and

(b) isolating a composition comprising at least 80%, 85%, 90%, or 95% by weight of a compound or a pharmaceutically acceptable salt thereof;

wherein the compound has an analytical mass spectrum peak of $[M+H^+]$ at ~~about~~ 274.3.



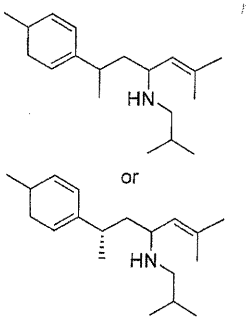
10. The method of claim 9, wherein the ^1H NMR (500 MHz, $CDCl_3$) spectrum of the compound comprises the peaks at ~~about~~ the following chemical shifts: δ 7.11, 7.09, 5.23, 3.72, 2.94, 2.51, 2.34, 2.31, 1.92, 1.72, 1.71, 1.58, 1.29, 1.27, 0.92 and wherein the ^{13}C NMR (125 MHz, $CDCl_3$) spectrum of the compound comprises peaks at ~~about~~ the following chemical shifts: δ 144.3, 135.4, 135.0, 129.0, 126.9, 126.7, 67.0, 49.3, 46.4, 35.1, 32.5, 25.8, 21.0, 20.7, 18.4.

11. A method of forming a compound or pharmaceutically acceptable salt thereof, the method comprising:

(a) reacting a turmeric oil with 4-isobutylamine under reactive amination condition to produce a crude product, wherein the ratio of the turmeric oil to 4-isobutylamine ~~about~~ 3.4 :1 by weight; and

(b) isolating a composition comprising at least 80%, 85%, 90%, or 95% by weight of a compound or a pharmaceutically acceptable salt thereof;

wherein the compound has an analytical mass spectrum peak of $[M+H^+]$ at ~~about~~ 276.3.



12. The method of claim 9, wherein the ^1H NMR (500 MHz, $CDCl_3$) spectrum of the compound comprises the peaks at ~~about~~ the following chemical shifts: δ 5.77, 5.65, 5.45, 5.23, 3.96, 2.94, 2.93, 2.51, 2.31, 2.30, 2.05, 1.92, 1.72, 1.71, 1.58, 1.29, 1.27, 0.92 and wherein the ^{13}C NMR (125 MHz, $CDCl_3$) spectrum of the compound comprises peaks at ~~about~~ the following

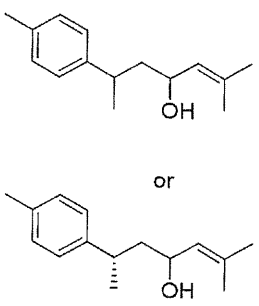
chemical shifts: δ 144.5, 135.4, 131.0, 127.9, 126.7, 120.8, 66.7, 49.3, 46.4, 35.1, 32.5, 25.8, 21.8, 21.79, 20.7, 18.4.

13. A method of forming a compound or pharmaceutically acceptable salt thereof, the method comprising:

(a) reacting a turmeric oil with a reducing agent to produce a crude product, wherein the molar ratio of the reducing agent to the turmeric oil is 1:1; and

(b) isolating a composition comprising at least 80%, 85%, 90%, or 95% by weight of a compound or a pharmaceutically acceptable salt thereof;

~~wherein,~~ wherein the compound has an analytical mass spectrum peak of $[M+H^+]$ at ~~about~~ 219.2.



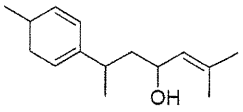
14. The method of claim 9, wherein the ^1H NMR (500 MHz, $CDCl_3$) spectrum of the compound comprises the peaks at ~~about~~ the following chemical shifts: δ 7.11, 7.09, 5.17, 4.45, 2.32, 2.76 1.75, 1.58, 1.52, 1.26 and wherein the ^{13}C NMR (125 MHz, $CDCl_3$) spectrum of the compound comprises peaks at ~~about~~ the following chemical shifts: δ 144.3, 135.4, 135.0, 129.1, 128.3, 126.9, 67.1, 42.1, 39.6, 25.8, 23.0, 21.0, 18.1.

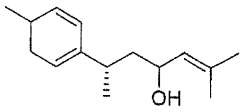
15. A method of forming a compound or pharmaceutically acceptable salt thereof, the method comprising:

(a) reacting a turmeric oil with a reducing agent to produce a crude product, wherein the molar ratio of the reducing agent to the turmeric oil is 1:1; and

(b) isolating a composition comprising at least 80%, 85%, 90%, or 95% by weight of a compound or a pharmaceutically acceptable salt thereof;

wherein the compound has an analytical mass spectrum peak of $[M+H^+]$ at ~~about~~ 221.1.





16. The method of claim 9, wherein the ^1H NMR (500 MHz, $CDCl_3$) spectrum of the compound comprises the peaks at ~~about~~ the following chemical shifts: δ 6.18, 5.70, 5.56, 5.17,

4.24, 2.32, 2.80, 2.29, 2.15, 1.95, 1.68, 1.75, 1.58, 1.42, 1.27 and wherein the ^{13}C NMR (125 MHz, $CDCl_3$) spectrum of the compound comprises peaks at ~~about~~ the following chemical shifts: δ144.1, 135.0, 134.1, 129.6, 128.3, 125.3, 66.9, 46.2, 41.2, 39.6, 37.1, 25.8, 24.5, 23.0, 18.1.

17. A pharmaceutical composition comprising the compound of claim 1 or pharmaceutically acceptable salt thereof, and a pharmaceutically acceptable carrier.

18. Use of the compound 2-methyl-6-*p*-tolylhept-2-en-4-ol, (6*S*)-2-methyl-6-*p*-tolylhept-2-en-4-ol, or a pharmaceutically acceptable salt thereof, or the compound of claim 1 or a pharmaceutically acceptable salt thereof in the manufacture of a medicament for inhibiting, treating, and/or abatement of cognitive decline and/or Alzheimer's disease in a patient.

19. The use of claim 18 wherein said inhibiting, treating, and/or abatement of cognitive decline and/or Alzheimer's disease comprises inhibiting, treating, or abatement of one or more symptoms of cognitive decline selected from the group consisting of memory loss, confusion, impaired judgment, personality changes, disorientation, and loss of language skills.

20. The use of claim 18 wherein said inhibiting, treating, and/or abatement of cognitive decline and/or Alzheimer's disease comprises one or more of:

(i) restoration of long term potentiation; and/or

(ii) inhibiting, treating, and/or abatement of neurodegeneration; and/or

(iii) inhibiting, treating, and/or abatement of general amyloidosis; and/or

(iv) inhibiting, treating, and/or abatement of one or more of amyloid production, amyloid assembly, amyloid aggregation, amyloid oligomer binding, and amyloid deposition; and/or

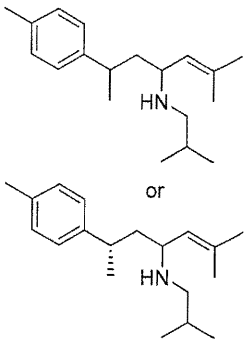
(v) inhibiting, treating, and/or abatement of the activity/effect of one or more of Abeta oligomers on a neuron cell.

21. A method of forming a compound or pharmaceutically acceptable salt thereof, the method comprising:

(a) reacting a turmeric oil with 4-isobutylamine to produce a crude product, wherein the ratio of the turmeric oil to 4-isobutylamine 3.4 :1 by weight; and

(b) isolating a composition comprising at least 80%, 85%, 90%, or 95% by weight of a compound or a pharmaceutically acceptable salt thereof;

wherein the compound has an analytical mass spectrum peak of $[M+H^+]$ at 274.3.



22. A method of forming a compound or pharmaceutically acceptable salt thereof, the method comprising:

(a) reacting a turmeric oil with 4-isobutylamine to produce a crude product, wherein the ratio of the turmeric oil to 4-isobutylamine 3.4 :1 by weight; and

(b) isolating a composition comprising at least 80%, 85%, 90%, or 95% by weight of a compound or a pharmaceutically acceptable salt thereof;

wherein the compound has an analytical mass spectrum peak of $[M+H^+]$ at 276.3.

