metallic aftertastes. Products prepared with 2,4-dihydroxybenzoic acid are claimed to display reduced undesirable aftertastes associated with sweeteners, and do so at concentrations below those concentrations at which their own tastes are perceptible. Also, high intensity sweeteners such as sucralose and aspartame are reported to have sweetness delivery problems, i.e., delayed onset and lingering of sweetness (S. G. Wiet, et al., J. Food Sci., 58(3):599-602, 666 (1993)).

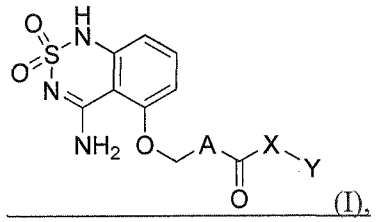
It has been reported that an extra-cellular domain, *e.g.*, the Venus flytrap domain of a chemosensory receptor, especially one or more interacting sites within the Venus flytrap domain, is a suitable target for compounds or other entities to modulate the chemosensory receptor and/or its ligands. Certain compounds have been reported to be modulators of the chemosensory receptors in T1R family and/or their ligands and are described in the four patent applications listed below.

(1) U.S. Patent Application Serial No. 11/760,592, entitled "Modulation of Chemosensory Receptors and Ligands Associated Therewith", filed June 8, 2007; (2) U.S. Patent No. 7,928,111, entitled "Modulation of Chemosensory Receptors and Ligands Associated Therewith", issued April 19, 2011; and (3) International Application No. PCT/US2008/065650, entitled "Modulation of Chemosensory Receptors and Ligands Associated Therewith", filed June 3, 2008. The content of these applications are herein incorporated by reference in their entirety for all purposes.

There is a need in the art to develop novel and inventive compounds suitable for modifying receptors and/or their ligands associated with chemosensory or chemosensory related sensation or reaction.

SUMMARY ~~OF THE INVENTION~~

In one aspect, there is provided a compound having structural Formula (I):



(I),

or a salt or solvate thereof; wherein

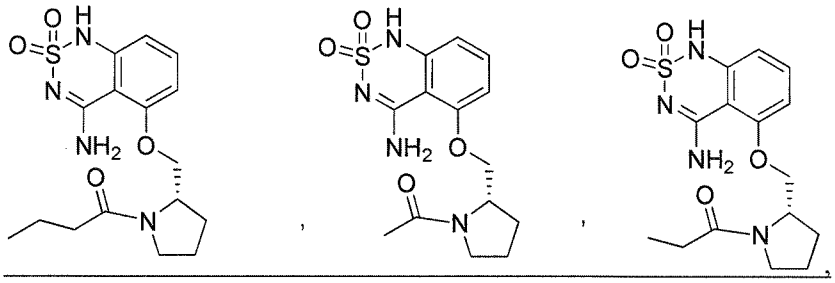
A is an optionally substituted four to eight-membered azacyclic ring;

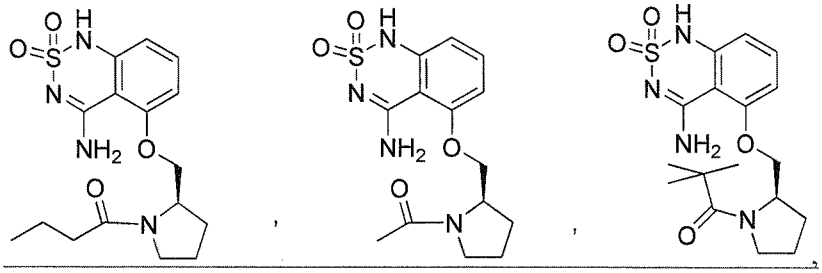
X is a covalent bond or $-NR^1-$;

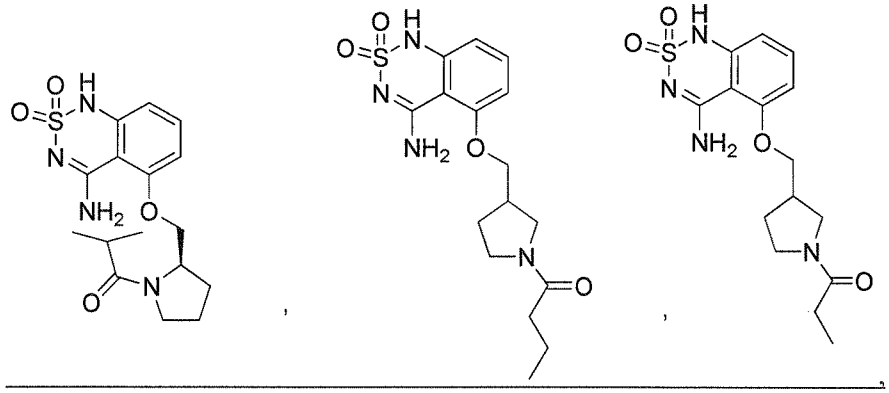
R^1 is hydrogen or C1 to C6 alkyl; and

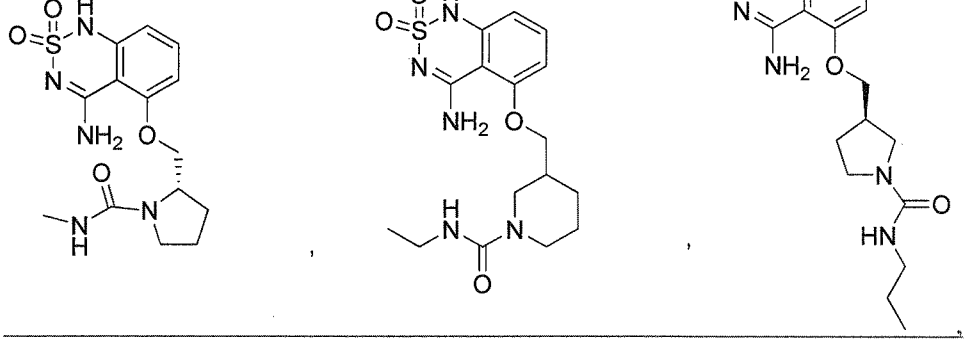
Y is alkyl, substituted alkyl, heteroalkyl, substituted heteroalkyl, carbocyclyl, substituted carbocyclyl, heterocyclyl, substituted heterocyclyl, aryl, substituted aryl, heteroaryl, substituted heteroaryl, aralkyl, substituted aralkyl, heteroarylalkyl, or substituted heteroarylalkyl;

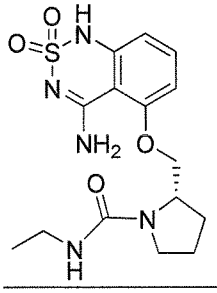
with the proviso that Formula (I) does not include the following compounds:







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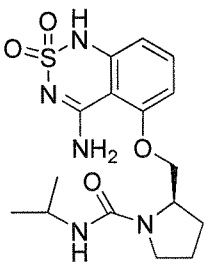
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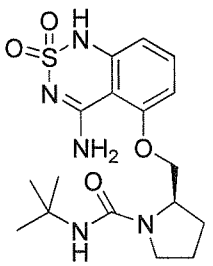
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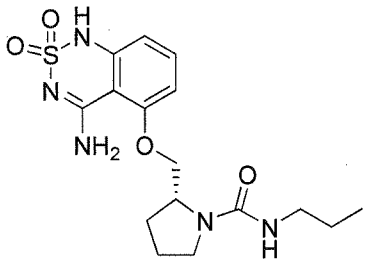
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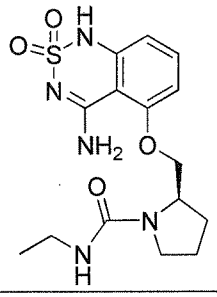
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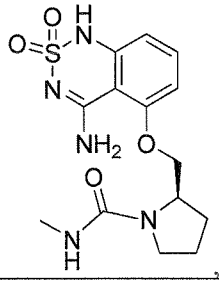
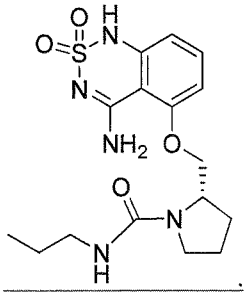

, and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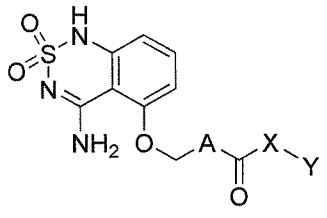
In one embodiment, the present ~~invention~~ disclosure provides a compound having structural Formula (I):


(I),

or a salt or solvate thereof; wherein

A is an optionally substituted four to eight-membered azacyclic ring;

X is a covalent bond or $-NR^1-$;

R^1 is hydrogen or C1 to C6 alkyl; and

Y is alkyl, substituted alkyl, heteroalkyl, substituted heteroalkyl, carbocyclyl, substituted carbocyclyl, heterocyclyl, substituted heterocyclyl, aryl, substituted aryl, heteroaryl, substituted heteroaryl, aralkyl, substituted aralkyl, heteroarylalkyl, or substituted heteroarylalkyl.

In another ~~embodiment~~aspect, the present ~~invention~~ disclosure provides an ingestible composition comprising a compound of the present invention; and optionally an ingestibly acceptable excipient.

In another ~~embodiment~~aspect, the present ~~invention~~ disclosure provides a method of increasing the sweet taste of an ingestible composition comprising contacting the ingestible composition thereof with a compound of the present invention to form a modified ingestible composition. In the method, the present compound can be a chemosensory receptor modifier, a chemosensory receptor ligand modifier, or both, i.e., a partial chemosensory receptor modifier and partial chemosensory receptor ligand modifier. For example, the present compound can be a sweet receptor agonist, or a sweet modulator, or a partial sweet receptor agonist and partial sweet modulator.

In another ~~embodiment~~aspect, the present ~~invention~~ disclosure provides a sweet modulating composition, comprising a compound of the present invention in an amount effective to provide sweetening in combination with a first amount of sweetener, wherein the sweetening is more than the sweetening provided by the first amount of sweetener without the compound.

In one aspect, the present disclosure provides an ingestible composition comprising the sweet modulating composition as disclosed herein.

In another ~~embodiment~~aspect, the present ~~invention~~ disclosure provides a flavoring concentrate formulation comprising i) as flavor modifying ingredient, a compound of the present invention; ii) a carrier; and iii) optionally at least one adjuvant.

In another embodiment, the present invention provides a method of treating a condition, disease, or disorder associated with a chemosensory receptor comprising administering to a subject in need of such treatment an therapeutically effective amount of a compound of the present invention, or a salt, solvate, and/or prodrug thereof.

DETAILED DESCRIPTION OF THE INVENTION

These and other embodiments, advantages, and features of the present invention are provided in the sections below. Unless defined otherwise, all technical and scientific terms