CLAIMS

1. A method for identifying a compound that inhibits the bitter taste due to KCl, comprising:

a) providing a first and a second cell,

wherein the first and second cell each expresses one or more bitter taste receptors selected from the group consisting of:

TAS2R4 (SEQ ID NO: 30), TAS2R9 (SEQ ID NO: 34), TAS2R13 (SEQ ID NO: 36), TAS2R14 (SEQ ID NO: 37), TAS2R44 (SEQ ID NO: 44) and TAS2R60 (SEQ ID NO: 56), or a naturally-occurring allelic variant thereof, wherein the first and second cell express the same one or more bitter taste receptors;

b) contacting said first cell with a tastant,

wherein the tastant activates the one or more bitter taste receptor;

c) contacting said second cell with a test compound and the tastant;

d) assaying said first and second cells for bitter taste receptor activation; and

e) comparing the bitter taste receptor activation of said first cell to the bitter taste receptor activation of said second cell,

wherein the test compound is an inhibitor of bitter taste due to KCl, if bitter taste receptor activity of said second cell is less than the bitter taste receptor activity of said first cell.

2. The method of claim 1, wherein the bitter taste receptor is complexed to a G protein.

3. The method according to claim 2, wherein said G protein is a Gq protein, an alpha transducin or an alpha gustducin.

4. The method according to claim 3, wherein the Gq protein is a Gα15 protein (SEQ ID NO: 1).

5. The method according to any one of claims 1-4, wherein bitter taste receptor activity is determined by measuring intracellular calcium concentration.

6. The method according to claim 5, wherein the concentration of intracellular calcium is determined using a calcium-sensitive fluorescent dye.

7. The method according to claim 6, wherein the calcium-sensitive fluorescent dye is selected from the group consisting of Indo-1, Fura-2, Fluo-3, Fluo-4, Rhod-2, Rhod-5N, Calcein, Calcein blue, cytoCalcein Violet, Quin-2, Quest Fluo-8H™, Quest Fluo 8L™, Quest Fluo 8™, Quest Rhod-4™, coelenterazine and Calcium-3.

8. The method according to any one of claims 1-7, wherein said first and second cells are present in in vitro cell lines.

9. The method according to any one of claims 1-7, wherein said first and second cells are present in panels of in vitro cell lines.

10. A method for identifying a compound that selectively acts on receptors to inhibit the bitter taste due to KCl comprising:

a) providing a first and second panel of cell lines,

wherein each of said first and second panel comprises cell lines that express a bitter taste receptor selected from the group consisting of: TAS2R4 (SEQ ID NO: 30), TAS2R9 (SEQ ID NO: 34), TAS2R13 (SEQ ID NO: 36), TAS2R14 (SEQ ID NO: 37), TAS2R44 (SEQ ID NO: 44) and TAS2R60 (SEQ ID NO: 56), or a naturally-occurring allelic variant thereof;

wherein TAS2R4, TAS2R9, TAS2R13, TAS2R14, TAS2R44 and TAS2R60, or a naturally-occurring allelic variant thereof are each expressed in at least one cell line, and

wherein the first and second panels comprise the same cell lines;

b) contacting each cell line in the first panel with a tastant,

wherein the tastant activates at least two of the group selected from TAS2R4, TAS2R9, TAS2R13, TAS2R14, TAS2R44 and TAS2R60, or a naturally-occurring allelic variant thereof;

c) contacting each cell line in the second panel with a test compound and the tastant;

d) assaying each cell line for bitter taste receptor activation;

wherein, the test compound is a selective inhibitor of bitter taste due to KCl if the bitter taste receptor activity of at least two of the group selected from TAS2R4, TAS2R9, TAS2R13, TAS2R14, TAS2R44 and TAS2R60, or a naturally-occurring allelic variant thereof is less in the second panel compared to the first panel.

11. The method of claim 10, wherein the bitter taste receptor activity of at least three of the group selected from TAS2R4, TAS2R9, TAS2R13, TAS2R14, TAS2R44 and TAS2R60, or a naturally-occurring allelic variant thereof is less in the second panel compared to the first panel.

12. The method of claim 10, wherein the bitter taste receptor activity of at least four of the group selected from TAS2R4, TAS2R9, TAS2R13, TAS2R14, TAS2R44 and TAS2R60, or a naturally-occurring allelic variant thereof is less in the second panel compared to the first panel.

13. The method of claim 10, wherein the bitter taste receptor activity of at least five of the group selected from TAS2R4, TAS2R9, TAS2R13, TAS2R14, TAS2R44 and TAS2R60, or a naturally-occurring allelic variant thereof is less in the second panel compared to the first panel.

14. The method of claim 10, wherein the bitter taste receptor activity of each member in the group selected from TAS2R4, TAS2R9, TAS2R13, TAS2R14, TAS2R44 and TAS2R60, or a naturally-occurring allelic variant thereof is less in the second panel compared to the first panel.

15. The method of any one of claims 10-14, wherein the first and second panel comprise TAS2R1 (SEQ ID NO: 28), TAS2R3 (SEQ ID NO: 29), TAS2R4 (SEQ ID NO: 30), TAS2R5 (SEQ ID NO: 31), TAS2R7 (SEQ ID NO: 32), TAS2R8 (SEQ ID NO: 33), TAS2R9 (SEQ ID NO: 34), TAS2R10 (SEQ ID NO: 35), TAS2R13 (SEQ ID NO: 36), TAS2R14 (SEQ ID NO: 37), TAS2R16 (SEQ ID NO: 38), TAS2R38 (SEQ ID NO: 39), TAS2R39 (SEQ ID NO: 40), TAS2R40 (SEQ ID NO: 41), TAS2R41 (SEQ ID NO: 42), TAS2R43 (SEQ ID NO: 43), TAS2R44 (SEQ ID NO: 44), TAS2R45 (SEQ ID NO: 45), TAS2R46 (SEQ ID NO: 46), TAS2R47 (SEQ ID NO: 47), TAS2R48 (SEQ ID NO: 48), TAS2R49 (SEQ ID NO: 49), TAS2R50 (SEQ ID NO: 50), TAS2R55 (SEQ ID NO: 51), and TAS2R60 (SEQ ID NO: 52) bitter taste receptors, or naturally-occurring allelic variants thereof.

16. The method of any of claims 10-15, wherein the bitter taste receptor is complexed to a G protein.

17. The method according to claim 16, wherein said G protein is a Gq protein, an alpha transducin or an alpha gustducin.

18. The method according to claim 17, wherein the Gq protein is a Gα15 protein (SEQ ID NO: 1).

19. The method according to any one of claims 10-18, wherein bitter taste receptor activity is determined by measuring intracellular calcium concentration.

20. The method according to claim 19, wherein the concentration of intracellular calcium is determined using a calcium-sensitive fluorescent dye.

21. The method according to claim 20, wherein the calcium-sensitive fluorescent dye is selected from the group consisting of Indo-1, Fura-2, Fluo-3, Fluo-4, Rhod-2, Rhod-5N, Calcein, Calcein blue, cytoCalcein Violet, Quin-2, Quest Fluo-8H™, Quest Fluo 8L™, Quest Fluo 8™, Quest Rhod-4™, coelenterazine and Calcium-3.

22. A method for identifying a compound that enhances the bitter taste due to KCl comprising:

a) providing a first and a second cell,

wherein the first and second cell each expresses one or more bitter taste receptors selected from the group consisting of:

TAS2R4 (SEQ ID NO: 30), TAS2R9 (SEQ ID NO: 34), TAS2R13 (SEQ ID NO: 36), TAS2R14 (SEQ ID NO: 37), TAS2R44 (SEQ ID NO: 44) and TAS2R60 (SEQ ID NO: 56), or a naturally-occurring allelic variant thereof, wherein the first and second cell express the same one or more bitter taste receptors;

b) contacting said first cell with a tastant,

wherein the tastant activates one or more of TAS2R4, TAS2R9, TAS2R13, TAS2R14, TAS2R44 and TAS2R60 bitter taste receptors, or a naturally-occurring allelic variant thereof;

c) contacting said second cell with a test compound and the tastant;

d) assaying said first and second cells for bitter taste receptor activation; and

e) comparing the bitter taste receptor activation of said first cell to the bitter taste receptor activation of said second cell,

wherein the test compound is an enhancer of bitter taste due to KCl, if bitter taste receptor activity of said second cell is more than the bitter taste receptor activity of said first cell.

23. The method according to any one of claims 1-22, wherein (i) the allelic variant of TAS2R4 comprises a R3Q, a Y6S, a F7S, a F62L, a T74M, a V96L, a S171N, or a I191V mutation or a combination thereof; (ii) the TAS2R9 variant comprises a F67L, N127K, D150E, K170Q, V187A, A233T, L238V, L289F, or a L294M mutation or a combination thereof; (iii) the TAS2R13 variant comprises a N149S or a N259S mutation or a combination thereof; (iv) the TAS2R14 variant comprises a T86A or a M197V mutation or a combination thereof; (v) the TAS2R44 variant comprises a R35W, a L162M, a C200Y, a Q217E, a P219L, a A227V, a V240I, a P276R, or a W281C mutation or a combination thereof; or (vi) the TAS2R60 variant comprises a M199L mutation.

24. The method according to any one of claims 1-22, wherein (i) the allelic variant of TAS2R4 has an amino acid sequence having at least 95% sequence identity to SEQ ID NO:30, (ii) the allelic variant of TAS2R9 has an amino acid sequence having at least 95% sequence identity to SEQ ID NO:34, (iii) the allelic variant of TAS2R13 has an amino acid sequence having at least 95% sequence identity to SEQ ID NO:36, (iv) the allelic variant of TAS2R14 has an amino acid sequence having at least 95% sequence identity to SEQ ID NO:37, (v) the allelic variant of TAS2R44 has an amino acid sequence having at least 95% sequence identity to SEQ ID NO:44, or (vi) the allelic variant of TAS2R60 has an amino acid sequence having at least 95% sequence identity to SEQ ID NO:52.

What is claimed:

1. A method for identifying a compound that inhibits the bitter taste due to KCl, comprising:

a) providing a first and a second cell,

wherein each cell expresses one or more bitter taste receptors independently selected from the group consisting of:

TAS2R4, TAS2R9, TAS2R13, TAS2R14, TAS2R44 and TAS2R60, wherein each cell expresses the same one or more bitter taste receptors;

b) contacting said first cell with a tastant,

wherein the tastant activates the one or more bitter taste receptor;

c) contacting said second cell with a test compound and the tastant;

d) assaying said first and second cells for bitter taste receptor activation; and

e) comparing the bitter taste receptor activation of said first cell to the bitter taste receptor activation of said second cell,

wherein the test compound is an inhibitor of bitter taste due to KCl, if bitter taste receptor activity of said second cell is less than the bitter taste receptor activity of said first cell.

2. The method of claim 1, wherein the bitter taste receptor is complexed to a G protein.

3. The method according to claim 2, wherein said G protein is a Gq protein, an alpha transducin or an alpha gustducin.

4. The method according to claim 3, wherein the Gq protein is a Gα15 protein.

5. The method according to any one of claims 1-4, wherein bitter taste receptor activity is determined by measuring intracellular calcium concentration.

6. The method according to claim 5, wherein the concentration of intracellular calcium is determined using a calcium-sensitive fluorescent dye.

7. The method according to claim 6, wherein the calcium-sensitive fluorescent dye is selected from the group consisting of Indo-1, Fura-2, Fluo-3, Fluo-4, Rhod-2, Rhod-5N, Calcein, Calcein blue, cytoCalcein Violet, Quin-2, Quest Fluo-8H™, Quest Fluo 8L™, Quest Fluo 8™, Quest Rhod-4™, coelenterazine and Calcium-3.

8. The method according to any one of claims 1-7, wherein said first and second cells are present in in vitro cell lines.

9. The method according to any one of claims 1-7, wherein said first and second cells are present in panels of in vitro cell lines.

10. A method for identifying a compound that selectively acts on receptors to inhibit the bitter taste due to KCl comprising:

a) providing a first and second panel of cell lines,

wherein each panel comprises cell lines that expresses a bitter taste receptor selected from the group consisting of: TAS2R4, TAS2R9, TAS2R13, TAS2R14, TAS2R44 and TAS2R60;

wherein each receptor is expressed in at least one cell line, and

wherein the first and second panels comprise the same cell lines;

b) contacting each cell line in the first panel with a tastant,

wherein the tastant activates at least two of the group selected from TAS2R4, TAS2R9, TAS2R13, TAS2R14, TAS2R44 and TAS2R60;

c) contacting each cell line in the second panel with a test compound and the tastant;

d) assaying each cell line for bitter taste receptor activation;

wherein, the test compound is a selective inhibitor of bitter taste due to KCl if the bitter taste receptor activity of at least two of the group selected from TAS2R4, TAS2R9, TAS2R13, TAS2R14, TAS2R44 and TAS2R60 is less in the second panel compared to the first panel.

11. The method of claim 10, wherein the bitter taste receptor activity of at least three of the group selected from TAS2R4, TAS2R9, TAS2R13, TAS2R14, TAS2R44 and TAS2R60 is less in the second panel compared to the first panel.

12. The method of claim 10, wherein the bitter taste receptor activity of at least four of the group selected from TAS2R4, TAS2R9, TAS2R13, TAS2R14, TAS2R44 and TAS2R60 is less in the second panel compared to the first panel.

13. The method of claim 10, wherein the bitter taste receptor activity of at least five of the group selected from TAS2R4, TAS2R9, TAS2R13, TAS2R14, TAS2R44 and TAS2R60 is less in the second panel compared to the first panel.

14. The method of claim 10, wherein the bitter taste receptor activity of each member in the group selected from TAS2R4, TAS2R9, TAS2R13, TAS2R14, TAS2R44 and TAS2R60 is less in the second panel compared to the first panel.

15. The method of any one of claims 10-14, wherein the first and second panel comprise TAS2R1, TAS2R3, TAS2R4, TAS2R5, TAS2R7, TAS2R8, TAS2R9, TAS2R10, TAS2R13, TAS2R14, TAS2R16, TAS2R38, TAS2R39, TAS2R40, TAS2R41, TAS2R43, TAS2R44, TAS2R45, TAS2R46, TAS2R47, TAS2R48, TAS2R49, TAS2R50, TAS2R55, and TAS2R60 bitter taste receptors.

16. The method of any of claims 10-15, wherein the bitter taste receptor is complexed to a G protein.

17. The method according to claim 16, wherein said G protein is a Gq protein, an alpha transducin or an alpha gustducin.

18. The method according to claim 17, wherein the Gq protein is a Gα15 protein.

19. The method according to any one of claims 10-18, wherein bitter taste receptor activity is determined by measuring intracellular calcium concentration.

20. The method according to claim 19, wherein the concentration of intracellular calcium is determined using a calcium-sensitive fluorescent dye.

21. The method according to claim 20, wherein the calcium-sensitive fluorescent dye is selected from the group consisting of Indo-1, Fura-2, Fluo-3, Fluo-4, Rhod-2, Rhod-5N, Calcein, Calcein blue, cytoCalcein Violet, Quin-2, Quest Fluo-8H™, Quest Fluo 8L™, Quest Fluo 8™, Quest Rhod-4™, coelenterazine and Calcium-3.

22. A method for identifying a compound that enhances the bitter taste due to KCl comprising:

a) providing a first and a second cell,

wherein each cell expresses one or more bitter taste receptors independently selected from the group consisting of:

TAS2R4, TAS2R9, TAS2R13, TAS2R14, TAS2R44 and TAS2R60, wherein each cell expresses the same one or more bitter taste receptors;

b) contacting said first cell with a tastant,

wherein the tastant activates one or more of TAS2R4, TAS2R9, TAS2R13, TAS2R14, TAS2R44 and TAS2R60 bitter taste receptors;

c) contacting said second cell with a test compound and the tastant;

d) assaying said first and second cells for bitter taste receptor activation; and

e) comparing the bitter taste receptor activation of said first cell to the bitter taste receptor activation of said second cell,

wherein the test compound is an enhancer of bitter taste due to KCl, if bitter taste receptor activity of said second cell is more than the bitter taste receptor activity of said first cell.