An object of the present invention is to provide a means which has a highly agonistic activation of both PPARα and PPARγ and is effective and safe for improving both lipid metabolism and/or sugar metabolism.

[0008]

Another object of the present invention is to provide a means for treating or preventing diseases or disorders associated with lipid metabolism disorders and/or sugar metabolism disorders.

MEANS FOR SOLVING PROBLEM

[0009]

The present inventors carried out extensive studies to solve the above problems and have now accidentally found that a plurality of lactic acid bacteria strains or *Bifidobacteria* strains, which strongly activate both PPARα and PPARγ. In particular, *Lactobacillus amylovorus* CP1563 strain has now been found as the highly active strains.

[0010]

In one aspect, the present invention refers to a bacterial cell of *Lactobacillus amylovorus* CP1563 strain (Accession Number FERM BP-11255) or *Lactobacillus amylovorus* CP1562 strain (Accession Number FERM BP-11379), or a mutant or bred strain thereof having dual-agonistic activities on a peroxisome proliferator activated receptor (PPAR)α and a peroxisome proliferator activated receptor (PPAR)γ, wherein the PPARα agonistic activity is 70 or more relative to DMSO negative control activity of 0 and GW 7647 (10nM, SIGMA) positive control activity of 100 as measured by PPARα reporter assay regarding diethyl ether extracts of the bacterial cell and the PPARγ agonistic activity is 30 or more relative to DMSO negative control activity of 0 and Troglitazone (1μM Wako Pure Chemical Industry, Ltd.) positive control activity of 100 as measured by PPARγ reporter assay regarding diethyl ether extracts of the bacterial cell, or a treated product thereof. Accordingly, the present invention encompasses the following ~~embodiments~~examples.

[0011]

(1) A bacterial cell or a treated product thereof having dual-agonistic activities on a peroxisome proliferator activated receptor (PPAR)α and a peroxisome proliferator activated receptor (PPAR)γ.

[0012]

(2) The bacterial cell or the treated product thereof according to the above (1), wherein the PPARα activity is 70 or more relative to negative control activity of 0 and positive control

activity of 100 as measured by PPARα reporter assay and the PPARγ ligand activity shows positive exceeding 0 relative to negative control activity of 0 and positive control activity of 100 as measured by PPARγ reporter assay.

[0013]

(3) The bacterial cell or the treated product thereof according to the above (1) or (2), wherein the bacterial cell belongs to *Lactobacillus amylovorus*, *Lactobacillus gasseri*, *Bifidobacterium infantis, Bifidobacterium adolescentis,* or *Bifidobacterium breve.*

[0014]

(4) The bacterial cell or the treated product thereof according to any one of the above (1) to (3), wherein the bacterial cell is the CP1563 strain (Accession Number FERM BP-

CLAIMS

1. A bacterial cell or a treated product thereof having dual-agonistic activities on a peroxisome proliferator activated receptor (PPAR)α and a peroxisome proliferator activated receptor (PPAR)γ.

2. The bacterial cell or the treated product thereof according to claim 1, wherein the PPARα activity is 70 or more relative to negative control activity of 0 and positive control activity of 100 as measured by PPARα reporter assay and the PPARγ ligand activity shows positive exceeding 0 relative to negative control activity of 0 and positive control activity of 100 as measured by PPARγ reporter assay.

3. The bacterial cell or the treated product thereof according to claim 1 or 2, wherein the bacterial cell belongs to *Lactobacillus amylovorus*, *Lactobacillus gasseri*, *Bifidobacterium infantis*, *Bifidobacterium adolescentis*, or *Bifidobacterium breve*.

4. The bacterial cell or the treated product thereof according to any one of claims 1 to 3, wherein the bacterial cell is *Lactobacillus amylovorus* CP1563 strain (Accession Number FERM BP-11255) or *Lactobacillus amylovorus* CP1562 strain (Accession Number FERM BP-11379) or a mutant or bred strain thereof, or a mutant or bred strain of *Lactobacillus gasseri* CP2305 strain (Accession Number FERM BP-11331).

5. The treated product of bacterial cell according to any one of claims 1 to 4, which is a destructed product of the bacterial cell, an extracted product of the bacterial cell, or a dried product thereof.

6. A lipid metabolism and/or sugar metabolism improver comprising, as an active ingredient, a bacterial cell, a treated product thereof, or a mixture thereof having dual-agonistic activities on a peroxisome proliferator activated receptor (PPAR)α and a peroxisome proliferator activated receptor (PPAR)γ.,.

7. A lipid metabolism and/or sugar metabolism improver comprising, as an active ingredient, a bacterial cell selected from bacteria belonging to the genus *Lactobacillus* and the genus *Bifidobacterium*, a treated product thereof, or a mixture thereof having dual-agonistic activities on a peroxisome proliferator activated receptor (PPAR)α and a peroxisome proliferator activated receptor (PPAR)γ.

8. The lipid metabolism and/or sugar metabolism improver according to claim 6 or 7, wherein the PPARα activity is 70 or more relative to negative control activity of 0 and positive control activity of 100 as measured by PPARα reporter assay and the PPARγ ligand

activity shows positive exceeding 0 relative to negative control activity of 0 and positive control activity of 100 as measured by PPARγ reporter assay.

9. The lipid metabolism and/or sugar metabolism improver according to any one of claims 6 to 8, wherein the bacterial cell belongs to *Lactobacillus amylovorus*, *Lactobacillus gasseri*, *Bifidobacterium infantis*, *Bifidobacterium adolescentis*, or *Bifidobacterium breve*.

10. The lipid metabolism and/or sugar metabolism improver according to any one of claims 6 to 9, wherein the bacterial cell is *Lactobacillus amylovorus* CP1563 strain (Accession Number FERM BP-11255) or *Lactobacillus amylovorus* CP1562 strain (Accession Number FERM BP-11379), *Lactobacillus gasseri* CP2305 strain (Accession Number FERM BP-11331), or a mutant or bred strain thereof.

11. The lipid metabolism and/or sugar metabolism improver according to any one of claims 6 to 10, wherein the treated product of bacterial cell is a destructed product of the bacterial cell, an extracted product of the bacterial cell, or a dried product thereof.

12. The lipid metabolism and/or sugar metabolism improver according to any one of claims 6 to 11, which further comprises a carrier or an excipient used for foods or beverages or pharmaceutical drugs.

13. A food or beverage comprising the lipid metabolism and/or sugar metabolism improver according to any one of claims 6 to 12 as a food additive.

14. The food or beverage according to claim 13, which is a functional food or health food for use in improving the lipid metabolism and/or sugar metabolism.

15. A pharmaceutical composition for use in preventing, improving, or treating a lipid metabolism disorder and/or sugar metabolism disorder, comprising, as an active ingredient, the lipid metabolism and/or sugar metabolism improver according to any one of claims 6 to 12.

16. A process for producing a food or beverage having a lipid metabolism and/or sugar metabolism improving effect, comprising adding the lipid metabolism and/or sugar metabolism improver according to any one of claims 6 to 12 to a food or beverage.

17. Use of *Lactobacillus amylovorus* CP1563 strain (Accession Number FERM BP-11255), *Lactobacillus amylovorus* CP1562 strain (Accession Number FERM BP-11379), *Lactobacillus gasseri* CP2305 strain (Accession Number FERM BP-11331), or a mutant or bred strain thereof, a treated product thereof, or a mixture thereof in the production of the lipid metabolism and/or sugar metabolism improver according to any one of claims 6 to 12.

18. *Lactobacillus amylovorus* CP1563 strain (Accession Number FERM BP-11255) or *Lactobacillus amylovorus* CP1562 strain (Accession Number FERM BP-11379), or a mutant or bred strain thereof, or a mutant or bred strain of *Lactobacillus gasseri* CP2305 strain (Accession Number FERM BP-11331) for use in imparting a lipid metabolism and sugar metabolism improving action.

19. *Lactobacillus amylovorus* CP1563 strain (Accession Number FERM BP-11255) or *Lactobacillus amylovorus* CP1562 strain (Accession Number FERM BP-11379) or a mutant or bred strain thereof, or a mutant or bred strain of *Lactobacillus gasseri* CP2305 strain (Accession Number FERM BP-11331).

20. The bacterial cell or the treated product thereof according to claim 1 or 2, wherein the bacterial cell belongs to the genus *Lactobacillus* or the genus *Bifidobacterium*.

21. Use of the bacterial cell or the treated product thereof according to any one of claims 1 to 5 for use in the production of a composition for improving lipid metabolism and/or sugar metabolism.

22. Use of the bacterial cell or the treated product thereof according to any one of claims 1 to 5 for use in the production of a composition for preventing lipid metabolism and/or sugar metabolism.

23. The bacterial cell or the treated product thereof according to any one of claims 1 to 5 for use in the production of a composition for improving lipid metabolism and/or sugar metabolism.

24. The bacterial cell or the treated product thereof according to any one of claims 1 to 5 for use in the production of a composition for preventing lipid metabolism and/or sugar metabolism.

25. The bacterial cell or the treated product thereof according to any one of claims 1 to 5 for use in the production of a composition for reducing subcutaneous fat and/or visceral fat.

26. The bacterial cell or the treated product thereof according to any one of claims 1 to 5 for use in the production of a composition for preventing accumulation of subcutaneous fat and/or visceral fat.

CLAIMS

1. A bacterial cell of *Lactobacillus amylovorus* CP1563 strain (Accession Number FERM BP-11255) or *Lactobacillus amylovorus* CP1562 strain (Accession Number FERM BP-11379), or

a mutant or bred strain thereof having dual-agonistic activities on a peroxisome proliferator activated receptor (PPAR)α and a peroxisome proliferator activated receptor (PPAR)γ, wherein the PPARα agonistic activity is 70 or more relative to DMSO negative control activity of 0 and GW 7647 (10nM, SIGMA) positive control activity of 100 as measured by PPARα reporter assay regarding diethyl ether extracts of the bacterial cell and the PPARγ agonistic activity is 30 or more relative to DMSO negative control activity of 0 and Troglitazone (1μM Wako Pure Chemical Industry, Ltd.) positive control activity of 100 as measured by PPARγ reporter assay regarding diethyl ether extracts of the bacterial cell, or

a treated product thereof.

2. The treated product of bacterial cell according to claim 1, which is a destructed product of the bacterial cell, an extracted product of the bacterial cell, or a dried product thereof.

3. *Lactobacillus amylovorus* CP1563 strain (Accession Number FERM BP-11255) or *Lactobacillus amylovorus* CP1562 strain (Accession Number FERM BP-11379).