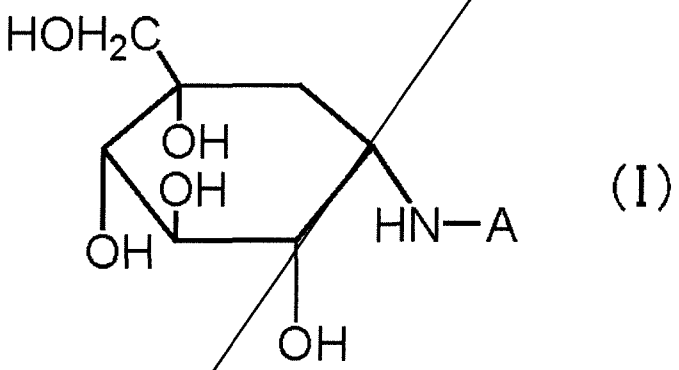
CLAIMS

1. A hypoglycemic effect enhancer for enhancing the activity of an α-glucosidase inhibitor, the enhancer comprising at least one kind of bacteria selected from the group consisting of bifidobacteria, lactic acid bacteria, saccharifying bacteria, and butyric acid bacteria.

2. The hypoglycemic effect enhancer according to claim 1, further comprising an α-glucosidase inhibitor.

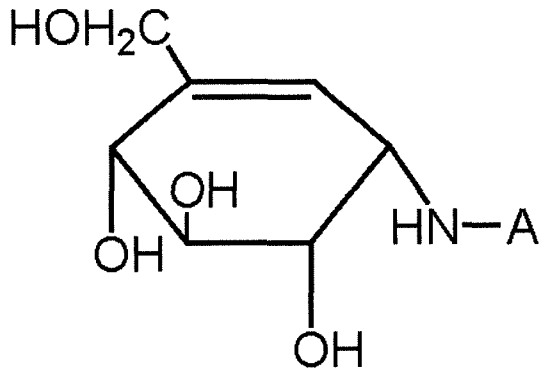
3. The hypoglycemic effect enhancer according to claim 1 or 2, wherein the α-glucosidase inhibitor is
a valiolamine derivative represented by the general formula (I):



(I)

(wherein A represents a chain hydrocarbon group having 1 to 10 carbon atoms and optionally having one or more of hydroxyl, phenoxy, thienyl, furyl, pyridyl, cyclohexyl, and optionally substituted phenyl; a cyclic hydrocarbon group having 5 or 6 carbon atoms and optionally having one or more of hydroxyl, hydroxymethyl, methyl, and amino; or a sugar residue),
an N-substituted valienamine derivative represented by the

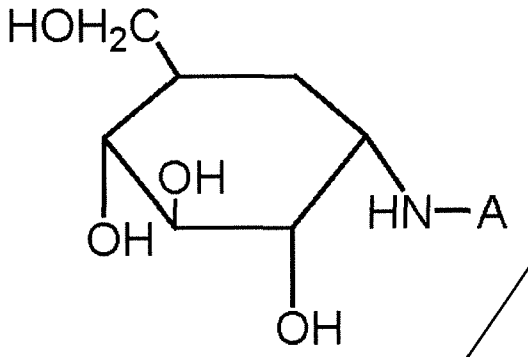
general formula (II):



(II)

(wherein A has the same meaning as defined above),

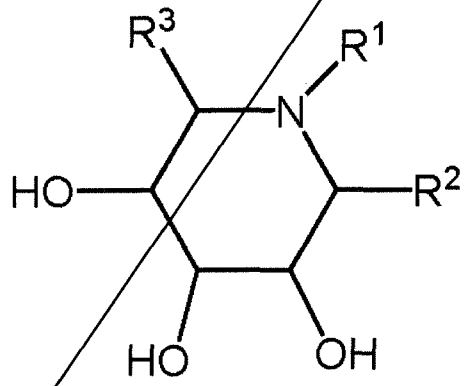
an N-substituted validamine derivative represented by the general formula (III):



(III)

(wherein A has the same meaning as defined above), or

a 3,4,5-trihydroxypiperidine represented by the general formula (IV):



(IV)

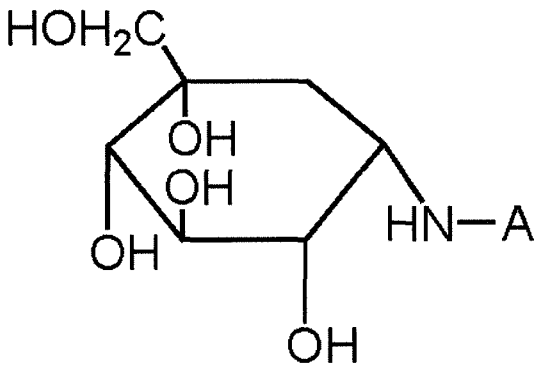
(wherein R^1 and R^3 may be the same or different and independently represent a hydrogen atom, an optionally substituted linear,

branched, or cyclic, saturated or unsaturated aliphatic hydrocarbon group, or an optionally substituted hydrocarbon ring, aromatic ring, or hetero ring; R^2 represents -H, -OH, -OR', -SH, -SR', $-NH_2$, -NHR', -N(R')(R''), NH_2CH_2-, NHR'-CH_2-, NR'R''-CH_2-, -COOH, -COOR', HO-CH_2-, R'CO-$NHCH_2$-, R'CO-NR''CH_2-, R'SO_2NHCH_2-, R'SO_2-NR''CH_2-, R'-NH-CO-NH-CH_2-, R'-NH-CS-NH-CH_2-R'-O-CO-NH-CH_2-, $-SO_3H$, -CN, $-CONH_2$, -CONHR', or -CONR'R'', wherein R' and R'' may be the same or different and each have the same meaning as that of R^1; and when R^3 is $-CH_2OH$ and R^2 is a hydrogen atom or -OH, when R^3 is a hydrogen atom and R^2 is a hydrogen atom, -OH, $-SO_3H$, -CN, or $-CH_2-NH_2$, or when R^3 is $-CH_2-NH_2$ and R^2 is -OH, R^1 is not a hydrogen atom).

4. A hypoglycemic effect enhancer for enhancing the activity of at least one kind of bacteria selected from the group consisting of bifidobacteria, lactic acid bacteria, saccharifying bacteria, and butyric acid bacteria, the enhancer comprising an α-glucosidase inhibitor.

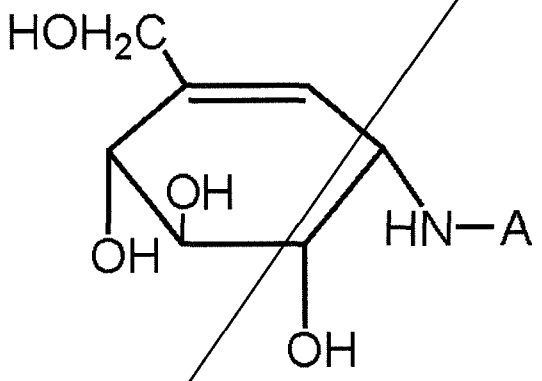
5. The hypoglycemic effect enhancer according to claim 4, further comprising at least one kind of bacteria selected from the group consisting of bifidobacteria, lactic acid bacteria, saccharifying bacteria, and butyric acid bacteria.

6. The hypoglycemic effect enhancer according to claim 4 or 5, wherein the α-glucosidase inhibitor is a valiolamine derivative represented by the general formula (I):



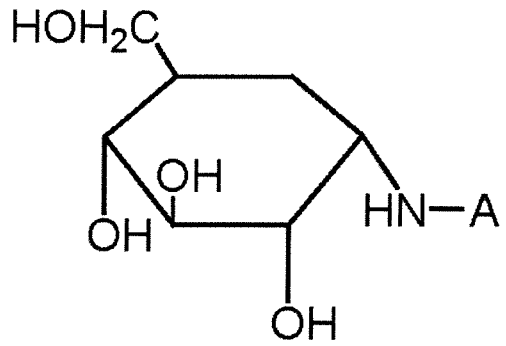
(I)

(wherein A represents a chain hydrocarbon group having 1 to 10 carbon atoms and optionally having one or more of hydroxyl, phenoxy, thienyl, furyl, pyridyl, cyclohexyl, and optionally substituted phenyl; a cyclic hydrocarbon group having 5 or 6 carbon atoms and optionally having one or more of hydroxyl, hydroxymethyl, methyl, and amino; or a sugar residue), an N-substituted valienamine derivative represented by the general formula (II):



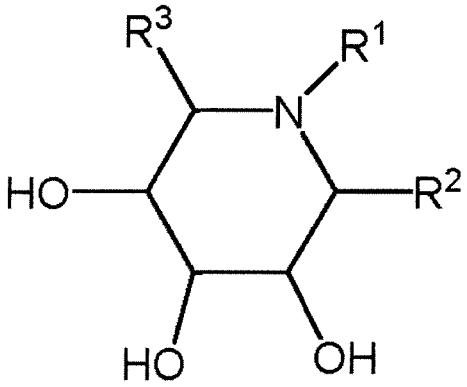
(II)

(wherein A has the same meaning as defined above), or an N-substituted validamine derivative represented by the general formula (III):



(III)

(wherein A has the same meaning as defined above), or a 3,4,5-trihydroxypiperidine represented by the general formula (IV)



(IV)

(wherein R^1 and R^3 may be the same or different and independently represent a hydrogen atom, an optionally substituted linear, branched, or cyclic, saturated or unsaturated aliphatic hydrocarbon group, or an optionally substituted hydrocarbon ring, aromatic ring, or hetero ring; R^2 represents -H, -OH, -OR', -SH, -SR', $-NH_2$, -NHR', -N(R')(R''), NH_2CH_2-, NHR'-CH_2-, NR'R''-CH_2-, -COOH, -COOR', HO-CH_2-, R'CO-$NHCH_2$-, R'CO-NR''CH_2-, R'SO_2NHCH_2-, R'SO_2-NR''CH_2-, R'-NH-CO-NH-CH_2-, R'-NH-CS-NH-CH_2-R'-O-CO-NH-CH_2-, $-SO_3H$, -CN, $-CONH_2$, -CONHR', or -CONR'R'', wherein R' and R'' may be the same or different and each have the same meaning as that of R^1; and when R^3 is $-CH_2OH$ and R^2 is a hydrogen atom or -OH, when R^3 is a hydrogen atom and R^2 is a hydrogen atom, -OH, $-SO_3H$, -CN, or

$-CH_2-NH_2$, or when R^3 is $-CH_2-NH_2$ and R^2 is -OH, R^1 is not a hydrogen atom).

7. A pharmaceutical drug comprising the hypoglycemic effect enhancer according to any one of claims 1 to 6.

8. A food or drink composition for enhancing the hypoglycemic activity of an α-glucosidase inhibitor, the composition comprising the hypoglycemic effect enhancer according to any one of claims 1 to 3.

9. A food or drink composition for enhancing the hypoglycemic activity of at least one kind of bacteria selected from the group consisting of bifidobacteria, lactic acid bacteria, saccharifying bacteria, and butyric acid bacteria, the composition comprising the hypoglycemic effect enhancer according to any one of claims 4 to 6.

10. Use of at least one kind of bacteria selected from the group consisting of bifidobacteria, lactic acid bacteria, saccharifying bacteria, and butyric acid bacteria, for enhancing the hypoglycemic activity of an α-glucosidase inhibitor.

11. Use of an α-glucosidase inhibitor, for enhancing the hypoglycemic activity of at least one kind of bacteria selected from the group consisting of bifidobacteria, lactic acid bacteria, saccharifying bacteria, and butyric acid bacteria.

12. An expression promoter for the hypoglycemic activity of an α-glucosidase inhibitor, the promoter comprising at least one kind of bacteria selected from the group consisting of bifidobacteria, lactic acid bacteria, saccharifying bacteria, and butyric acid bacteria.

13. At least one kind of bacteria selected from the group consisting of bifidobacteria, lactic acid bacteria, saccharifying bacteria, and butyric acid bacteria, for enhancing the hypoglycemic activity of an α-glucosidase inhibitor.

14. An α-glucosidase inhibitor for enhancing the hypoglycemic activity of at least one kind of bacteria selected from the group consisting of bifidobacteria, lactic acid bacteria, saccharifying bacteria, and butyric acid bacteria.

15. At least one kind of bacteria selected from the group consisting of bifidobacteria, lactic acid bacteria, saccharifying bacteria, and butyric acid bacteria, for promoting the expression of the hypoglycemic activity of an α-glucosidase inhibitor.

16. A method for enhancing the hypoglycemic activity of an α-glucosidase inhibitor, the method comprising administering to an animal at least one kind of bacteria selected from the group consisting of bifidobacteria, lactic acid bacteria, saccharifying bacteria, and butyric acid bacteria in combination with an α-glucosidase inhibitor.

17. A method for enhancing the hypoglycemic activity of at least one kind of bacteria selected from the group consisting of bifidobacteria, lactic acid bacteria, saccharifying bacteria, and butyric acid bacteria, the method comprising administering to an animal an α-glucosidase inhibitor in combination with the bacteria.

18. A method for promoting the expression of the hypoglycemic activity of an α-glucosidase inhibitor, the method comprising administering to an animal at least one kind of bacteria selected from the group consisting of bifidobacteria, lactic acid bacteria, saccharifying bacteria, and butyric acid bacteria in combination with an α-glucosidase inhibitor.

CLAIMS

1. Use of Streptococcus faecalis and Bacillus subtilis in combination with acarbose in the manufacture of a composition for enhancing a hypoglycemic activity.

2. Use of Streptococcus faecalis, Bacillus subtilis and acarbose in the manufacture of a composition for enhancing a hypoglycemic activity.

3. Use of acarbose in combination with Streptococcus faecalis and Bacillus subtilis in the manufacture of a composition for enhancing a hypoglycemic activity.

4. Use of the composition defined in any one of claims 1 to 3 in the manufacture of a pharmaceutical drug for enhancing a hypoglycemic activity.

5. The use according to claim 2, wherein the composition is a food or drink.

6. Use of Bifidobacterium bifidum G9-1 in combination with voglibose and/or acarbose in the manufacture of a composition for enhancing a hypoglycemic activity.

7. The use according to claim 6, wherein the composition comprises Bifidobacterium bifidum G9-1 and voglibose and/or acarbose.

8. Use of the composition defined in claim 6 or 7 in the manufacture of a pharmaceutical drug for enhancing a hypoglycemic activity.

9. Use of Bifidobacterium bifidum G9-1 in combination with voglibose and/or acarbose in the manufacture of a composition for promoting the expression of the hypoglycemic activity.

10. The use according to claim 6 or 7, wherein the composition is in a processed form as a natural liquid diet, a low residue diet, an elemental diet or a drinkable preparation.

11. Use of lactic acid bacteria, and saccharifying bacteria or bifidobacteria in combination with voglibose in the manufacture of a medicament for enhancing hypoglycemic activity of voglibose.

12. Use of voglibose in combination with lactic acid bacteria, and saccharifying bacteria or bifidobacteria in the manufacture of a medicament for enhancing hypoglycemic activity of the bacteria.

13. Use of lactic acid bacteria, and saccharifying bacteria or bifidobacteria in combination with voglibose in the manufacture of a medicament for promoting the expression of the hypoglycemic activity of voglibose.