

CLAIMS

1. A composition for use in increasing the blood bioavailability of at least one amino acid derived from a protein of plant origin in a subject who takes said protein of plant origin or said at least one amino acid or a peptide of plant origin comprising said at least one amino acid through oral route, wherein said composition comprises a mixture M comprising, or alternatively, consisting of at least one bacterial strain, or a derivative thereof, selected from the group comprising, or alternatively, consisting of:

- a bacterial strain belonging to the species *Lactobacillus paracasei* identified as *Lactobacillus paracasei* DG® and deposited at the National Collection of Cultures of Microorganisms of the Pasteur Institute in Paris under the accession number CNCM I-1572,
- a bacterial strain belonging to the species *Lactobacillus paracasei* identified as *Lactobacillus paracasei* LPC-S01 and deposited at Deutsche Sammlung von Mikroorganismen und Zellkulturen GmbH (DSMZ) under accession number DSM 26760,
- a bacterial strain belonging to the species *Bifidobacterium breve* identified as *Bifidobacterium breve* BbIBS01 and deposited at Deutsche Sammlung von Mikroorganismen und Zellkulturen GmbH (DSMZ) under deposit number DSM 33231,
- a bacterial strain belonging to the species *Bifidobacterium breve* identified as *Bifidobacterium breve* BbIBS02 and deposited at Deutsche Sammlung von Mikroorganismen und Zellkulturen GmbH (DSMZ) under deposit number DSM 33232,
- a bacterial strain belonging to the species *Bifidobacterium animalis* identified as *Bifidobacterium animalis subsp. lactis* BbIBS01 and deposited at Deutsche Sammlung von Mikroorganismen und Zellkulturen GmbH (DSMZ) under deposit number DSM 33233,
- a bacterial strain belonging to the species *Lactobacillus plantarum* identified as *Lactobacillus plantarum* LpIBS01 and deposited at Deutsche Sammlung von Mikroorganismen und Zellkulturen GmbH (DSMZ) under deposit number DSM 33234, and
- a mixture thereof; and,

optionally, said composition comprises at least one acceptable pharmaceutical or food grade additive and/or excipient, wherein said at least one amino acid is selected from the group A comprising or, alternatively, consisting of: arginine, glutamine, citrulline, serine, asparagine, glycine, threonine, alanine, ornithine, methionine, proline, lysine, aspartic acid, histidine, valine, glutamic acid, tryptophan, leucine, phenylalanine, isoleucine, cysteine, tyrosine and mixtures thereof.

2. The composition for use according to claim 1, wherein said at least one amino acid is selected from the group A.1.a comprising or, alternatively, consisting of: asparagine, alanine, methionine, aspartic acid, histidine, valine, tryptophan, leucine, phenylalanine, isoleucine, tyrosine and mixtures thereof.
3. The composition for use according to claim 1 or 2, wherein said mixture M comprises at least one bacterial strain, or a derivative thereof, selected from the group comprising, or alternatively, consisting of:
- *Lactobacillus paracasei* DG® CNCM I-1572,
 - *Lactobacillus paracasei* LPC-S01 DSM 26760,
- and a mixture thereof, preferably at a 1:1 by weight ratio.
4. The composition for use according to claim 3, wherein said mixture M further comprises at least one bacterial strain, or a derivative thereof, selected from the group comprising, or alternatively, consisting of:
- *Bifidobacterium breve* BbIBS01 DSM 33231,
 - *Bifidobacterium breve* BbIBS02 DSM 33232,
 - *Bifidobacterium animalis subsp. lactis* BbIBS01 DSM 33233,
 - *Lactobacillus plantarum* LpIBS01 DSM 33234, and
 - a mixture thereof.
5. The composition for use according to any one of claims 1 to 4, wherein said composition further comprises at least one protein of plant origin, and/or at least one peptide of plant origin, and/or at least one amino acid; preferably wherein said amino acid comprised in the composition is selected from the group A according to claim 2.
6. The composition for use according to any one of claims 1 to 5, wherein said subject suffers from a disease, symptom and/or disorder related with a protein deficiency or with an increased protein requirement.
7. The composition for use according to claim 6, wherein said disease, symptom and/or disorder related with said protein deficiency or with said increased protein requirement is selected from: decrease in metabolic efficiency, decrease in corpusculated elements in the blood, changes in healing processes, decrease in muscle strength, decrease in muscle mass, muscle depletion, weight loss, decrease in athletic performance, early fatigue, difficulty in concentrating, anxiety, changes in sleep, changes in mood, increased susceptibility to infections, digestive deficiency, changes in blood sugar, increased cholesterol, changes in blood-chemical parameters, malnutrition syndrome, such as for example Kwashiorkor or bialfra,

osteoporosis, decrease in at least one protein-based component of an organism selected from nails, hair, skin, enzymes, neurotransmitters, hormones and immunoglobulins.

8. A food product comprising

- proteins of plant origin, and
- the mixture M comprising or, alternatively, consisting of at least one bacterial strain selected from the group comprising or, alternatively, consisting of:

- *Lactobacillus paracasei* DG® CNCM I-1572,
- *Lactobacillus paracasei* LPC-S01 DSM 26760,
- *Bifidobacterium breve* BbIBS01 DSM 33231,
- *Bifidobacterium breve* BbIBS02 DSM 33232,
- *Bifidobacterium animalis subsp. lactis* BbIBS01 DSM 33233,
- *Lactobacillus plantarum* LpIBS01 DSM 33234, and
- a mixture thereof.

9. The food product according to claim 8, wherein said mixture M comprises at least one bacterial strain, or a derivative thereof, selected from the group comprising, or alternatively, consisting of:

- *Lactobacillus paracasei* DG® CNCM I-1572,
- *Lactobacillus paracasei* LPC-S01 DSM 26760, and
- a mixture thereof;

and, optionally, wherein said mixture M further comprises at least one bacterial strain, or a derivative thereof, selected from the group comprising, or alternatively, consisting of:

- *Bifidobacterium breve* BbIBS01 DSM 33231,
- *Bifidobacterium breve* BbIBS02 DSM 33232,
- *Bifidobacterium animalis subsp. lactis* BbIBS01 DSM 33233,
- *Lactobacillus plantarum* LpIBS01 DSM 33234, and
- a mixture thereof.

10. The food product according to claim 8 or 9, wherein said at least one bacterial strain is in a form of coated viable bacterial strain or coated probiotic, paraprobiotic or postbiotic; preferably at least one bacterial strain is in a form selected from the group comprising or, alternatively, consisting of: coated viable bacterial strain, tyndallized bacterial strain, sonicated bacterial strain, inactivated bacterial strain, lysate of the bacterial strain, extract of the bacterial strain, a component of the bacterial strain selected from exopolysaccharide, parietal fraction, metabolite and metabolic bioproduct.

11. The food product according to any one of claims 8 to 10 for use in increasing the blood bioavailability of at least one amino acid derived from said proteins of plant origin.

12. A non-therapeutic use of a composition for increasing the blood bioavailability of at least one amino acid derived from a protein of plant origin in a subject taking - through oral route - said protein of plant origin or said at least one amino acid or a peptide of plant origin comprising said at least one amino acid, wherein said composition comprises a mixture M comprising, or alternatively, consisting of at least one bacterial strain, or a derivative thereof, selected from the group comprising, or alternatively, consisting of:

- a bacterial strain belonging to the species *Lactobacillus paracasei* identified as *Lactobacillus paracasei* DG® and deposited at the National Collection of Cultures of Microorganisms of the Pasteur Institute in Paris under the accession number CNCM I-1572,

- a bacterial strain belonging to the species *Lactobacillus paracasei* identified as *Lactobacillus paracasei* LPC-S01 and deposited at Deutsche Sammlung von Mikroorganismen und Zellkulturen GmbH (DSMZ) under accession number DSM 26760,

- a bacterial strain belonging to the species *Bifidobacterium breve* identified as *Bifidobacterium breve* BbIBS01 and deposited at Deutsche Sammlung von Mikroorganismen und Zellkulturen GmbH (DSMZ) under deposit number DSM 33231,

- a bacterial strain belonging to the species *Bifidobacterium breve* identified as *Bifidobacterium breve* BbIBS02 and deposited at Deutsche Sammlung von Mikroorganismen und Zellkulturen GmbH (DSMZ) under deposit number DSM 33232,

- a bacterial strain belonging to the species *Bifidobacterium animalis* identified as *Bifidobacterium animalis subsp. lactis* BbIBS01 and deposited at Deutsche Sammlung von Mikroorganismen und Zellkulturen GmbH (DSMZ) under deposit number DSM 33233,

- a bacterial strain belonging to the species *Lactobacillus plantarum* identified as *Lactobacillus plantarum* LpIBS01 and deposited at Deutsche Sammlung von Mikroorganismen und Zellkulturen GmbH (DSMZ) under deposit number DSM 33234, and

- a mixture thereof; and,

optionally, said composition comprises at least one acceptable pharmaceutical or food grade additive and/or excipient, wherein said at least one amino acid is selected from the group A comprising or, alternatively, consisting of: arginine, glutamine, citrulline, serine, asparagine, glycine, threonine, alanine, ornithine, methionine, proline, lysine, aspartic acid, histidine, valine, glutamic acid, tryptophan, leucine, phenylalanine, isoleucine, cysteine, tyrosine and mixtures thereof.

13. A method for increasing the blood bioavailability of at least one amino acid derived from a protein of plant origin in a subject taking - through oral route - said protein of plant origin or said at least one amino

acid or a peptide of plant origin comprising said at least one amino acid, wherein said method comprises administering a composition comprising a mixture M comprising or, alternatively, consisting of at least one bacterial strain or a derivative thereof, selected from the group comprising or, alternatively, consisting of:

- a bacterial strain belonging to the species *Lactobacillus paracasei* identified as *Lactobacillus paracasei* DG® and deposited at the National Collection of Cultures of Microorganisms of the Pasteur Institute in Paris under the accession number CNCM I-1572,
- a bacterial strain belonging to the species *Lactobacillus paracasei* identified as *Lactobacillus paracasei* LPC-S01 and deposited at Deutsche Sammlung von Mikroorganismen und Zellkulturen GmbH (DSMZ) under accession number DSM 26760,
- a bacterial strain belonging to the species *Bifidobacterium breve* identified as *Bifidobacterium breve* BbIBS01 and deposited at Deutsche Sammlung von Mikroorganismen und Zellkulturen GmbH (DSMZ) under deposit number DSM 33231,
- a bacterial strain belonging to the species *Bifidobacterium breve* identified as *Bifidobacterium breve* BbIBS02 and deposited at Deutsche Sammlung von Mikroorganismen und Zellkulturen GmbH (DSMZ) under deposit number DSM 33232,
- a bacterial strain belonging to the species *Bifidobacterium animalis* identified as *Bifidobacterium animalis subsp. lactis* BbIBS01 and deposited at Deutsche Sammlung von Mikroorganismen und Zellkulturen GmbH (DSMZ) under deposit number DSM 33233,
- a bacterial strain belonging to the species *Lactobacillus plantarum* identified as *Lactobacillus plantarum* LpIBS01 and deposited at Deutsche Sammlung von Mikroorganismen und Zellkulturen GmbH (DSMZ) under deposit number DSM 33234, and
- a mixture thereof; and,

optionally, said composition comprises at least one acceptable pharmaceutical or food grade additive and/or excipient, and wherein,

said at least one amino acid is selected from the group A comprising or, alternatively, consisting of: arginine, glutamine, citrulline, serine, asparagine, glycine, threonine, alanine, ornithine, methionine, proline, lysine, aspartic acid, histidine, valine, glutamic acid, tryptophan, leucine, phenylalanine, isoleucine, cysteine, tyrosine and mixtures thereof.

14. A probiotic bacterial strain (I.i) *Lactobacillus paracasei* DG® CNCM I-1572 (freeze-dried in powder form), for use in increasing the blood bioavailability of at least one amino acid derived from a protein of plant or animal origin, preferably from a protein of plant origin, in a subject taking - through oral route - said protein or at least one amino acid or a peptide of plant origin comprising said at least one amino acid.

15. A probiotic bacterial strain (I.ii) *Lactobacillus paracasei* LPC-S01 DSM 26760 (freeze-dried in powder form), for use in increasing the blood bioavailability of at least one amino acid derived from a protein of plant or animal origin, preferably from a protein of plant origin, in a subject taking - through oral route - said protein or at least one amino acid or a peptide of plant origin comprising said at least one amino acid.