

[Non-Patent Literature 2] Takasugi et al., Biol. Trace Elem. Res., 2013, 153, 309-318

[Non-Patent Literature 3] Wearer et al., J. Agric. Food Chem., 2011, 59, 6501-6510

[Non-Patent Literature 4] Chonan et al., J. Nutr. Sci. Vitaminol., 1995, 41, 95-104

[Non-Patent Literature 5] Chonan et al., Biosci. Biotechnol. Biochem., 1995, 59, 236-

5 239

[Summary of the Invention]

In one aspect, there is provided use of a fermented dairy product obtained using lactic acid bacteria that belong to the genus *Lactobacillus* and/or lactic acid
10 bacteria that belong to the genus *Streptococcus* and a galacto-oligosaccharide in the manufacture of a composition for use in treating or preventing a disease caused by excessive incorporation of phosphorus, wherein the disease is selected from the group consisting of cardiovascular diseases, ectopic calcification, and osteoporosis.

In another aspect, there is provided use of a fermented dairy product obtained
15 using lactic acid bacteria that belong to the genus *Lactobacillus* and/or lactic acid bacteria that belong to the genus *Streptococcus* and a galacto-oligosaccharide in the manufacture of a composition for use in treating or preventing reduced gastric acid secretion and/or elevated gastric acid pH in a subject.

As described above, orally administering a combination of a lactic acid
20 fermentation product and GOS to growing rats for a short duration after short-term subcutaneous administration of a PPI improves calcium absorption and increases bone strength. However, administering a PPI to rats over a long period of time has an adverse effect on phosphorus metabolism, and it was unclear whether long-term administration of a lactic acid fermentation product and GOS in combination would
25 have any influence on the worsened phosphorus metabolism. The present inventors then experimentally investigated the influence on this worsened phosphorus metabolism of administering a lactic acid fermentation product and GOS in combination for a long period of time, in a state of reduced gastric acid secretion (elevated gastric acid pH) that results from long-term subcutaneous administration of a PPI.

In other words, an objective of the present invention is to provide
30 compositions for treating or preventing osteoporosis and for improving phosphorus metabolism (specifically, for suppressing excessive incorporation of phosphorus), which comprise a combination of a lactic acid fermentation product (a fermented dairy product) and GOS as active ingredients, which can be taken for a long period of time,
35 and are composed of ingredients (nutrients) that have been proven to be excellent in safety and taste property from a long history of use in foods. Further, an objective of

the present invention is to provide compositions for treating or preventing diseases caused by excessive incorporation of phosphorus, which comprise a combination of a lactic acid fermentation product and GOS as active ingredients.

The present inventors conducted intensive research to solve the above issues.

- 5 Specifically, the present inventors experimentally examined the influence on phosphorus metabolism, calcium metabolism, bone strength and such of orally administering for a long period of time a combination of a lactic acid fermentation product (a fermented dairy product) and GOS to rats in a state of reduced gastric acid secretion that results from PPI administration, and in a normal state without PPI
- 10 administration. As a result, the present inventors revealed that long-term oral administration of a combination of a fermented dairy product and GOS to rats increases

bone strength both in a state of reduced gastric acid secretion and in a normal state. The present inventors further revealed that the increase of phosphorus absorption is suppressed in a state of reduced gastric acid secretion by orally administering a combination of a fermented dairy product and GOS for a long period of time. The present inventors have thereby discovered the possibility that diseases caused by excessive incorporation of phosphorus can be treated and/or prevented by long-term administration of a fermented dairy product and GOS in combination to ameliorate the abnormality of phosphorus metabolism.

The present disclosure is based on the above-described findings and provides the subject matter below.

[1] A composition for use in suppressing phosphorus absorption, which comprise a fermented dairy product and an oligosaccharide as active ingredients.

[2] The composition of [1] above, wherein the oligosaccharide is an oligosaccharide that comprises galactose as a constituent sugar.

[3] The composition of [2] above, wherein the oligosaccharide is galacto-oligosaccharide.

[4] The composition of any one of [1] to [3] above, wherein the fermented dairy product is a fermented dairy product obtained using lactic acid bacteria that belong to the genus *Lactobacillus* and/or lactic acid bacteria that belong to the genus *Streptococcus*.

[5] The composition of any one of [1] to [4] above, wherein the fermented dairy product is yogurt and/or unmaturred cheese.

[6] The composition of any one of [1] to [5] above, for use in oral administration to a subject with reduced gastric acid secretion and/or elevated gastric acid pH.

[7] The composition of any one of [1] to [6] above, for use in daily oral administration over a period of at least four weeks or more.

[8] The composition of any one of [1] to [7] above, for use as a food additive.

[9] Use of a fermented dairy product and an oligosaccharide in the manufacturing of a composition for use in suppressing phosphorus absorption.

[Effect of the Invention]

The compositions of the present invention can suppress the increase of phosphorus absorption along with the reduction of gastric acid secretion. Accordingly, oral administration (which may also include the concept of enteral administration) of the compositions of the present invention to subjects with reduced gastric acid secretion such as elderly people and such can suppress the increase of phosphorus absorption, ameliorate the abnormality of phosphorus metabolism, and return the excessive

CLAIMS

1. Use of a fermented dairy product obtained using lactic acid bacteria that belong to the genus *Lactobacillus* and/or lactic acid bacteria that belong to the genus *Streptococcus* and a galacto-oligosaccharide in the manufacture of a composition for use in treating or preventing a disease caused by excessive incorporation of phosphorus, wherein the disease is selected from the group consisting of cardiovascular diseases, ectopic calcification, and osteoporosis.
2. Use of a fermented dairy product obtained using lactic acid bacteria that belong to the genus *Lactobacillus* and/or lactic acid bacteria that belong to the genus *Streptococcus* and a galacto-oligosaccharide in the manufacture of a composition for use in treating or preventing reduced gastric acid secretion and/or elevated gastric acid pH in a subject.
3. The use of claim 1 or 2, wherein the lactic acid bacteria that belong to the genus *Lactobacillus* is selected from the group consisting of *Lactobacillus bulgaricus*, *Lactobacillus gasseri*, *Lactobacillus helveticus*, *Lactobacillus plantarum*, *Lactobacillus casei*, *Lactobacillus reuteri*, *Lactobacillus rhamnosus*, *Lactobacillus oris*, *Lactobacillus acidophilus*, *Lactobacillus brevis*, *Lactobacillus mucosae* and *Lactobacillus murinus*, and the lactic acid bacteria that belong to the genus *Streptococcus* is *Streptococcus thermophiles* or *Streptococcus diacetylactis*.
4. The use of any of claims 1 to 3, wherein the lactic acid bacteria that belong to the genus *Lactobacillus* is *Lactobacillus bulgaricus* and the lactic acid bacteria that belong to the genus *Streptococcus* is *Streptococcus thermophiles*.
5. The use of any one of claims 1 to 4, wherein the fermented dairy product is a fermented milk.
6. The use of any one of claims 1 to 5, wherein the fermented dairy product is yogurt and/or unmaturred cheese.
7. The use of any one of claims 1 to 6, wherein the composition is to be used for oral administration to a subject with reduced gastric acid secretion and/or elevated gastric acid pH.
8. The use of any one of claims 1 to 7, wherein the composition is to be used for daily oral administration over a period of at least four weeks or more.
9. The use of any one of claims 1 to 8, wherein the composition is to be used as a food additive.