

AGENT FOR PROMOTING PRODUCTION OF CERAMIDE COVALENTLY
BOUND TO HORNY LAYER CELL

[CROSS-REFERENCE TO RELATED APPLICATION]

5 [0001]

The present application is based on and claims the benefit of priority of Japanese patent application No. 2014-158811 (filed on August 4, 2014), which is a prior Japanese patent application, the entire disclosure of which is incorporated herein by reference.

10

[0002] Technical Field

The present invention relates to an agent for promoting production of ceramides covalently bound to horny layer cells. More specifically, the present invention relates to an agent for promoting
15 production of ceramides covalently bound to horny layer cells, which agent comprises a sphingophospholipid derived from milk. These are useful to prevent, suppress or improve the deterioration of the skin condition.

20 [0003] Background Art

The horny layer of the epidermis is formed from horny layer cells into which keratinocytes are terminally differentiated, and lipid surrounding the horny layer cells. This intercellular lipid is formed from for example ceramide, cholesterol and fatty acids, and forms a
25 lamella structure from lipid layers and water molecular layers. Because of this, the barrier function to prevent the invasion of foreign substances from the outside and the water loss from the body works.

[0004]

The keratinocytes form each layer while successively
30 keratinizing basement membrane cells, prickly cells, granular cells and horny layer cells toward the outside. Proteins forming cornified envelope (CE) are synthesized from the upper layer of the prickly layer to the granular layer. In the process of reaching the horny layer, matrix proteins such as involucrin, loricrin and cystatin are bound to
35 the cell membrane of keratinocyte by an enzyme transglutaminase to form insoluble CE. Ceramides for example are covalently bound to

the insoluble CE to form bound ceramides (ceramides covalently bound to horny layer cells). Because of these, the basis of the barrier function of the horny layer is formed.

[0005]

5 Ceramides in the horny layer have a structure in which a fatty acid is bound to a long-chain sphingosine base through an acid amide bond, and can be classified into at least 12 groups depending on the types of sphingosine base and fatty acid (J Lipid Res, 2008, vol. 49, p. 1466-1476). The ceramides covalently bound to horny layer cells are
10 those in which omega hydroxy ceramides among the ceramides in the horny layer are covalently bound to CE, and mean particularly ceramides which are bound to the cell membrane of the horny layer among ceramides forming a lamella structure from lipid layers and water molecular layers in the horny layer.

15 [0006]

 It is known that the amount of ceramides in the horny layer is involved as an important factor in the skin barrier function. Therefore, for example, Japanese Patent Application Laid-Open Publication No. H09(1997)-208419 A discloses the use of a composition used
20 externally for skin, which comprises mevalonic acid and ceramides for the purpose of effect of improving a rough skin, effect of improving keratin and effect of a beautiful skin. It has been conventionally investigated that ceramides are supplied to the horny layer by directly applying ceramides to skin.

25 [0007]

 However, although the amount of ceramides in the horny layer is normal, a phenomenon that the skin barrier function decreases under ultraviolet irradiation has been observed (e.g. an example of this application). The present inventors thought that not the total
30 amount of ceramides in the horny layer but the amount of ceramides covalently bound to horny layer cells was important to retain the skin barrier function. From the viewpoint of accelerating the formation and maturation of cornified envelope, for example, Japanese Patent Application Laid-Open Publication No. 2008-303185 A discloses the
35 use of a specific pyrrolidone derivative. However, as far as the present inventors know, an improvement in the skin barrier function

by improving ceramides covalently bound to horny layer cells has not been investigated very much. As far as the present inventors know, particularly the oral intake of sphingolipid has not been known until now.

5 [0008]

Japanese Patent Application Laid-Open Publication No. 2005-281257 A discloses an agent for beautiful skin containing a sphingomyelin as an active ingredient, and that beauty effects such as moisturizing of skin, a beautiful skin, the prevention of rough dry skin,
10 and the prevention of wrinkles are obtained by the oral intake of sphingomyelin. Similarly, WO 2008/093657 A also discloses an agent for beautiful skin containing a milk-derived phospholipid containing a sphingomyelin as an active ingredient.

[0009]

15 However, these literatures do not describe and suggest that the production of ceramides covalently bound to horny layer cells is accelerated by the oral intake of sphingolipid derived from milk, and thus, a decrease in the skin barrier function can be improved.

20 [SUMMARY OF THE INVENTION]

[0010]

The present inventors unexpectedly found this time that the production of ceramides covalently bound to horny layer cells could be accelerated by the oral intake of sphingolipid, particularly
25 sphingomyelin. It was thus found that the deterioration of the skin condition was improved and particularly a decrease in the skin barrier function under ultraviolet irradiation could be also suppressed. The present invention is based on these findings.

[0011]

30 Therefore, an object of the present invention is to provide an agent for promoting production which promotes the production of ceramides covalently bound to horny layer cells. Another object of the present invention is to provide a composition and a food or beverage product to safely, easily and economically prevent, suppress
35 or improve a decrease in the skin barrier function for example under ultraviolet irradiation.

[0012]

That is, according to the present invention, there is provided the following inventions.

[0013]

- 5 <1> An agent for promoting production of ceramides covalently bound to horny layer cells, comprising a sphingolipid as an active ingredient.

[0014]

- 10 <2> In the agent according to <1> above, the sphingolipid is preferably a sphingophospholipid derived from milk.

[0015]

<3> In the agent according to <1> or <2> above, the sphingophospholipid is preferably a sphingomyelin.

[0016]

- 15 <4> In the agent according to any of <1> to <3> above, the ceramides covalently bound to horny layer cells preferably comprise one or more molecular species selected from the group consisting of omega hydroxy d18:1-C28:0, d18:1-C30:1, d18:1-C30:0, d18:1-C32:0, d18:1-C32:1, d18:1-C34:0, d18:1-C34:1, d18:1-C36:1,
20 d17:1-C32:0, d17:1-C32:1, d17:1-C34:0, d17:1-C34:1 and d17:1-C36:1.

[0017]

<5> The agent according to any of <1> to <4> above is preferably for oral intake or enteral administration.

25 [0018]

<6> A composition for preventing, suppressing or improving the deterioration of the skin condition, which composition comprises an active ingredient according to any of <1> to <5> above.

[0019]

- 30 <7> In the composition according to <6> above, the deterioration of the skin condition is preferably a decrease in the skin barrier function.

[0020]

- 35 <8> In the composition according to <7> above, the decrease in the skin barrier function is preferably caused by a decrease in the production of ceramides covalently bound to horny layer cells in the

horny layer.

[0021]

5 <9> In the composition according to <7> or <8> above, the decrease in the skin barrier function is preferably caused by ultraviolet irradiation.

[0022]

<10> The composition according to any of <6> to <9> above preferably comprises a sphingolipid in the amount by which 0.5 to 1500 mg can be taken per day.

10 [0023]

<11> A food or beverage product, comprising the agent for promoting production of ceramides covalently bound to horny layer cells according to any of <1> to <5> above.

[0024]

15 <12> A food or beverage product, comprising a composition for preventing, suppressing or improving the deterioration of the skin condition according to any of <6> to <9> above.

[0025]

20 <13> The food or beverage product according to <11> or <12> above preferably comprises a sphingolipid in the amount by which 0.2 to 45000 mg can be taken per package.

[0026]

25 <14> The food or beverage product according to any of <11> to <13> above is preferably functional food, health and nutrition food, a supplement, food with function claims, food for specified health uses or food with disease risk reduction claims.

[0027]

30 <15> A yogurt, comprising the agent for promoting production of ceramides covalently bound to horny layer cells according to any of <1> to <5> above.

[0028]

<16> A yogurt, promoting the production of ceramides covalently bound to horny layer cells, which yogurt comprises an additional sphingolipid.

35 [0029]

<17> The yogurt according to <15> or <16> above preferably

further comprises collagen.

[0030]

<18> In the yogurt according to any of <15> to <17> above, the sphingophospholipid is preferably a sphingomyelin.

5 [0031]

<15B> In the food or beverage product according to any of <11> to <14> above, the food or beverage product is preferably a yogurt.

[0032]

10 <16B> The food or beverage product according to any of <11> to <14> and <15B> above preferably further comprises collagen.

[0033]

<17B> In the food or beverage product according to any of <11> to <14>, <15B> and <16B> above, the sphingophospholipid is preferably a sphingomyelin.

15 [0034]

<19> A composition for oral intake or enteral administration, which comprises the agent for promoting production of ceramides covalently bound to horny layer cells according to any of <1> to <5> above, and a yogurt.

20 [0035]

<20> A composition for oral intake or enteral administration, which comprises an additional sphingolipid and a yogurt.

[0036]

25 <21> The composition for oral intake or enteral administration according to <19> or <20> above preferably further comprises collagen.

[0037]

30 <22> In the composition for oral intake or enteral administration according to any of <19> to <21> above, the sphingophospholipid is preferably a sphingomyelin.

[0038]

<23> The composition for oral intake or enteral administration according to any of <19> to <22> above is preferably for promoting the production of ceramides covalently bound to horny layer cells.

35 [0039]

<24> A sphingolipid for promoting the production of ceramides

covalently bound to horny layer cells.

[0040]

5 <25> A method for promoting the production of ceramides covalently bound to horny layer cells, the method including allowing a target in which the production of ceramides covalently bound to horny layer cells decreases to orally take a sphingolipid or enterally administering the sphingolipid to the target.

[0041]

10 <26> A method for preventing, suppressing or improving the deterioration of the skin condition, the method including allowing a target in which the production of ceramides covalently bound to horny layer cells decreases to orally take a sphingolipid or enterally administering the sphingolipid to the target.

[0042]

15 <27> The use of a sphingolipid to promote the production of ceramides covalently bound to horny layer cells. Preferably, the use can be the use of a sphingolipid to produce a composition for oral intake or enteral administration, which composition is for promoting the production of ceramides covalently bound to horny layer cells.
20 Herein, the use can be also non-therapeutic use.

[0043]

25 <28> The use of a sphingolipid for preventing, suppressing or improving the deterioration of the skin condition. Preferably, the use can be the use of a sphingolipid to produce a composition for oral intake or enteral administration for preventing, suppressing or improving the deterioration of the skin condition. Herein, the use can be also non-therapeutic use.

[ADVANTAGEOUS EFFECTS OF THE INVENTION]

30 [0044]

According to the agent for promoting production of the present invention, the production of ceramides covalently bound to horny layer cells can be accelerated, and particularly the production of ceramides covalently bound to horny layer cells can be accelerated in epidermis in
35 a state in which the production of ceramides covalently bound to horny layer cells decreases. The deterioration of the skin condition can be

effectively prevented, suppressed or improved by accelerating the production of ceramides covalently bound to horny layer cells. In particular, the agent for promoting production and composition of the present invention can effectively prevent, suppress or improve a decrease in the skin barrier function under ultraviolet irradiation. Further, the agent for promoting production and composition of the present invention are taken by an oral or enteral route, and also safe, easy and economical because the raw materials are derived from those which have been conventionally used as food.

10

[BRIEF DESCRIPTION OF THE DRAWINGS]

[0045]

Fig. 1 is a graph showing changes in the amount of moisture in the horny layer in Test 1 (there are significant differences between different alphanumeric characters ($p < 0.05$)).

15

Fig. 2 is a graph showing changes in the transepidermal water loss in Test 1 (there are significant differences between different alphanumeric characters ($p < 0.05$)).

Fig. 3 is a graph showing changes in the amount of ceramides in the horny layer in Test 1 (there are significant differences between different alphanumeric characters ($p < 0.05$)).

20

Fig. 4 is a graph showing changes in the amount of moisture in the horny layer in Test 2 (*there are significant differences ($p < 0.05$)).

Fig. 5 is a graph showing changes in the transepidermal water loss in Test 2 (*there are significant differences ($p < 0.05$)).

25

Fig. 6 is a graph showing changes in the amount of ceramides covalently bound to horny layer cells in Test 2 (*there are significant differences ($p < 0.05$)).

Fig. 7 is a graph showing changes in the amount of ceramides in the horny layer in Test 2 (there are no significant differences).

30

Fig. 8 is a graph showing changes in the amount of ceramides in the horny layer in Test 3 (each molecular species) (*there are significant differences ($p < 0.05$)).

Fig. 9 is a graph showing changes in the amount of ceramides in the horny layer in Test 3 (the sum of values in each molecular species) (*there are significant differences ($p < 0.05$)).

35

[MODE FOR CARRYING OUT THE INVENTION]

[0046]

The embodiments of the present invention will now be
5 described.

[0047]

**Agent for Promoting Production of Ceramides Covalently
Bound to Horny Layer Cells**

The agent for promoting production of ceramides covalently
10 bound to horny layer cells according to the present invention
comprises a sphingolipid as an active ingredient as mentioned above.
[0048]

In the description, ceramides covalently bound to horny layer
cells are those in which omega hydroxy ceramides among ceramides in
15 the horny layer are covalently bound to cornified envelope (CE), and
mean ceramides which are bound to the cell membrane of the horny
layer among ceramides forming a lamella structure from lipid layers
and water molecular layers in the horny layer. Ceramides covalently
bound to horny layer cells can be referred to as bound ceramides.

20 [0049]

According to a preferred aspect of the present invention,
ceramides covalently bound to horny layer cells comprise one or more
molecular species selected from the group consisting of omega
hydroxy d18:1-C28:0, d18:1-C30:1, d18:1-C30:0, d18:1-C32:0,
25 d18:1-C32:1, d18:1-C34:0, d18:1-C34:1, d18:1-C36:1, d17:1-C32:0,
d17:1-C32:1, d17:1-C34:0, d17:1-C34:1 and d17:1-C36:1. The
ceramides covalently bound to horny layer cells more preferably
comprise three or more molecular species selected from the above
group, and yet more preferably comprise 5 or more molecular species
30 selected from the above group.

[0050]

Sphingolipid

Sphingolipids which can be used in the present invention are
naturally occurring ones, and examples thereof include those derived
35 from milk such as cow's milk, goat milk, sheep milk or horse milk,
those derived from egg yolk, those derived from rice, corn or grain,

those derived from konjac, and those derived from beet. Sphingolipids are preferably those derived from milk, and more preferably those derived from cow's milk. Sphingolipids are preferably sphingophospholipids, and more preferably sphingomyelins.

- 5 These can be prepared from natural raw materials by a common method, or a commercially available product can be used.

[0051]

Sphingomyelins derived from milk which can be used in the present invention preferably comprise one or more molecular species

10 selected from the group consisting of myristyl sphingosylphosphorylcholine (d18:1-C14:0), tricosanyl sphingosylphosphorylcholine (d18:1-C23:0), palmityl sphingosylphosphorylcholine (d18:1-C16:0), tricosenoyl sphingosylphosphorylcholine (d18:1-C23:1), stearyl

15 sphingosylphosphorylcholine (d18:1-C18:0), lignoceryl sphingosylphosphorylcholine (d18:1-C24:0), arachidyl sphingosylphosphorylcholine (d18:1-C20:0), nervonyl sphingosylphosphorylcholine (d18:1-C24:1), behenyl sphingosylphosphorylcholine (d18:1-C22:0), and cerotyl

20 sphingosylphosphorylcholine (d18:1-C26:0). The sphingomyelins derived from milk more preferably comprise three or more molecular species selected from the above group, and yet more preferably comprise 5 or more molecular species selected from the above group.

[0052]

25 According to a more preferred aspect of the present invention, sphingomyelins derived from milk comprise at least one or more molecular species selected from the group consisting of tricosanyl sphingosylphosphorylcholine (d18:1-C23:0), palmityl sphingosylphosphorylcholine (d18:1-C16:0), lignoceryl

30 sphingosylphosphorylcholine (d18:1-C24:0), arachidyl sphingosylphosphorylcholine (d18:1-C20:0) and behenyl sphingosylphosphorylcholine (d18:1-C22:0). The sphingomyelins derived from milk further preferably comprise two or more molecular species selected from the above group, yet more preferably comprise

35 3 or more molecular species selected from the above group, and particularly preferably comprise at least all 5 molecular species in the

above group. According to a further preferred aspect of the present invention, sphingomyelins derived from milk comprise at least molecular species of palmityl sphingosylphosphorylcholine (d18:1-C16:0) and/or behenyl sphingosylphosphorylcholine (d18:1-C22:0).

[0053]

According to a preferred aspect of the present invention, the agent for promoting production according to the present invention is for oral intake (i.e. oral ingestion agent) or enteral administration (i.e. enteral administration agent).

[0054]

The agent for promoting production according to the present invention is preferably used for skin in the deteriorated condition, skin with a decreased barrier function or skin with a decrease in the production of ceramides covalently bound to horny layer cells.

[0055]

As shown in examples described below, according to the present invention, the skin barrier function can be retained or improved by accelerating the production of ceramides covalently bound to horny layer cells in a condition of a decreased skin barrier function, for example the amount of ceramides in the horny layer does not change or the amount of ceramides increases. Because of this, the agent for promoting production according to the present invention is more preferably used for skin in the deteriorated condition, for example the amount of ceramides in the horny layer does not change or the amount of ceramides increases, skin with a decreased barrier function, or skin with a decrease in the production of ceramides covalently bound to horny layer cells.

[0056]

According to the agent for promoting production of ceramides covalently bound to horny layer cells of the present invention, it can be expected that the amount of moisture in the horny layer is retained and increases and the transepidermal water loss is retained and reduced as described below, and thus the present invention also provides an agent for retaining or increasing the amount of moisture in the horny layer, which comprises a sphingolipid as an active ingredient,

and an agent for retaining or reducing the transepidermal water loss, which comprises a sphingolipid as an active ingredient.

[0057]

Uses

5 A sphingolipid, which is an active ingredient in the present invention, has an activity to promote the production of ceramides covalently bound to horny layer cells (an example described below), and also has the effect of preventing, suppressing or improving the deterioration of the skin condition.

10 [0058]

 Herein, promoting the production of ceramides covalently bound to horny layer cells encompasses promoting the production of ceramides covalently bound to horny layer cells, maintaining the production, and recovering or improving a condition of decreased

15 production.

[0059]

 Herein, the deterioration of the skin condition encompasses for example a decrease in the skin barrier function, skin dryness, skin roughness, a decrease in the amount of moisture in the horny layer, and atopic dermatitis. The decrease in the skin barrier function also encompasses maintaining the barrier function. In addition, the decrease in the skin barrier function is preferably a decrease in the skin barrier function under ultraviolet irradiation.

20

[0060]

25 Herein, the "prevention, suppression or improvement" of deteriorated condition is used in a sense to encompass for example the adjustment, delay in the progression, relief, prevention of onset, and prevention of recurrence of such condition.

[0061]

30 According to another aspect of the present invention, the treatment, prevention or improvement of the condition which can be treated, prevented or improved by promoting the production of ceramides covalently bound to horny layer cells can be attempted.

[0062]

35 **Composition, and Food or Beverage Product**

 As mentioned above, according to the present invention, there

is provided a composition for preventing, suppressing or improving the deterioration of the skin condition, which composition comprises the active ingredient of the present invention, i.e. a sphingolipid. It can be also said that this composition comprises an agent for promoting
5 production of ceramides covalently bound to horny layer cells according to the present invention. In addition, according to the present invention, there is provided a food or beverage product comprising an agent for promoting production of ceramides covalently bound to horny layer cells according to the present invention.

10 [0063]

Such composition, and food or beverage product can be produced for example by a production method including adding the agent for promoting production according to the present invention to raw material components for a composition and a food or beverage
15 product.

[0064]

As a preferred aspect, a composition for preventing, suppressing or improving the deterioration of the skin condition according to the present invention is a pharmaceutical composition.

20 [0065]

In the present invention, the pharmaceutical composition is prepared as an oral preparation or parenteral preparation by using additives which are acceptable to make preparations in combination in accordance with a conventional method. The oral preparation can be
25 in the form of solid preparation such as tablets, powder, subtle granules, granules, capsules, pills or sustained formulations and liquid preparation such as solutions, suspensions or emulsions. The parenteral preparation can be in the form of injections and suppository. In the terms of easiness, the composition is preferably an oral
30 preparation. Examples of additives which are acceptable to make preparations include an excipient, a stabilizer, an antiseptic, a humectant, an emulsifier, a lubricant, a sweetener, a coloring agent, a flavor, a buffer, an antioxidant, and a pH adjuster and the like.

[0066]

35 To the food or beverage product of the present invention, optional components can be added if necessary. Such optional

components which can be added are not particularly limited, and components blended with a food or beverage product, a sweetener, an acidulant, vegetables, fruits, fruit juice and extracts thereof, nutrients such as vitamins, minerals and amino acids, useful microorganisms
5 such as lactic acid bacteria, bifidobacteria and propionic acid bacteria and cultures thereof, functional sugars such as oligosaccharides, existing functional materials such as royal jelly, collagen, ceramide, glucosamine, astaxanthin and polyphenol, a flavor, a pH adjuster, an excipient, an acidulant, a coloring agent, an emulsifier, and a
10 preservative and the like can be usually blended.
[0067]

In a preferred aspect of the present invention, collagen is used as an optional component which is added to a food or beverage product (preferably a yogurt).
15 [0068]

In the present invention, the food or beverage product is other than pharmaceutical compositions, and only needed to be in an orally ingestible form such as solutions, suspensions, emulsions, powder or solid molded products, and the form is not particularly limited.
20 Specific examples thereof include dairy products such as milk beverages, yogurt, lactobacillus beverages, fermented milk, ice cream, cream and cheese; beverages such as soft drinks, fruit drinks, vegetable drinks, soymilk drinks, coffee beverages, tea drinks, jelly drinks, powder beverages such as hot chocolate and smoothie, sports
25 powder beverages, nutrient-enriched powder beverages, powdered food for cosmetic purpose, powder soup, steamed bread mix, condensed drinks and alcohol; flour products such as bread, pasta, noodles, bread mix, flour for deep-fried chicken and bread crumbs; sweets such as dessert confectionery such as chocolate, gum, candy,
30 cookie, gummi, snacks, Japanese confectionery, jelly and pudding; seasonings such as processed seasonings, flavor seasonings and cooking mix; retort food such as curry, pasta sauce, pot-au-feu, stew and Japanese food; fat and oil such as processed fat and oil, butter, margarine, spread and mayonnaise; convenience food such as
35 freeze-dry food; processed agricultural products such as canned agricultural products, jam and marmalade, pickled vegetables, cooked

beans, cereal and rice gruel; processed marine products; processed livestock products; frozen food such as pizza, Doria, gratin, precooked food and fry; liquid food, further animal feed, tablets, cosmetic products used in the oral cavity and the like.

5 [0069]

According to a preferred aspect of the present invention, the food or beverage product is milk beverages (which can include processed milk), fermented milk, soft drinks, jelly drinks, tablets, powdered food for cosmetic purpose, powder beverages, liquid food,
10 and liquid formula milk. According to a more preferred aspect, the food or beverage product is milk beverages, fermented milk, soft drinks, jelly drinks, tablets, and powdered food for cosmetic purpose. According to a further preferred aspect, the food or beverage product is milk beverages (which can include processed milk), and fermented
15 milk (yogurt).

[0070]

The food or beverage product also encompasses those classified into functional food, health and nutrition food, a supplement, health food, food with function claims, food for specified health uses,
20 food with nutrient function claims, food for patients, infant formula, powdered milk for pregnant and nursing women or lactating women, or a food or beverage product with disease risk reduction claims. According to a preferred aspect of the present invention, the food or beverage product is functional food, health and nutrition food, a
25 supplement, food with function claims, food for specified health uses, or food with disease risk reduction claims.

[0071]

Herein, the disease risk reduction claim is a claim for a food or beverage product which has a possibility to reduce disease risks, and
30 can be a claim which is decided or admitted based on standards established by the FAO/WHO Codes Alimentarius Commission (Codex Committee) or with reference to the standards.

[0072]

Therefore, the food or beverage product according to the
35 present invention can be provided for example as food suitable for consumers who expect to improve or relieve the deterioration of the

skin condition, and food suitable to improve the deterioration of the skin condition, i.e. what is called food for specified health uses.

[0073]

According to another aspect of the present invention, there can
5 be provided a food or beverage product with claims to prevent, suppress or improve the deterioration of the skin condition by promoting the production of ceramides covalently bound to horny layer cells.

[0074]

10 The active ingredient content in a food or beverage product and a composition can be changed depending on for example the type and form of composition, and purposes of prevention and improvement, and thus it is difficult to provide the content without variation; however, in the composition of the present invention, the content can be
15 adjusted to an effective amount by which an adult (body weight 60 kg) can take 0.5 to 1500 mg of sphingolipid (preferably sphingolipid derived from milk, more preferably sphingomyelin derived from milk) per day, preferably 1 to 1000 mg, and more preferably 5 to 500 mg.

[0075]

20 A method for measuring a sphingolipid can be carried out by a common method, and measurement can be carried out for example by liquid chromatography using AQUASIL SP100 (4.6 × 250 mm, Senshu Scientific Co., Ltd.) as a column.

[0076]

25 At this time, for example a solution obtained by mixing a 0.5 mM phosphoric acid-citric acid buffer (pH 3.0) and methanol at a proportion of 5 : 95 can be used as a mobile phase. Detection can be carried out at an absorbance of 205 nm by setting a measurement time to 20 minutes, the mobile phase flow rate to 0.6 mL/min, and the
30 column temperature to 40°C. As a standard substance, for example, a sphingomyelin (derived from milk, manufactured by Nagara Science Co., Ltd.) can be used, and quantitative determination can be carried out by area ratio.

[0077]

35 In another aspect of the present invention, the active ingredient content in a food or beverage product and a composition

can be provided per package, and for example in the case of a food or beverage product, the sphingolipid content can be 5 to 1500 mg, preferably 6 to 1000 mg, and more preferably 7 to 500 mg. In the case of a composition, the sphingolipid content can be 0.5 to 1500 mg, preferably 1 to 1000 mg, and more preferably 5 to 500 mg. The amount per package is not limited to an amount by single intake, and can be an amount obtained by combining the amounts taken by multiple intake or multiple days (e.g. 30 days). For example, in the case of a food or beverage product, the sphingolipid content can be 5 to 45000 mg, preferably 6 to 30000 mg, and more preferably 7 to 15000 mg. In addition, in the case of a composition, the sphingolipid content can be 0.5 to 45000 mg, preferably 1 to 30000 mg, and more preferably 5 to 15000 mg.

[0078]

In conventionally common milk beverages and fermented milk, 20 mg of phospholipid is contained per g of lipid, while in the milk beverages and fermented milk of the present invention, 25 to 3000 mg of phospholipid can be contained per g of lipid, preferably 30 to 2500 mg, more preferably 40 to 2000 mg, and further preferably 50 to 1500 mg. In conventionally common milk beverages and fermented milk, 6 mg of sphingomyelin is contained per g of lipid, while in the milk beverages and fermented milk of the present invention, 7 to 1500 mg of sphingomyelin can be contained per g of lipid, preferably 8 to 1250 mg, more preferably 9 to 1000 mg, and further preferably 10 to 750 mg. That is, in a preferred aspect of the present invention, milk beverages and fermented milk, in which the phospholipid (particularly sphingolipid) content (preferably the sphingomyelin content) is purposely raised, are used.

[0079]

Therefore, according to a preferred aspect of the present invention, there is provided a yogurt promoting the production of ceramides covalently bound to horny layer cells, which yogurt comprises an additional sphingolipid. Herein, the "additional sphingolipid" is not a sphingolipid which can be originally contained in a yogurt, and means a sphingolipid separately added when making a yogurt in which the concentration of sphingolipid is purposely raised by

separately adding the sphingolipid to the yogurt.

[0080]

In the milk beverages and fermented milk of the present invention, when a typical amount of lipid is contained (e.g. 3 wt% of lipid is contained), 1 to 300 mg/g of phospholipid can be contained, preferably 1.5 to 250 mg/g, more preferably 2 to 200 mg/g, and further preferably 2.5 to 150 mg/g. In the milk beverages and fermented milk of the present invention, when a typical amount of lipid is contained, 0.2 to 60 mg/g of sphingomyelin can be contained, preferably 0.25 to 50 mg/g, more preferably 0.3 to 40 mg/g, and further preferably 0.35 to 30 mg/g.

[0081]

In the milk beverages and fermented milk of the present invention, when a low amount of lipid is contained (e.g. low fat with 1 wt% of lipid), 0.5 to 300 mg/g of phospholipid can be contained, preferably 0.6 to 250 mg/g, more preferably 0.7 to 200 mg/g, and further preferably 0.8 to 150 mg/g. In the milk beverages and fermented milk of the present invention, when a low amount of lipid is contained, 0.05 to 60 mg/g of sphingomyelin can be contained, preferably 0.1 to 50 mg/g, more preferably 0.15 to 40 mg/g, and further preferably 0.2 to 30 mg/g.

[0082]

In the milk beverages, fermented milk, soft drinks, jelly drinks, tablets, and powdered food for cosmetic purpose of the present invention, when lipid is hardly contained (non-fat), 0.2 to 300 mg/g of phospholipid can be contained, preferably 0.3 to 250 mg/g, more preferably 0.4 to 200 mg/g, and further preferably 0.5 to 150 mg/g. In the milk beverages and fermented milk of the present invention, when lipid is hardly contained, 0.02 to 60 mg/g of sphingomyelin can be contained, preferably 0.04 to 50 mg/g, more preferably 0.06 to 40 mg/g, and further preferably 0.08 to 30 mg/g.

[0083]

According to another treatment of the present invention, there is provided a method for promoting the production of ceramides covalently bound to horny layer cells, the method including allowing a target in which the production of ceramides covalently bound to horny

layer cells decreases, to orally take a sphingolipid or enterally administering the sphingolipid to the target.

[0084]

Herein, preferably, the above method is not applied to
5 pharmaceutical uses. In addition, the above target is preferably human, or mammals other than human.

[0085]

The above method can be preferably a method for promoting the production of ceramides covalently bound to horny layer cells for a
10 target in which the production of ceramides covalently bound to horny layer cells decreases, the method including oral intake or enteral administration of a sphingolipid with a duration of two or more days.

[EXAMPLES]

15

[0086]

The present invention will be described below in detail by way of the following examples. It should be noted however that the present invention is not limited thereto.

20 [0087]

Used Sphingolipid

Phospholipid concentrate containing 16.0 wt% of sphingomyelin derived from milk (PC700, Fonterra Co-operative Group Limited) was used as a sphingolipid.

25 [0088]

The composition of sphingomyelin molecular species in the actually used phospholipid concentrate is shown in Table 1 given below.

The composition of sphingomyelin molecular species was
30 measured as described below.

[0089]

Measurement of Composition of Sphingomyelin Molecular Species

Phospholipid concentrate was dissolved in Tris buffer with 2% Triton X-100 (pH 7.4), and 1U sphingomyelinase (Sigma) was added
35 thereto. The obtained mixture was allowed to react at 37°C for 2 hours to hydrolyze a sphingomyelin into a ceramide. The hydrolyzed

ceramide molecular species were extracted with a chloroform methanol mixed solution (2 : 1, v/v).

The extracted ceramide molecular species were measured using a liquid chromatograph-mass spectrometer LC/MS/MS (Quatro premier XE (Waters)), using ACQUITY UPLC BEH C18 (2 mm × 100 mm, particle diameter 1.7 µm, Waters) as a column.

At this time, ammonium acetate (5 mM)/acetonitrile was used as a mobile phase A, and ammonium acetate (5 mM)/methanol (95%) was used as a mobile phase B. The mobile phase A was initiated at 100%, and the gradient was carried out so that the mobile phase B was 100% after 30 minutes. The mobile phase B was then retained at 100% for 2 minutes, and further the mobile phase was shifted so that the mobile phase A was 100% after 3 minutes. That is, the measurement time per sample of LC/MS/MS was set to 35 minutes. Detection was carried out by setting the mobile phase flow rate to 0.4 mL/min and the column temperature to 40°C in the positive mode by electrospray ionization. The analysis variables of LC/MS/MS were set to a capillary voltage of 3000 V, a source temperature of 120°C, a desolvation temperature of 400°C, a desolvation gas flow rate of 850 L/h, a cone gas flow rate of 50 L/h, and a cone voltage of 30 eV/h.

From the molar concentration of the obtained ceramide molecular species, the amount of sphingomyelin molecular species was calculated.

[0090]

[Table 1]

Table 1: Composition of Sphingomyelin Molecular Species

Molecular Species	Content [mg/g]	Molecular Species	Content [mg/g]
d18:1-C14:0	1.14	d16:1-C16:0	3.62
d18:1-C16:0	15.10	d16:1-C22:0	10.07
d18:1-C18:0	1.06	d16:1-C23:0	15.85
d18:1-C20:0	0.31	d16:1-C24:0	10.15
d18:1-C22:0	7.43	d17:1-C16:0	2.60
d18:1-C23:0	12.05	d17:1-C22:0	2.01
d18:1-C23:1	2.31	d17:1-C23:0	3.04
d18:1-C24:0	7.80	d17:1-C24:0	2.06
d18:1-C24:1	2.15		
d18:1-C25:0	0.38		
d18:1-C26:0	0.14		

5 [0091]

Test 1: Influence of Sphingolipid on Dry Skin

Feed to induce dry skin was provided to hairless mice, and the influence of oral intake of phospholipid concentrate was examined.

[0092]

10 (1-1) Induction of Dry Skin

Hairless mice (Hos: HR-1, female, 4 weeks old) were habituated for a week, and then freely fed feed to induce dry skin (special feed HR-AD, manufactured by Nosan Corporation) for 8 weeks.

15 [0093]

(1-2) Evaluation Group Construction

An influence on the skin condition by the oral intake of phospholipid concentrate (PC700) was evaluated using a dry skin model animal test system. At this time, 10 mice were in each group.

20 The relationship between the animal experiment group construction (evaluation group construction) and the sphingomyelin content is shown in Table 2 given below.

[0094]

[Table 2]

5 Table 2: Relationship between Animal Experiment Group Construction and Sphingomyelin Content

Group	Feed	Sphingomyelin Content [g/kg]
Normal	Normal Feed (FR-2 feed)	0
HR-AD	Special Feed (HR-AD feed)	0
L-MPL	HR-AD feed blended with 7 g/kg PC700	1.1
H-MPL	HR-AD feed blended with 41 g/kg PC700	6.7

[0095]

(1-3) Method for Evaluation Test

- 10 The amount of moisture in the horny layer, the transepidermal water loss (TEWL), and the amount of ceramides covalently bound to horny layer cells were measured in each experimental animal group, and from these, the skin barrier function was evaluated.

[0096]

- 15 (a) Amount of Moisture in Horny Layer

The amount of moisture in the horny layer was measured 5 times/mouse using a corneometer (manufactured by Courage and Khazaka Electronic GmbH). Among the results, the average of 3 measured values except the maximum value and the minimum value was used as the amount of moisture in the horny layer.

[0097]

(b) Transepidermal Water Loss (TEWL)

- 25 The transepidermal water loss was measured by a tewameter (Tewameter MPA580 manufactured by Courage and Khazaka Electronic GmbH) which uses a probe maintained to 29°C for 20 seconds. The average of these 3 obtained measurement results was used as the transepidermal water loss.

[0098]

(c) Amount of Ceramides Covalently Bound to Horny Layer Cells

The amount of ceramides covalently bound to horny layer cells was measured using the liquid chromatograph-mass spectrometer LC/MS/MS (Quattro premier XE (Waters)), using ACQUITY UPLC BEH C18 (2 mm × 100 mm, particle diameter 1.7 µm, Waters) as a column.

At this time, ammonium acetate (5 mM)/acetonitrile was used as a mobile phase A, and ammonium acetate (5 mM)/methanol (95%) was used as a mobile phase B. The mobile phase A was initiated at 100%, and the gradient was carried out so that the mobile phase B was 100% after 30 minutes. The mobile phase B was retained at 100% for 2 minutes, and the mobile phase was shifted so that the mobile phase A was 100% after 3 minutes. That is, the measurement time per sample of LC/MS/MS was set to 35 minutes. Detection was carried out by setting the mobile phase flow rate to 0.4 mL/min and the column temperature to 40°C in the positive mode by electrospray ionization. The analysis variables of LC/MS/MS were set to a capillary voltage of 3000 V, a source temperature of 120°C, a desolvation temperature of 400°C, a desolvation gas flow rate of 850 L/h, a cone gas flow rate of 50 L/h, and a cone voltage of 30 eV/h.

[0099]

(d) Amount of Ceramides in Horny Layer

The amount of ceramides in the horny layer was measured using a liquid chromatograph-mass spectrometer LC/MS/MS (Quattro premier XE (Waters)), using ACQUITY UPLC BEH C18 (2 mm × 100 mm, particle diameter 1.7 µm, Waters) as a column.

At this time, ammonium acetate (5 mM)/acetonitrile was used as a mobile phase A, and ammonium acetate (5 mM)/methanol (95%) was used as a mobile phase B. The mobile phase A was initiated at 100%, and the gradient was carried out so that the mobile phase B was 100% after 30 minutes. The mobile phase B was then retained at 100% for 2 minutes, and the mobile phase was shifted so that the mobile phase A was 100% after 3 minutes. That is, the measurement time per sample of LC/MS/MS was set to 35 minutes. Detection was carried out by setting the mobile phase flow rate to 0.4 mL/min and the column temperature to 40°C in the positive mode by electrospray ionization. The analysis variables of LC/MS/MS were set to a capillary

voltage of 3000 V, a source temperature of 120°C, a desolvation temperature of 400°C, a desolvation gas flow rate of 850 L/h, a cone gas flow rate of 50 L/h, and a cone voltage of 30 eV/h.

[0100]

5 As the amount of ceramides in the horny layer, the sum of palmityl sphingosine (d18:1-C16:0), stearyl sphingosine (d18:1-C18:0), arachidyl sphingosine (d18:1-C20:0), behenyl sphingosine (d18:1-C22:0), tricosanyl sphingosine (d18:1-C23:0), tricosenoyl sphingosine (d18:1-C23:1), lignoceryl sphingosine
10 (d18:1-C24:0), nervonyl sphingosine (d18:1-C24:1) and cerotyl sphingosine (d18:1-C26:0) was found. As the standard substance of each ceramide, those manufactured by Avanti Polar Lipids, Inc. were used, and quantitative determination was carried out by area ratio.

[0101]

15 (1-4) Evaluation Results

The results were as follows.

[0102]

(a) Amount of Moisture in Horny Layer

The results were as shown in Fig. 1.

20 In Fig. 1, the amount of moisture in the horny layer in the HD-AD group was low compared to the amount of moisture in the horny layer in the Normal group. On the other hand, the amount of moisture in the horny layer in the L-MPL group and H-MPL group was high compared to the amount of moisture in the horny layer in the
25 HD-AD group. Because of this, it can be said that the deterioration of the skin barrier function was suppressed in the L-MPL group and H-MPL group.

[0103]

(b) Transepidermal Water Loss (TEWL)

30 The results were as shown in Fig. 2.

In Fig. 2, TEWL in the HD-AD group was high compared to the TEWL in the Normal group. On the other hand, TEWL in the L-MPL group and H-MPL group was low compared to TEWL in the HD-AD group. Because of this, it can be said that the deterioration of the skin
35 barrier function was suppressed in the L-MPL group and H-MPL group.

[0104]

(c) Amount of Ceramides Covalently Bound to Horny Layer Cells

The results were as shown in Table 3 given below.

[0105]

[Table 3]

5

Table 3: Content Ratio of Ceramides Covalently Bound to Horny Layer Cells [wt%]

Molecular Species	Normal	HR-AD	L-MPL	H-MPL
d18:1-C30:0	100.0 ± 14.4a	8.3 ± 0.8c	14.2 ± 1.2c	43.4 ± 3.6b
d18:1-C32:0	100.0 ± 7.9a	11.4 ± 1.0c	16.6 ± 1.1c	59.1 ± 4.7b
d18:1-C32:1	100.0 ± 4.7a	28.3 ± 2.0d	45.0 ± 1.5c	63.7 ± 2.9b
d18:1-C34:0	100.0 ± 11.5a	9.1 ± 0.9c	11.8 ± 1.0c	66.3 ± 6.5b
d18:1-C34:1	100.0 ± 4.2a	34.9 ± 2.2d	49.8 ± 1.7c	84.8 ± 3.3b
d18:1-C36:1	100.0 ± 6.8a	24.6 ± 1.8b	33.1 ± 1.8b	97.3 ± 5.4a
d17:1-C32:0	100.0 ± 7.1a	3.9 ± 0.4c	5.6 ± 0.5c	50.0 ± 4.4b
d17:1-C32:1	100.0 ± 5.2a	14.3 ± 1.1c	22.0 ± 1.7c	69.1 ± 3.2b
d17:1-C34:0	100.0 ± 8.5a	3.5 ± 0.4c	4.2 ± 0.5c	59.6 ± 5.9b
d17:1-C34:1	100.0 ± 4.0a	17.7 ± 1.2c	24.1 ± 1.6c	83.7 ± 3.9b
d17:1-C36:1	100.0 ± 6.2a	12.2 ± 1.1b	15.9 ± 1.4b	95.7 ± 6.6a

10 [0106]

In Table 3, the content ratio of ceramides covalently bound to horny layer cells is shown. As the content ratio of ceramides covalently bound to horny layer cells, the amount of each ceramide covalently bound to horny layer cells in the Normal group at the end of the test (after intake of test meals for 8 weeks) was considered as 100, and the amount of other ceramides covalently bound to horny layer cells is shown using a relative value.

Herein, the content ratio of each ceramide covalently bound to horny layer cells in the HD-AD group was low compared to the content ratio of ceramides covalently bound to horny layer cells in the Normal group. On the other hand, the content ratio of each ceramide

20

covalently bound to horny layer cells in the H-MPL group was high compared to the content ratio of each ceramide covalently bound to horny layer cells in the HD-AD group. Because of this, it can be said that the deterioration of the skin barrier function was suppressed in the L-MPL group and H-MPL group.

[0107]

(d) Amount of Ceramides in Horny Layer

The results were as shown in Fig. 3.

As can be seen from the results, compared to the amount of ceramides in the horny layer in the Normal group, the amount of each ceramide in the horny layer in the HD-AD group did not change or rather increased. On the contrary, as described above, compared to the content ratio of ceramides covalently bound to horny layer cells in the Normal group, the content ratio of ceramides covalently bound to horny layer cells in the HD-AD group was low.

That is, it was found that even when the skin condition was deteriorated, the amount of ceramides in the horny layer was normal without a decrease, or rather increased, while the amount of ceramides covalently bound to horny layer cells had a tendency independent of that, and the amount decreased with the deterioration the skin condition.

[0108]

(e) Others

When the skin surface of mice in each group was visually observed, the condition of rough skin due to dry skin was obviously observed in the HD-AD group, while the H-MPL group had a good skin condition at the same level as that of the Normal group.

[0109]

According to histological findings of a skin surface tissue in each group which was collected, stained with HD and observed with a microscope, the H-MPL group had a good skin condition at the same level as that in the Normal group.

[0110]

Test 2: Influence of Sphingolipid on Deterioration of Skin Barrier Function under Ultraviolet Irradiation

Hairless mice were irradiated with ultraviolet rays to lower the

skin barrier function, and the influence of oral intake of phospholipid concentrate on this condition was examined.

[0111]

5 (2-1) Induction of Condition of Decreased Skin Barrier Function by Ultraviolet Irradiation

Hairless mice (Hos: HR-1, female, 4 weeks old) were habituated for a week, and then irradiated with ultraviolet rays (UV-B (GL20SE manufactured by SANKYO DENKI Co., Ltd.)) in the condition of 20 mJ/cm².

10 [0112]

(2-2) Evaluation Group Construction

An influence on the skin condition by the oral intake (oral administration) of sphingomyelin (purity: 98%, manufactured by Nagara Science Co., Ltd.) was evaluated using a dry skin model animal test system. At this time, 10 mice were in each group. The relationship between the animal experiment group construction (evaluation group construction) and the sphingomyelin content is shown below.

[0113]

20 Control group: group which takes normal feed

SM group: group to which a sphingomyelin (purity: 98%) is orally administered at 146 mg/kg/day

[0114]

(2-3) Method for Evaluation Test

25 The amount of moisture in the horny layer, the transepidermal water loss (TEWL), the amount of ceramides covalently bound to horny layer cells and the amount of ceramides in the horny layer in each experimental animal group were measured in the same manner as in the section (1-3) in Test 1, and from these, the skin barrier function was evaluated.

30

[0115]

(2-4) Evaluation Results

The results were as follows.

[0116]

35 (a) Amount of Moisture in Horny Layer

The results were as shown in Fig. 4.

On the 2nd and 3rd days of the test, the amount of moisture in the horny layer in the SM group was high compared to the amount of moisture in the horny layer in the Control group.

[0117]

5 (b) Transepidermal Water Loss (TEWL)

The results were as shown in Fig. 5.

Herein, on the 2nd and 3rd days of the test, TEWL in the SM group was low compared to TEWL in the Control group.

[0118]

10 (c) Amount of Ceramides Covalently Bound to Horny Layer Cells

The results were as shown in Fig. 6.

Here, changes in the amount of ceramide covalently bound to horny layer cells (d18:1-C34:1) were shown. As the amount of ceramides covalently bound to horny layer cells, the amount of ceramides covalently bound to horny layer cells in the Control group at the start of the test was considered as 100, and the amount of other ceramides covalently bound to horny layer cells were shown as a relative value. Herein, the amount of ceramides covalently bound to horny layer cells in the SM group was high compared to the amount of ceramides covalently bound to horny layer cells in the Control group.

[0119]

(d) Amount of Ceramides in Horny Layer

The results were as shown in Fig. 7.

It was found that the amount of ceramides in the horny layer was normal without a decrease even under ultraviolet irradiation, or rather increased, while the amount of ceramides covalently bound to horny layer cells had a tendency independent of that, and the amount decreased with the deterioration of the skin condition.

[0120]

It was suggested that the deterioration of the skin barrier function by ultraviolet rays was suppressed by the oral intake of sphingomyelin. It was further suggested that as a sphingomyelin was taken with a duration of 2 or more days, the deterioration of the skin barrier function was more easily suppressed.

35 [0121]

Test 3: Influence of Sphingolipid on Human with Dry Skin

The influence of intake of food containing phospholipid concentrate on women with subjective dry symptoms was examined.
[0122]

(3-1) Preparation of Test Food

5 Powdered skim milk, 8.8 parts, 5.3 parts of sugar, 1.7 parts of milk protein, 1.7 parts of collagen peptide, 0.2 parts of processed starch, 0.1 parts of thickening polysaccharide, 0.04 parts of phospholipid concentrate, 0.05 parts of flavor, 0.01 parts of acidulant, 0.01 parts of arginine, 0.0001 parts of sweetener, and 82.0 parts of
10 water were blended, and the obtained mixture was sterilized in the condition of 95°C for a minute. To this raw milk, a mixed starter of Lactobacillus bulgaricus and Streptococcus thermophilus was added as a yogurt starter at 0.15%, and the milk was fermented at 37°C to 45°C to produce a yogurt, which is test food.

15 In 75 g of this test food, 1000 mg of collagen (Nitta Gelatin Inc.), and phospholipid concentrate (PC700, Fonterra Co-operative Group Limited) (containing 10 mg of sphingomyelin) are contained.
[0123]

(3-2) Method for Evaluation Test

20 Thirty-two women with subjective dry symptoms (panelists) took the test food containing a sphingomyelin for 4 weeks at 75 g (10 mg as a sphingomyelin) per day.
[0124]

(3-3) Evaluation Index

25 Before and after intake, a total of 3 horny layers were collected from an identical site in the inner side of the forearm using PPS tape (PPS film adhesive tape, TERAOKA SEISAKUSHO CO., LTD.), and the amount of ceramides covalently bound to horny layer cells (d18:1-C28:0, d18:1-C30:0, d18:1-C30:1, d18:1-C32:0,
30 d18:1-C32:1, d18:1-C34:0, d18:1-C34:1, d18:1-C36:0, d18:1-C36:1 and the sum thereof) was evaluated.
[0125]

(3-4) Evaluation Results

The results were as described below.
35 [0126]

Amount of Ceramides Covalently Bound to Horny Layer Cells

The results were as shown in Fig. 8 and Fig. 9.

[0127]

- 5 The sum of the amount of ceramides covalently bound to horny layer cells after intake was high compared to that before intake. The amount of each ceramide covalently bound to horny layer cells after intake was also high compared to that before intake. It was thus shown that ceramides covalently bound to horny layer cells increased by continuously taking food containing a sphingomyelin.

CLAIMS

1. An agent for promoting production of ceramides covalently bound to horny layer cells, comprising a sphingolipid as an active ingredient.
2. The agent according to claim 1, wherein the sphingolipid is a sphingophospholipid derived from milk.
3. The agent according to claim 1 or 2, wherein the sphingophospholipid is a sphingomyelin.
4. The agent according to any one of claims 1 to 3, wherein the ceramides covalently bound to horny layer cells comprise one or more molecular species selected from the group consisting of omega hydroxy d18:1-C28:0, d18:1-C30:1, d18:1-C30:0, d18:1-C32:0, d18:1-C32:1, d18:1-C34:0, d18:1-C34:1, d18:1-C36:1, d17:1-C32:0, d17:1-C32:1, d17:1-C34:0, d17:1-C34:1 and d17:1-C36:1.
5. The agent according to any one of claims 1 to 4, which is for oral intake or enteral administration.
6. A composition for preventing, suppressing or improving the deterioration of the skin condition, which composition comprises the active ingredient according to any one of claims 1 to 5.
7. The composition according to claim 6, wherein the deterioration of the skin condition is a decrease in the skin barrier function.
8. The composition according to claim 7, wherein the decrease in the skin barrier function is caused by a decrease in the production of ceramides covalently bound to horny layer cells in the horny layer.
9. The composition according to claim 7 or 8, wherein the decrease in the skin barrier function is caused by ultraviolet

irradiation.

10. The composition according to any one of claims 6 to 9, which comprises a sphingolipid in the amount by which 0.5 to 1500 mg can be taken per day.

11. A food or beverage product, comprising the agent for promoting production of ceramides covalently bound to horny layer cells according to any one of claims 1 to 5.

12. A food or beverage product, comprising the composition for preventing, suppressing or improving the deterioration of the skin condition according to any one of claims 6 to 9.

13. The food or beverage product according to claim 11 or 12, comprising a sphingolipid in the amount by which 0.2 to 45000 mg can be taken per package.

14. The food or beverage product according to any one of claims 11 to 13, which is functional food, health and nutrition food, a supplement, food with function claims, food for specified health uses, or food with disease risk reduction claims.

15. A yogurt, comprising the agent for promoting production of ceramides covalently bound to horny layer cells according to any one of claims 1 to 5.

16. A yogurt, promoting the production of ceramides covalently bound to horny layer cells, which yogurt comprises an additional sphingolipid.

17. The yogurt according to claim 15 or 16, further comprising collagen.

18. The yogurt according to any one of claims 15 to 17, wherein a sphingophospholipid is a sphingomyelin.