

Statement of particulars

Title: FUNCTIONAL MATERIAL DERIVED FROM NATURAL SUBSTANCES AND
USE THEREOF

Technical Field

[0001]

The present invention relates to a functional material discovered based on the specificity of white *Auricularia polytricha* produced by mutation of *Auricularia polytricha* (*Auricularia polytricha* (Mont.) Sacc.), and the use thereof.

More specifically, in the selection of materials derived from natural products, the present invention places emphasis on so-called upcycling, possesses an anti-glycation action (hereinafter referred to as "AGEs production inhibitory action") focusing on the glycation reaction of in vivo proteins, and relates to its use in external preparations such as cosmetics considering skin affinity and food and beverage products considering nutritional aspects.

Background Technology

[0002]

Amidst the ancient human desire to "continue to maintain youthfulness forever," so-called anti-aging, or "anti-aging medicine," was born, and a medical system for overcoming the aging process and its causes has developed.

In recent years, the glycation reaction has attracted attention as one of the risk factors for aging. The glycation reaction means that sugars and proteins (amino acids) chemically react non-enzymatically, and the general term for the substances produced by this chemical reaction is generally referred to as AGEs (Advanced Glycation End Products).

[0003]

Protein glycation is said to occur even in healthy individuals; however, according to recent findings, it has been understood that the glycation is accelerated by ultraviolet rays and aging, and advanced glycation end products (hereinafter simply referred to as "AGEs") are produced and accumulated. Diseases associated with recent changes in lifestyle and dietary habits are also risk factors that cannot be overlooked. For example, individuals suffering from diabetes are at a particularly high risk and are prone to accumulating AGEs, which consequently accelerates various aging phenomena.

[0004]

Since AGEs are accompanied by the sclerotic degeneration of proteins, their progression causes a functional decline in living tissues, raising concerns about various health effects. Moreover, since proteins are present in body tissues such as the brain, organs, skin, scalp, hair, nails, and blood, the effects of the production and accumulation of AGEs naturally extend to the entire body.

Collagen, a type of protein, accounts for about 30% of body weight, of which 40% is present in the skin (including eyelid skin), and 10 to 20% in bones and cartilage. In addition, collagen is present in blood vessels, the scalp, and organs, and glycation reactions occur in each of these sites.

[0005]

Elastin, which is a vital protein in the living body akin to collagen, is a fibrous component that brings elasticity by binding the network-structured collagen together, playing a role in imparting elasticity to the skin.

Therefore, both collagen and elastin are directly affected by AGEs production. The specific effects of this AGEs production, particularly on the skin, blood vessels, and scalp, are as follows.

[0006]

That is, in the skin (including eyelid skin; hereinafter sometimes used synonymously), the glycation of proteins such as collagen proteins and elastin fibers occurs, inducing a biological reaction that destroys the structure of collagen fibers that maintain skin firmness. Enzymes that inhibit collagen synthesis (collagenases) are also activated. As a result, the skin loses its normal elasticity, discolours into a state lacking firmness and gloss, and waste products accumulate in the skin cells. Consequently, this causes so-called yellow dullness and darkening, leading to a loss of skin transparency.

Furthermore, rough skin during a diet is often influenced by a lack of nutritional balance, but if an unreasonable diet is continued, not only is the stratum corneum with barrier function damaged and loses moisture retention, but the decline in elasticity is also accelerated due to the effect of glycation.

In the eyelid region, so-called dark circles under the eyes become conspicuous, and the eyelashes lose elasticity, firmness, and gloss.

[0007]

AGEs in the blood have a high affinity and adhesiveness to vascular cells and easily accumulate on the vascular walls. When AGEs adhere to the vascular wall, active oxygen is generated, and by oxidizing NO (nitric oxide), blood flow deteriorates, which results in a factor causing lipid metabolism system diseases.

[0008]

Like the skin, the scalp also possesses a dermal layer. When AGEs cross-linking occurs in the dermal layer of the scalp, or when keratin (a type of protein), the main component of hair, is glycated and AGEs accumulate, hair loss, hair breakage, and graying increase. Additionally, scalp firmness is produced by elastin, hyaluronic acid, chondroitin sulfate, and the like present in the dermal layer.

[0009]

The influence on hair is also significant; when the glycation of collagen and elastin present in this dermal layer progresses, the dermal layer hardens, bringing adverse effects on secretory glands, hair follicles, blood vessels, and the like. As a result, the vitality to produce hair declines, further leading to an adverse effect on hair quality, such as a loss of hair firmness and gloss. Hair growth is governed by hair papillae at the hair roots, but upon receiving stimulation from the hair papillae, hair matrix cells divide and keratinize to become hair, elongating from the scalp. Here, when AGEs accumulate in the hair roots, the functions of the hair papillae and hair matrix cells are restricted, and as a result, the hair cannot grow sufficiently, causing hair loss and the like. Eyelashes can be considered as body hair growing at the edges of the eyelids, but similar to hair, protein degradation such as collagen and elastin occurs due to the effect of glycation in the eyelid skin, resulting in the loss of eyelash elasticity, firmness, and gloss, and a decrease in the regeneration cycle.

[0010]

In addition, melanocytes are adjacent to hair matrix cells, and when hair matrix cells divide, they take in melanin pigment from the melanocytes to become black or brown hair; however, if AGEs accumulate in the melanocytes, they cannot sufficiently supply melanin pigment, which also causes gray hair.

[0011]

In this way, from the perspective of caring for the scalp, hair, and eyelashes, anti-glycation (glycation countermeasures), that is, AGEs production suppression countermeasures, are attracting attention.

[0012]

Regarding collagen, when young, the secretion of collagen-synthesizing enzymes is active, so collagen is abundantly produced, and the normal condition of skin quality, blood vessels, and the scalp is maintained, but as aging advances, collagen-synthesizing enzymes decrease, and AGEs production progresses. When such a stage advances further, local care such as so-called UV countermeasures and moisturizing countermeasures is no longer sufficient, and systemic care including food and drink becomes essential. This applies similarly to elastin.

[0013]

There are prior arts developed from the viewpoint of active intake of collagen and promotion of synthesis. For example, Patent Document 1 discloses that by ingesting a large amount of collagen protein or a hydrolyzate thereof, the biosynthesis of biological collagen is promoted, and various diseases associated with a decline in the metabolism of biological collagen can be improved. Patent Document 2 discloses a skin revitalizer that exhibits an effect on improving skin turnover by using *Eucommia* or an extract thereof and ginseng or an extract thereof as essential components, and selectively blending them with deoxyribonucleic acid, chondroitin sulfate, collagen or a hydrolyzate thereof, and Coix seed extract. Patent Document 3 discloses that an oral hair restorative agent blended with *Laminaria japonica* rhizoid, *Hydrangea macrophylla*, ginseng, and collagen can promote the function of hair matrix cells and exhibit a hair growth effect. Patent Document 4 discloses a collagen synthesis promoter composition that revitalizes the metabolism of biological tissues by using a specific plant to enhance the collagen synthesis promoting ability in the living body.

However, although these focus on applied materials derived from natural products, none of them are radical countermeasures focusing on the glycation reaction like the present invention, and the obtained effects are also not sufficient.

[0014]

As examples of patent applications for AGEs production inhibitors, Patent Documents 5 to 7 can be cited, for example. Patent Documents 5 and 7 disclose pharmaceutical applications. In addition, Patent Document 6 discloses solving problems of skin quality improvement, such as wrinkles, spots, dullness, and sagging, mainly from the aspect of cosmetic aging, particularly dermatology.

However, none of these are applied to the skin or to hair growth agents related to the scalp and hair from the viewpoint of anti-glycation.

[0015]

On the other hand, focusing on food-related materials, with the transition of lifestyles, dietary habits have undergone various changes, and needs are also diversifying.

Here, as ingredients under the theme of anti-aging, with the historical background of increasing health consciousness, there are great expectations for functional ingredients including nutritional aspects while expecting various physiological activities, and mushrooms are attracting more attention than ever before.

In this regard, the applicant focused on the unique properties of white *Auricularia polytricha* produced by the mutation of *Auricularia polytricha* (*Auricularia polytricha* (Mont.) Sacc.), and made an invention as a multifunctional additive (Patent Document

8).

[0016]

Regarding *Auricularia polytricha*, there are cases where application development as a health ingredient containing vitamin D was performed (for example, Patent Document 9). However, unlike the present invention, it is not a nutritional ingredient focusing on the antiglycation effect, and it is insufficient as a material expected by consumers.

[0017]

As described above, considering the versatility for food and drink uses and skin application, providing a natural product-derived anti-aging material possessing an AGEs production inhibitory effect is highly significant.

Prior Art Documents

Patent Documents

[0018]

Patent Document 1: Japanese Patent Application Laid-Open No. 7-278012

Patent Document 2: Japanese Patent Application Laid-Open No. 9-67262

Patent Document 3: Japanese Patent Application Laid-Open No. 2013-116887

Patent Document 4: Japanese Patent Application Laid-Open No. 2005-255527

Patent Document 5: Japanese Patent Application Laid-Open No. 2009-96773

Patent Document 6: Japanese Patent Application Laid-Open No. 2013-139392

Patent Document 7: Japanese Patent Application Laid-Open No. 2014-37399

Patent Document 8: Japanese Patent Application Laid-Open No. 2020-124178

Patent Document 9: Japanese Patent Application Laid-Open No. 2022-121877

Summary of the Invention

Problems to be Solved by the Invention

[0019] The present invention has been made in view of the above unachieved problems, and an object thereof is to provide a functional material discovered based on the specificity of white *Auricularia polytricha* produced by mutation of *Auricularia polytricha* (*Auricularia polytricha* (Mont.) Sacc.) and uses thereof.

More specifically, an object is to place emphasis on so-called upcycling in the selection of materials derived from natural products, and to provide a material that possesses an antiglycation suppressing action (hereinafter referred to as "AGEs production suppressing action") focusing on glycation reactions of proteins within the body, and can contribute to uses in external preparations such as cosmetics considering skin affinity and food and beverage products considering nutrition.

Means for Solving the Problems

[0020]

As a result of continuous exploration of materials to solve the above problems, the present inventors have found that white *Auricularia polytricha* produced by mutation of *Auricularia polytricha* (*Auricularia polytricha* (Mont.) Sacc.) exhibits the desired effects, and completed the present invention.

That is, according to the present invention, the desired object is achieved by the following configurations (1) to (6).

(1) A functional material having an AGEs production inhibitory effect derived from the white *Auricularia polytricha* produced by mutation of *Auricularia polytricha* (*Auricularia polytricha* (Mont.) Sacc.).

(2) The functional material derived from white *Auricularia polytricha* according to (1), comprising vitamin D2 (ergocalciferol) obtained by irradiating the white *Auricularia polytricha* produced by mutation of *Auricularia polytricha* (*Auricularia polytricha* (Mont.) Sacc.) with ultraviolet B rays, and free amino acids that stably exist in the white *Auricularia polytricha* even after the irradiation with ultraviolet B rays.

(3) The functional material derived from white *Auricularia polytricha* according to (2), wherein the component species of the free amino acids comprise at least histidine, serine, arginine, glycine, aspartic acid, glutamic acid, threonine, alanine, γ -aminobutyric acid, proline, cysteine, lysine, tyrosine, methionine, valine, isoleucine, leucine, phenylalanine, and tryptophan.

(4) A food or beverage product comprising, as an active ingredient, the functional material according to (1) and/or (2).

(5) An external preparation comprising, as an active ingredient, the functional material according to (1) and/or (2).

(6) The functional material derived from white *Auricularia polytricha*, the food and beverage product, and the external preparation according to any one of (1) to (5), wherein a part used of the functional material derived from white *Auricularia polytricha* is a hard tip.

Effects of the Invention

[0021]

The present invention is a functional raw material derived from the white *Auricularia polytricha* produced by mutation of *Auricularia polytricha* (*Auricularia polytricha* (Mont.) Sacc.), and since the functional raw material also has an AGEs production

inhibitory effect, it has wide versatility, and is a raw material that can be applied as an additive in a form acceptable particularly for food and drink as an anti-aging measure or as an additive in an acceptable form for skin application.

In addition, the material of the present invention was completed in consideration of nutritional aspects, and in particular, vitamin D2 (ergocalciferol) is abundantly produced by irradiation with ultraviolet B waves, and the free amino acids stably existing in the white *Auricularia polytricha* are maintained and contained even after irradiation with ultraviolet B waves, so it contributes as a material suitable also for the anti-aging supplements described above.

Furthermore, a notable feature of the present invention is its unique properties in addition to the novel functionality inherent in the mutated white *Auricularia polytricha* itself. In particular, since it contains viscous components, it is useful as a material for food and drinks and external preparations such as cosmetics, and contributes to manufacturing utilizing known multifunctionality, for example, antioxidant effect, moisture retention, elasticity, swelling, and emulsifying functionality.

The above viscosity characteristics vary greatly depending on the part used, and the utilization of the hard tip part enables application to various new forms of food and drinks. At the same time, the hard tip part has conventionally been discarded as an unused part or composted, but it is a highly significant application as a so-called upcycled material that uses everything completely from the perspective of food loss.

Brief Description of the Drawings

[0022]

[Fig. 1] is a diagram showing a utilization process of the unused part of the present invention.

[Fig. 2] is a diagram showing the results of an AGEs production inhibition test.

[Fig. 3] is a diagram showing the basic mechanism of the AGEs production suppressing (inhibitory) action.

[Fig. 4] is a diagram comparing the change amount of vitamin D2 between white *Auricularia polytricha* and *Auricularia polytricha*.

[Fig. 5] is a diagram comparing the water absorption and water retention capacity of white *Auricularia polytricha* and *Auricularia polytricha*, and comparing the water retention capacity of white *Auricularia polytricha* and sodium hyaluronate.

[Fig. 6] is a diagram showing cases where two types of raw materials (dry raw material and raw material) are used in the manufacturing process of white *Auricularia polytricha* extract.

Modes for Carrying Out the Invention

[0023]

The present invention is a multifunctional raw material that expands its applicability while focusing on anti-aging using white *Auricularia polytricha* produced by mutation of *Auricularia polytricha* (*Auricularia polytricha* (Mont.) Sacc.).

The form of its utilization is not limited, and broadly includes the material itself, a pulverized product, an extract, etc., and from the viewpoint of upcycling, the part to be used includes not only the main body but also the utilization of all conventionally unused hard tip parts.

[0024]

As for the pretreatment steps up to manufacturing, first, the white *Auricularia polytricha* is washed with water after harvesting, and then dried at a maximum temperature of 70°C for 5 hours, and blanched for 4 minutes. The processing temperature and drying time up to blanching are arbitrary depending on the purpose of use.

When using only the hard tip, it is cut after the above water washing.

[0025]

When commercializing the powder, a commonly used pulverizer may be used, but in order to prevent browning after treatment, it is preferable to perform instantaneous pulverization under a nitrogen atmosphere or using a low-temperature dry pulverizer (for example, Centri Dry Mill manufacturing method manufactured by Micro Powtec Corp.). The size of the powder is variable depending on the purpose of use, and the method disclosed in Patent Document 8, which has already been invented by the applicant, can be adopted.

However, when using only the hard tip for jelly or side dishes, it is preferable to stop at a short-time treatment using, for example, a food processor, in order to purposely retain specific textures such as thickness, a crunchy feel on the tongue, and chewiness.

[0026]

When it is used as an extract for various purposes, it is preferable to extract it with hot water after pulverization from the viewpoint of viscosity adjustment and extraction efficiency, but the conditions are arbitrary.

[0027]

According to the present invention, an anti-glycation action (AGEs production inhibitory action) was found in white *Auricularia polytricha* produced by mutation of *Auricularia polytricha* (*Auricularia polytricha* (Mont.) Sacc.), and a highly significant functional

material as an anti-aging agent has been provided.

As already mentioned in the background art, the glycation reaction means that sugars and proteins (amino acids) chemically react non-enzymatically, and since this glycation reaction triggers various diseases in the body, suppressing it has great significance.

[0028]

Further, according to the present invention, it was found that by irradiating white *Auricularia polytricha* produced by mutation of *Auricularia polytricha* (*Auricularia polytricha* (Mont.) Sacc.) with ultraviolet B rays, vitamin D2 (ergocalciferol) and free amino acids stably existing in the white *Auricularia polytricha* even after the irradiation with ultraviolet B rays are abundantly contained without decomposition or the like.

Here, vitamin D2 is a product resulting from the conversion of ergosterol, which is provitamin D. Amino acids have many component species including essential amino acids, and specifically, free amino acids composed of at least histidine, serine, arginine, glycine, aspartic acid, glutamic acid, threonine, alanine, γ -aminobutyric acid, proline, cysteine, lysine, tyrosine, methionine, valine, isoleucine, leucine, phenylalanine, and tryptophan are abundantly contained.

[0029]

These findings are highly significant in the following two points.

(1) It is possible to expand the application as a nutritional material.

(2) A complementary role in suppressing AGEs can be expected.

The above (1) can be widely applied, for example, to nutritional supplements for nursing care. Since it contains viscosity-retaining components, it can be cooked and processed into an easily ingestible form such as a jelly or a fluid form, and applied to swallowing foods.

Furthermore, since the presence of valine, leucine, and isoleucine, which are blended in so-called BCAA supplements, is also observed in the material, application to supplements is expected.

Regarding the above (2), considering that AGEs are caused by binding to amino acids in the body, since amino acids can be supplemented while suppressing AGEs, the so-called dual effect of supplementing deficient amino acids while suppressing a quantitative decrease in amino acids can be expected, which is highly rational and significant in terms of the metabolic mechanism.

[0030]

That is, according to Claims 1 to 3 of the present invention, the following functional materials are provided.

(1) A functional material having an AGEs production inhibitory effect derived from the white *Auricularia polytricha* produced by mutation of *Auricularia polytricha* (*Auricularia polytricha* (Mont.) Sacc.).

(2) The functional material derived from white *Auricularia polytricha* according to (1), comprising vitamin D2 (ergocalciferol) obtained by irradiating the white *Auricularia polytricha* produced by mutation of *Auricularia polytricha* (*Auricularia polytricha* (Mont.) Sacc.) with ultraviolet B rays, and free amino acids that stably exist in the white *Auricularia polytricha* even after the irradiation with ultraviolet B rays.

(3) The functional material derived from white *Auricularia polytricha* according to (2), wherein the component species of the free amino acids comprise at least histidine, serine, arginine, glycine, aspartic acid, glutamic acid, threonine, alanine, γ -aminobutyric acid, proline, cysteine, lysine, tyrosine, methionine, valine, isoleucine, leucine, phenylalanine, and tryptophan.

[0031]

It is a matter of course that the provision of applied products based on the functionality found in the present invention is permitted, and the provision of applied products including the functionality disclosed in Patent Document 8 is also permitted.

As described above, the main body itself, pulverized products, and extracts can all be optionally used as properties of the material; however, in the case of an extract, since it is tasteless, odorless, colorless, and transparent, and an appropriate viscosity adjustment is possible, the same texture can be obtained by using it as an alternative to egg white when wheat flour is replaced with rice flour, making it effective as a material for anti-allergic foods. Alternatively, as a substitute for eggs, it is a material that can be applied as a material for so-called plant-based foods.

[0032]

The pulverized product has an expansion function, a function of maintaining it, and an emulsifying function, and has an elasticity-imparting effect, so that when applied to foods, for example, a processed food having a mochi-like texture can be provided. When added to mochi products or processed foods using rice flour, excellent products with no chronological changes in hardness or softness can be provided.

In other words, as described above, when it is added and blended as a food material, in addition to improving the texture of existing processed foods, etc., effects of maintaining their quality and improving their shelf life can be obtained.

In addition, white *Auricularia polytricha* is known to contain abundant dietary fiber. Therefore, moisture is maintained by the water retention capacity of the dietary fiber, and the softness of mochi, bread dough, etc. is preserved. The extract of the present

application is excellent in permeability and affinity to food materials, and is therefore effective, for example, in improving the meat quality of sinewy and tough meat.

Furthermore, very interestingly, while being added as a food material, it can also be provided for use as a quality retention agent.

That is, by packaging the powder of the present invention in a moisture-absorbing packaging material to form a small bag and enclosing the small bag with a processed food, excess moisture can be absorbed, and an anti-mold effect can be exhibited.

[0033]

The application to foods is not particularly limited, but specific examples include dietary supplements such as drinks and supplements, foods for specified health uses, foods with function claims, health foods, and the like, as well as various general processed foods such as soft drinks, soups, chiffon cakes, roll cakes, pizzas, pound cakes, dorayaki, manju, meat buns, gyoza, shumai, noodles, donuts, pull-apart bread, macarons, cookies, puddings, jellies, bavarois, candies, gummies, gum, ice cream, and gelato.

In these examples, it is useful to add thickness to fluid foods such as soft drinks and soups, and it is useful to adjust the texture when swallowed for those having thixotropy such as puddings, jellies, and bavarois. For solid or semi-solid type foods such as candies, gummies, gum, ice cream, and gelato, it is useful for adjusting tactile sensations such as tongue feel.

For chiffon cakes, roll cakes, pizzas, pound cakes, dorayaki, manju, meat buns, gyoza, shumai, noodles, donuts, pull-apart bread, etc., in addition to imparting elasticity to the dough and adjusting the tactile sensation and texture, when these foods contain fillings or ingredients, it is also useful for adjusting the tactile sensation and texture of the contents. Other uses include processed products obtained by directly blending into fresh fish products such as meat, hamburgers, and kamaboko, and smoked white Auricularia polytricha itself is also included in the scope of the present invention.

Among these, from the point that the characteristics of the material provided in the present invention are fully exhibited, processed products using cereals, fish meat, meat, etc., and processed products using powders such as wheat and rice are cited as being particularly preferable.

[0034]

Described in terms of its form, the functional raw material of the present invention can be configured, in market transactions and logistics, as a form acceptable for food and beverage use, such as an active ingredient or a premix raw material for formulation into capsules, tablets, granules, powders, syrups, liquids, and jellies.

Regarding excipients at that time, a wide range of any liquid and solid raw materials

acceptable for internal use can be used, but considering the effect of anti-glycation, attention must be paid to the selection of sweeteners. That is, it is preferable to select one that is less likely to be glycated, and for example, it is preferable to use sugar alcohols such as sorbitol, maltitol, erythritol, lactitol, xylitol, trehalose, and stevia, Luo Han Guo extract, and the synthetic sweetener aspartame.

That is, according to claim 4 of the present invention, there is provided a food and beverage product comprising the functional material specified in claim 1 and/or the functional material according to claim 2 formulated as an active ingredient.

[0035]

As oral supplements for food and drink, etc., known nutritional tonics and blood circulation promoters may be appropriately used in combination within a range that does not impair the effects of the present invention.

[0036]

For example, examples of nutritional tonics include softshell turtle extract, mamushi extract, oriental bezoar tincture, velvet antler fluid extract, Eleutherococcus senticosus extract, Eucommia extract, and Polygonum multiflorum extract.

[0037]

Examples of blood circulation promoters include glucosyl hesperidin, citrulline, vitamin E nicotinate, nicotinic acid, nicotinamide, benzyl nicotinate, ginger tincture, capsicum tincture, and rosmarinic acid.

[0038]

When applied to preparations such as cosmetics, by the emulsifying function characteristics and the swelling function (base molding property) and its maintaining function, a formulation design using a raw material composition with low skin irritation can be achieved, and it is possible to provide a preparation applicable even to a person with delicate skin quality.

In addition, since it has an AGEs inhibitory action, it is useful for preventing skin aging.

[0039]

The functional raw material of the present invention can be configured as an active ingredient in forms acceptable for topical or systemic skin application, such as creams, ointments, emulsions, liniments, pastes, lotions, milky lotions, essences, gels, powder/liquid/solid type bath preparations, cleaning agents, shampoos, rinses, conditioners, and tonics.

As described above, since the white *Auricularia polytricha* of the present invention has an excellent emulsifying action, basic performance can be ensured without using a surfactant in an emulsified type base, and a formulation that can be widely used by

customers with skin types sensitive to skin irritation can be provided. In addition, the powder itself is white and does not impair the desired appearance.

In addition, in a transparent formulation, when formed into an aqueous solution, it can be blended as a colorless and transparent extract having a high moisturizing effect, and the appearance is not impaired in terms of formulation design.

Furthermore, an arbitrary concentration adjustment can impart a high viscosity, and for example, the use of thickeners and other additives can be reduced.

[0040]

The external preparation of the present invention includes forms acceptable as categories of pharmaceuticals, quasi-drugs, and cosmetics, and the dosage form is not particularly limited as long as it is within a range that does not impair the purpose of the present invention.

[0041]

Regarding a blending base (excipient) during formulation design, a wide range of any liquid and solid raw materials acceptable for skin application can be used.

Among bases, in the case of an emulsion type, since the material itself according to the present invention possesses excellent emulsification characteristics, there is no need to use a surfactant, making it a very convenient material in terms of low-irritation formulation design. Even when the use of a surfactant is unavoidable, the total amount used can be reduced.

Furthermore, as already mentioned, the extract derived from the material according to the present invention has a specific viscosity, and since it exhibits gelling ability as a synergistic effect through combined use with a thickener, a formulation retaining elasticity can be designed. The strength of the elasticity can be arbitrarily adjusted depending on the type and blending amount of the thickener.

Suitable examples of the thickener include gum arabic, carrageenan, karaya gum, tragacanth gum, carob gum, quince seed (marmelo), casein, dextrin, gelatin, sodium pectate, sodium alginate, methylcellulose, ethylcellulose, CMC, hydroxyethylcellulose, hydroxypropylcellulose, PVA, PVM, PVP, sodium polyacrylate, carboxyvinyl polymer, locust bean gum, guar gum, tamarind gum, dialkyldimethylammonium cellulose sulfate, xanthan gum, AlMg silicate, bentonite, and hectorite.

At that time, various general-purpose additives such as a functional component, a moisturizer, and an antioxidant can be arbitrarily added as needed within a range that does not impair the object of the present invention.

That is, according to claim 5 of the present invention, there is provided an external preparation characterized by formulating the functional material specified in claim 1

and/or the functional material according to claim 2 as an active ingredient.

[0042]

Examples of moisturizers include polyhydric alcohols such as urea, glycerin, propylene glycol, 1,3-butylene glycol, sorbitol, mannitol, polyethylene glycol, and dipropylene glycol, ceramides, heparinoid-like substances, sodium hyaluronate, sodium PCA, collagen, collagen peptide, elastin, chondroitin sulfate, glucosamine, fucoidan, trimethylglycine, betaine, and seaweed extract (algae colloid). The combined use of these moisturizers is a useful choice for a formulation design particularly intended to improve rough skin that may occur during a diet.

The above collagen is not particularly limited, but considering absorbability, collagen peptides, particularly oligopeptides (number of peptides: less than 10) composed of "proline-hydroxyproline" and/or "hydroxyproline-glycine", and atelocollagens are preferred.

Hyaluronic acid is a high-molecular polysaccharide in which N-acetylglucosamine and glucuronic acid are linked by a beta-1,4 bond, and a low-molecular product (average molecular weight of around 100,000) obtained by decomposing hyaluronic acid with an enzyme such as hyaluronidase is suitably used.

Elastin is an elastic fiber that has the role of supporting collagen fibers isolated from mammals such as pigs and cows, and fishes such as tuna and salmon. Considering absorption in the body, it is preferable to use those having an average molecular weight of around 100,000 hydrolyzed enzymatically with a proteolytic enzyme such as elastase, pepsin, or pronase, or hydrolyzed with an acid. Furthermore, from the viewpoint of ease of solubilization, those having an average molecular weight of around 20,000 are preferred.

Chondroitin sulfate is a simple substance such as chondroitin 6-sulfate and chondroitin 4-sulfate, or a mixture thereof. The molecular weight is not particularly limited, but considering absorption in the body, an average molecular weight of 50,000 is preferable. In the present invention, a salt of chondroitin sulfate can also be used, and the type of salt is not particularly limited, but a sodium salt or a potassium salt is preferable.

[0043]

Examples of preservatives include benzoates, sorbates, dehydroacetates, parahydroxybenzoic acid esters, benzalkonium chloride, hinokitiol, resorcin, ethanol, and phenoxyethanol, but it is preferable to constitute them with naturally derived substances.

[0044]

Examples of antioxidants include dibutylhydroxytoluene, butylhydroxyanisole, propyl

gallate, and ascorbic acid, but like the preservatives, they should preferably be constituted with naturally derived substances.

[0045]

In addition to the active ingredients of the present invention, other functional components commonly used for external preparations can be optionally blended within a range that does not impair the effects and purposes of the present invention. Specifically, for example, lysozyme chloride, glycyrrhizic acid or a salt thereof, anti-inflammatory agents such as allantoin, immunostimulators such as beta-glucan, male hormones (methyltestosterone), peripheral vasodilators such as glucosyl hesperidin, citrulline, vitamin E nicotinate, nicotinic acid, nicotinamide, benzyl nicotinate, ginger tincture, swertia herb extract, and capsicum tincture, antibacterial agents such as hinokitiol, benzalkonium chloride, and undecylenic acid, placenta extract, liver extract, oyster extract, althea extract, ononis extract, *Artemisia capillaris* extract, *Aloe arborescens* extract, red ginseng extract, deer horn reishi extract, basho (banana peel) extract, *Geranium thunbergii* extract, *Petasites japonicus* root extract, *Lilium japonicum* extract, yarrow extract, pumpkin (dried seed) extract, sage extract, celery extract, soybean extract, wild thyme extract, citrus unshiu peel extract, *Isodon japonicus* extract, coltsfoot extract, moutan cortex extract, *Laminaria japonica* extract, melissa extract, yuzu extract, resveratrol, various animal/plant/microorganism-derived extracts such as lactic acid bacteria culture extracts, and extracts obtained by fermenting vegetables, fruits, and wild plants (hereinafter, wild plant fermented extracts) can be mentioned. As raw materials for the wild plant fermented extract, for example, mugwort, *Houttuynia cordata*, *Aloe arborescens*, turmeric, ginseng, wolfberry fruit, adlay, St. John's wort, *Sasa veitchii*, Reishi mushroom, dandelion root, *Glechoma hederacea*, peach leaf, *Ginkgo biloba* leaf, *Cassia tora* seed, *Lonicera japonica*, fig leaf, *Cassia obtusifolia*, safflower, *Eleutherococcus senticosus*, *Gynostemma pentaphyllum*, Luo Han Guo, *Eucommia* leaf, *Isodon japonicus*, loquat leaf, Moroheiya, wolfberry leaf, *Sambucus sieboldiana*, *Mallotus japonicus*, plantain, Tulsi, licorice, pine needle, heavenly bamboo leaf, horsetail, *Polygonatum odoratum*, *Commelina communis*, *Acer maximowiczianum*, *Tetragonia tetragonoides*, yam, persimmon leaf, chamomile, Chinese quince, perilla leaf, mandarin orange peel, ginger, mulberry leaf, *Andrographis paniculata*, kumquat, onion peel, *Panax notoginseng*, *Platycodon* root, jujube, *Salacia*, red pepper, yew fruit, red ginseng, rooibos, amla fruit, *Centella asiatica*, *Mucuna pruriens*, Muira Puama, *Cissampelos pareira*, cat's claw, kelp, Funori, mandarin orange, apple, pineapple, grape, fig, ume plum, melon, grapefruit, lemon, apricot, carrot, onion, parsley, burdock, garlic, Japanese scallion, cabbage, shiitake mushroom, and the like can be appropriately selected and used

according to the intended use.

[0046]

Further, examples of other AGEs production inhibitors include known plant extracts such as flax, *Polygonatum odoratum*, olive, *Asarum*, *Tilia*, *Filipendula multijuga*, *Swertia japonica*, elderberry, rose, sunflower, *Swertia pseudochinensis*, *Saxifraga stolonifera*, and *Sanguisorba officinalis*.

[0047]

In the present invention, in order to fully use the material, the conventionally unused hard tip portion is actively utilized. This is an upcycling intended for so-called food loss. Upcycling often refers to increasing the value of the product itself by providing new value to waste products or unneeded items that have not been actively used, but the present invention has found value creation in the hard tip part that had not been actively utilized. That is, according to claim 6, a functional material derived from white *Auricularia polytricha*, a food and beverage product, and an external preparation, wherein the used part of the functional material derived from white *Auricularia polytricha* is a hard tip, are provided.

[0048]

Here, there are many advantages when using the hard tip part as a functional material. As an example of the utilization process is shown in Fig. 1, after washing and pulverization, extraction is performed with hot water, and the extract is divided into an extract and a residue, which are used depending on the desired purpose. The extract is rich in useful components and may be used as it is in a beauty essence or a bath additive. If it is formed into a special sheet material by freeze-drying in order to improve storage stability, it is also optional to use it by preparing it at the time of use. Since the extraction residue portion has a unique texture, it can also be utilized as a jelly for desserts. Both the extract and the residue can be provided in advance as a functional material richly containing vitamin D2 and amino acids by ultraviolet irradiation (UVB irradiation), making it convenient to provide as a nutritional supplement.

[0049]

That is, according to the present invention, the desired objective is achieved by the following configurations (1) to (6).

(1) A functional material having an AGEs production inhibitory effect derived from the white *Auricularia polytricha* produced by mutation of *Auricularia polytricha* (*Auricularia polytricha* (Mont.) Sacc.).

(2) The functional material derived from white *Auricularia polytricha* according to (1),

comprising vitamin D2 (ergocalciferol) obtained by irradiating the white *Auricularia polytricha* produced by mutation of *Auricularia polytricha* (*Auricularia polytricha* (Mont.) Sacc.) with ultraviolet B rays, and free amino acids that stably exist in the white *Auricularia polytricha* even after the irradiation with ultraviolet B rays.

(3) The functional material derived from white *Auricularia polytricha* according to (2), wherein the component species of the free amino acids comprise at least histidine, serine, arginine, glycine, aspartic acid, glutamic acid, threonine, alanine, γ -aminobutyric acid, proline, cysteine, lysine, tyrosine, methionine, valine, isoleucine, leucine, phenylalanine, and tryptophan.

(4) A food or beverage product comprising, as an active ingredient, the functional material according to (1) and/or (2).

(5) An external preparation comprising, as an active ingredient, the functional material according to (1) and/or (2).

(6) The functional material derived from white *Auricularia polytricha*, the food and beverage product, and the external preparation according to any one of (1) to (5), wherein a part used of the functional material derived from white *Auricularia polytricha* is a hard tip.

Examples

[0050]

Hereinafter, the functionality of the present invention will be specifically described by way of examples, but the scope of the present invention is not limited to these examples.

[0051]

<Test Example 1> AGEs Production Inhibitory Action Test

(Test Method)

(1) Reagents, Consumables, and Measuring Instruments

- Collagen anti-glycation assay kit (glucose/fructose) (Cosmo Bio Co., Ltd.)
- 96 well plate, F-Bottom MicroCLEAR, BLACK, TC, Greiner (Green Bio Research)
- Microplate reader, SH-9000Lab for downward fluorescence measurement (Corona Electric Co., Ltd.)

(2) Test Sample and Experimental Procedure

A heat-treated powder was used as the sample. The powder was prepared to 0.005, 0.05, 0.5, and 5 mg/mL, and subjected to evaluation as sample solutions. The experimental procedure was according to the following.

50 microL of a neutralized collagen solution was dropped into a 96 well plate and incubated overnight at 37°C. Thereafter, 10 microL of an aminoguanidine solution and

a sample solution were dropped, and 50 microL of a buffer solution and a fructose solution were dropped.

After stirring, the fluorescence intensity measured at an excitation wavelength of 370 nm and a fluorescence wavelength of 440 nm was defined as I₀, and measurement was performed three times every week. The glycated collagen production rate was calculated from the obtained absorbance. The formula is as follows. Glycated collagen production rate (%) =

(F_{ss} - F_{bs})

(F_s - F_b)

× 100

F_{ss}: Sample Abs of Fructose line

F_{bs}: Sample Abs of Buffer line

F_s: Control Abs of Fructose line

F_b: Control Abs of Buffer line

[0052]

(Results and Discussion)

The results of the glycated collagen production rate after 3 weeks are shown in Fig. 2.

This is the proportion at the sample concentration when the blank is taken as 100%. The glycated collagen production rate of white *Auricularia polytricha* showed a decreasing trend with an increase in concentration, and the inhibition rate was superior to that of *Auricularia polytricha* at any concentration. At 5 mg/mL, the glycated collagen production rate was 10%, showing the same value as the positive control aminoguanidine (AG).

On the other hand, *Auricularia polytricha* showed a glycated collagen production rate of 59% at 5 mg/mL. From these results, it was suggested that white *Auricularia polytricha* contains more substances that suppress the glycation of collagen.

[0053]

Fig. 3 shows the mechanism of the anti-glycation action. By preventing glycation through inhibiting the reaction intermediate 3-deoxyglucosone from reacting with a compound having an amino group to produce AGEs, the AGEs production suppressing action can be exhibited.

Here, as will be described later, white *Auricularia polytricha* has been found to be rich in essential amino acids, and according to the aforementioned mechanism of the anti-glycation action, it is suggested that the inhibitory ability of white *Auricularia polytricha* involves each amino acid having an amino group contained in the components. By

optimally applying the material of the present invention in an external and/or oral form, the desired effects aimed at by the present invention can be expected.

[0054]

<Test Example 2> Measurement of Vitamin D2 Content

(Test Method)

The heat-treated white *Auricularia polytricha* of the present invention was irradiated while changing the energy amount of ultraviolet B (285 nm) (including substantive enhancement), and its transition was confirmed.

[0055]

(Results and Discussion)

The results are shown in Table 1. Conditions were set so that the amount of energy irradiation by ultraviolet B (285 nm) was enhanced according to Settings 1 to 5. Before irradiation, vitamin D2 (ergocalciferol) did not exist, and only the presence of ergosterol, which is a precursor of vitamin D2, was observed, but by increasing the irradiation intensity, ergosterol decreased, and vitamin D2 was detected depending on the irradiation intensity.

[Table 1]

Changes in white *Auricularia polytricha* Following
Ultraviolet B (285 nm) Irradiation

No.	Vitamin D	Ergosterol	備考
	($\mu\text{g}/100\text{g}$)	($\text{mg}/100\text{g}$)	
Setting 1	562	95.3	Light output 15W
Setting 2	1,016	93.4	Reference Settings
Setting 3	1,244	101.0	Irradiation time +10 minutes
Setting 4	2,876	79.3	Distance -20 cm, Input amount 1/2
Setting 5	4,553	73.4	New Drum (Irradiation time +50 minutes, Distance -20 cm, Input amount 1/2)

[0056]

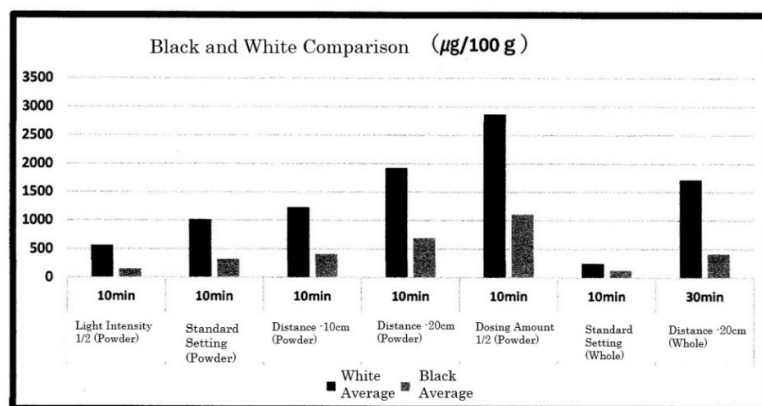
Under the same conditions, using heat-treated *Auricularia polytricha*, the content of vitamin D2 (ergocalciferol) contained in the sample was measured. As a result, *Auricularia polytricha* also showed the same tendency, but a comparison of the absolute amounts revealed that it was less than white *Auricularia polytricha*, thereby demonstrating the superiority of the material of the present invention (Table 2 and Fig. 4).

[Table 2]

Comparison of VD2 Concentration Enhancement Test
Results for 白美茸® and Auricularia polytricha

(μg/100g)

No.	Setting	Irradiation Time	White Average	Black Average	Black ratio	Notes
1	Light Intensity 1/2 (Powder)	10min	565	150	376.7%	Settings No.1 through 5 were adjusted to effectively increase the UVB irradiation energy by varying the conditions.
2	Standard Setting (Powder)	10min	1,015	330	307.6%	
3	Distance -10cm (Powder)	10min	1,230	415	296.4%	
4	Distance -20cm (Powder)	10min	1,930	695	277.7%	
5	Dosing Amount 1/2 (Powder)	10min	2,875	1,105	260.2%	
6	Standard Setting (Whole)	10min	250	130	192.3%	Ibid.
7	Distance -20cm (Whole)	30min	1,720	420	409.5%	



[0057]

<Test Example 3> Measurement of Free Amino Acids

(Test Method)

As shown below, using the heat-treated white Auricularia polytricha of the present invention and, as a comparative example, heat-treated Auricularia polytricha, the types of free amino acids contained in each sample and their contents were measured, and the two were compared.

[0058]

(Results and Discussion)

The results are shown in Table 3. The amount of free amino acids was stably maintained even after ultraviolet irradiation. Moreover, the total amount is more abundantly contained in white Auricularia polytricha than in Auricularia polytricha.

[Table 3]

Unit : $\mu\text{g}/100\text{ g}$

	Black (Auricularia polytricha Powder)				White (White Auricularia polytricha Powder)					
	Standard Setting (№6)	Light Intensity 1/2 (№7)	Distance -20cm (№10)	Unirradiated (№29)	Standard Setting (№21)	Irradiation time +10 Input amount 1/2 (№23)	Irradiation time +10 Distance -20 Input amount 1/2 (№25)	Irradiation time +20 Input amount 1/2 (№27)	Irradiation time +50 Input amount 1/2 (№28)	Reference (Not irradiated) (№30)
	Average	Average	Average	Average	Average	Average	Average	Average	Average	Average
Free Amino Acids										
Hydroxyproline	0.7	0.7	0.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Histidine	4.1	4.0	4.1	3.6	1.9	2.2	2.2	2.2	2.4	0.7
Taurine	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.5	0.6	0.0
Serine	34.1	34.5	34.1	34.9	52.2	52.9	54.2	56.1	52.7	23.5
Arginine	45.5	44.6	45.0	58.5	44.1	42.2	44.5	64.3	63.8	6.8
Glycine	5.8	6.0	6.0	6.4	115.0	117.3	118.2	126.2	129.6	2.5
Aspartic acid	27.0	26.2	27.5	28.3	8.8	9.3	8.5	8.9	9.0	20.1
Glutamic acid	48.1	47.5	48.9	63.5	25.8	24.9	24.4	16.0	14.8	17.4
Threonine	7.8	8.3	8.1	8.4	7.8	7.8	8.3	8.3	7.7	1.6
Alanine	39.5	38.8	39.1	40.8	28.6	29.0	30.1	30.8	28.7	5.5
Gamma-aminobutyric acid	73.3	70.2	73.1	78.1	58.8	62.2	62.4	66.5	62.4	6.2
Proline	4.7	4.7	4.7	4.4	3.8	3.8	3.9	4.2	4.2	1.5
Cysteine	0.4	0.0	0.0	0.7	0.0	0.0	0.0	0.0	0.4	0.0
Lysine	13.3	13.0	13.2	13.5	9.2	9.5	9.0	9.2	8.3	5.4
Tyrosine	0.0	0.0	0.0	2.6	0.0	0.0	0.0	2.1	1.2	0.0
Methionine	1.5	1.5	1.8	2.2	2.5	0.9	1.0	1.6	2.1	2.9
Valine	10.1	9.7	9.3	10.7	8.2	8.3	8.1	9.3	8.8	2.6
Isoleucine	4.5	4.5	4.7	4.6	3.3	3.4	3.5	3.8	3.5	1.4
Leucine	11.3	11.0	11.6	10.1	7.6	7.8	8.0	7.9	7.9	4.1
Phenylalanine	6.9	7.1	7.2	5.7	7.4	7.8	8.0	8.4	9.3	2.0
Tryptophan	4.7	4.5	4.6	4.8	6.0	5.8	6.1	6.5	7.9	0.7
Total	343.3	336.8	343.6	381.6	391.0	395.0	400.5	432.8	425.1	104.8
Reference Value										
Vitamin D ($\mu\text{g}/100\text{ g}$)	330	155	1,105	0	505	1,025	1,905	3,005	4,555	0

[0059]

<Test Example 4> Water Absorption and Water Retention Ability Test

(1) Comparison with Auricularia polytricha 10 g of a dried product of white Auricularia polytricha (Hakubitate; registered trademark) was put into boiling water, the heat was turned off, and the progress of water absorption and water retention ability after being left standing was observed.

As a result, it swelled by absorbing water to about 600 g after 17 hours, and when the amount of water retained after being left standing was measured, it was confirmed that it retained about 45% even after 6 days (144 hours), which was remarkably superior to Auricularia polytricha. The results are shown in Table 4 and Fig. 5 (upper).

[Table 4]

		dry weight	17h water absorption	24 hours have passed	48 hours have passed	96 hours have passed	120 hours have passed	144 hours have passed
白美茸®	Weight (g)	10.0	595.0	520.0	453.5	351.0	316.0	268.0
	Evaporated Water Content (g)	—	0	75.0	141.5	244.0	279.0	327.0
	Water Retention Rate (g)	1.7%	100%	87.39%	76.22%	59.99%	53.11%	45.04%
Auricularia polytricha	Weight (g)	10.0	202.0	151.0	109.0	54.0	38.5	22.0
	Evaporated Water Content (g)	—	0	51.0	93.0	148.0	163.5	180.0
	Water Retention Rate (g)	5.0%	100%	74.63%	53.96%	26.73%	19.06%	10.89%

[0060]

(2) Comparison with Sodium Hyaluronate

Each freeze-dried sample was dispersed in water to 0.2%, 1 mL of which was impregnated into a glass fiber filter paper (ADVANTEC GS-25, ϕ 47 mm) (n=4), and from the residual moisture amount when left standing for 8 hours at a temperature of 25°C/relative humidity of 55%, the water retention ability was calculated by the following formula.

[Water retention ability = weight of residual moisture after 8 hours / sample weight]
[0061]

By the above procedure, upon comparison with sodium hyaluronate, it was confirmed that the water retention ability of white *Auricularia polytricha* is equivalent to that of sodium hyaluronate. For the hard tip part, which was conventionally an unused part, similar excellent water retention performance results were obtained. These evaluation results are shown in Fig. 5 (lower).

The respective water retention capabilities are as follows.

- 1 Powder: 112.6
- 2 Hot water extract: 201.1
- 3 Pressurized hot water extract: 222.3
- 4 Hot water extract of inedible part: 216.5
- 5 Sodium hyaluronate: 221.0

[0062]

As shown in Fig. 6, regarding the extract of the present invention, at the time of feeding raw materials, there are cases where dry raw materials are used and cases where raw materials are used, but the conditions are the same even when the entire material is used as it is without discarding the hard tip.

In addition, regarding the manufacturing process (application example) when using the conventionally unused hard tip, various applications are possible as shown in Fig. 1, but for example, an example of using the extraction residue as a dessert jelly is a new application that has never existed before.

<Formulation Example 1> Skin Lotion

Raw material name (% by weight)

- 1. White *Auricularia polytricha* powder: 2.00
- 2. Ascorbyl glucoside: 2.00
- 3. Kojic acid: 1.00
- 4. Cucumber extract: 2.00
- 5. Thyme extract: 0.50
- 6. 5% Elastin hydrolyzate solution: 1.00
- 7. Purified water: Appropriate amount

[0063]

<Formulation Example 2> Essence

Raw material name (% by weight)

1. Allantoin: 0.50
2. Placenta extract: 0.50
3. White Auricularia polytricha powder: 5.00
4. Purified water: Appropriate amount

[0064]

<Formulation Example 3> Cream

Raw material name (% by weight)

1. Retinol: 1.00
2. Sodium hyaluronate aqueous solution: 2.00
3. Polyethylene glycol 400: 3.00
4. White Auricularia polytricha powder: 5.00
5. Stearic acid: 5.00
6. Avocado oil: 1.00
7. Almond oil: 10.00
8. Sodium dl-pyrrolidone carboxylate solution: 5.00
9. Purified water: Appropriate amount

[0065]

<Formulation Example 4> Cream Pack

Raw material name (% by weight)

1. Retinol: 2.00
2. Arbutin: 1.00
3. Sodium polyacrylate: 5.00
4. White Auricularia polytricha extract (5% aqueous solution): 5.00
5. Myristic acid: 6.00
6. Grape seed oil: 1.00
7. Jojoba oil: 3.00
8. Olive oil: 2.00
9. Purified water: Appropriate amount

[0066]

<Formulation Example 5> Milky Lotion

Raw material name (% by weight)

1. Retinoic acid: 4.00
2. White Auricularia polytricha powder: 3.00

3. Almond oil: 4.00
 4. Olive oil: 15.00
 5. Xanthan gum: 0.50
 6. Purified water: Appropriate amount
- [0067]

<Formulation Example 6> Hair Essence

Raw material name (% by weight)

1. Minoxidil: 3.00
 2. Ethanol: 7.00
 3. 1,3-Butylene glycol: 5.00
 4. White Auricularia polytricha extract (2% aqueous solution): 20.00
 5. Purified water: Appropriate amount
- [0068]

<Formulation Example 7> Body Soap

Raw material name (% by weight)

1. Potassium myristate: 4.50
 2. White Auricularia polytricha extract (4% aqueous solution): 25.00
 3. Egg yolk lecithin: 3.00
 5. Glycol distearate: 2.00
 6. Dipropylene glycol: 2.00
 7. Glycerin: 1.00
 8. Purified water: Appropriate amount
- [0069]

<Formulation Example 8> Soap (Elastic Type)

Raw material name (% by weight)

1. Glycerin: 25.00
 2. Potassium cocoyl glycinate: 8.00
 3. Tamarind gum: 2.00
 4. Pentylene glycol: 5.00
 5. White Auricularia polytricha extract (0.5% aqueous solution): 5.00
 6. Mozuku-derived fucoidan extract: 1.50
 7. Sodium hyaluronate: 2.50
 8. Hydrolyzed collagen: 3.00
 9. Purified water: Appropriate amount
- [0070]

<Formulation Example 9> Jelly Beverage

Raw material name (% by weight)

1. Maltodextrin: 4.50
2. High fructose corn syrup: 1.00
3. Citric acid: 0.10
5. Gelling agent (thickening polysaccharide): 2.00
6. White Auricularia polytricha extract (5% aqueous solution): 10.00
(Including 20% extraction residue derived from the hard tip)
7. Niacin: 0.01
8. Purified water: Appropriate amount

[0071]

<Formulation Example 10> Gyuhi (Turkish delight-like sweet)

Raw material name (% by weight)

1. Glutinous rice starch: 22.00
2. White Auricularia polytricha powder: 1.00
3. Sugar: 34.00
4. Maltose: 10.00
5. Psyllium: 0.20
6. Purified water: Appropriate amount

[0072]

<Formulation Example 11> Drink

Raw material name (% by weight)

1. Ascorbyl maltoside: 0.50
2. White Auricularia polytricha extract (4% aqueous solution): 6.00
3. High fructose corn syrup: 2.00
4. Honey: 0.50
5. Ascorbic acid: 0.30
6. Vitamin B6: 0.005
7. Vitamin B12: 0.001
8. Isoleucine: 0.005
9. Phenylalanine: 0.005
10. Guarana extract: 0.05
11. Flavor: 0.10
12. Purified water: Appropriate amount

[0073]

<Formulation Example 12> Pizza Dough

Raw material name (% by weight)

1. Rice flour: 40.00
2. White Auricularia polytricha powder: 2.00
3. Millet sugar: 5.00
4. Potato starch: 6.50
5. Dry yeast: 1.00
6. Purified water: 40.00
7. Olive oil: 5.00
8. Salt: 0.50

[0074]

<Formulation Example 13> Protein-containing Food

Raw material name (% by weight)

1. Pea protein: 40.00
2. White Auricularia polytricha powder: 25.00
3. Brown sugar: 4.00
4. Valine: 0.50
5. Leucine: 1.00
6. Arginine: 2.00
7. Tryptophan: 0.50
8. Whey: 3.00
9. Maltodextrin: 24.00

Claims

[Claim 1] A functional material derived from white *Auricularia polytricha* produced by mutation of *Auricularia polytricha* (*Auricularia polytricha* (Mont.) Sacc.), the functional material having an AGEs production inhibitory effect.

[Claim 2] The functional material derived from white *Auricularia polytricha* according to Claim 1, comprising vitamin D2 (ergocalciferol) obtained by irradiating the white *Auricularia polytricha* produced by mutation of *Auricularia polytricha* (*Auricularia polytricha* (Mont.) Sacc.) with ultraviolet B rays, and free amino acids that stably exist in the white *Auricularia polytricha* even after the irradiation with ultraviolet B rays.

[Claim 3] The functional material derived from white *Auricularia polytricha* according to Claim 2, wherein component species of the free amino acids comprise at least histidine, serine, arginine, glycine, aspartic acid, glutamic acid, threonine, alanine, γ -aminobutyric acid, proline, cysteine, lysine, tyrosine, methionine, valine, isoleucine, leucine, phenylalanine, and tryptophan.

[Claim 4] A food or beverage product comprising, as an active ingredient, the functional material according to Claim 1 and/or Claim 2.

[Claim 5] An external preparation comprising, as an active ingredient, the functional material according to Claim 1 and/or Claim 2.

[Claim 6] The functional material derived from white *Auricularia polytricha*, the food and beverage product, and the external preparation according to any one of claims 1 to 5, wherein a part used of the functional material derived from white *Auricularia polytricha* is a hard tip.