DESCRIPTION

COMPOSITION FOR SUPPRESSING CELLULAR SENESCENCE, AND METHOD FOR SUPPRESSING CELLULAR SENESCENCE

TECHNICAL FIELD

[0001]

The present invention relates to a composition for inhibiting cellular senescence. The present invention also relates to, for example, a method of inhibiting cellular senescence.

BACKGROUND ART

[0002]

Cellular senescence refers to a state of irreversible arrest of cell growth. For example, normal somatic cells of humans and other mammals have a limit to the number of times the cells can divide. A certain number of repeated cell divisions leads to irreversible arrest of cell division.

[0003]

Unlike apoptosis, the cells undergoing senescence (senescent cells) do not spontaneously induce cell death. Thus, senescent cells accumulate in tissues and organs with aging (Non-Patent Literature 1). Senescent cells exhibit not only cell cycle arrest but also a decline in cellular function. Physiologically active factors secreted from senescent cells damage surrounding normal cells, causing a decline in organ function, for example. As a technique to inhibit cellular senescence, for example, Patent Literature 1 discloses an agent for inhibiting senescence of mesenchymal stem cells, the agent containing astaxanthin and tocopherol nicotinate as active ingredients.

[0004]

Known cellular senescence markers include senescence-

associated β-galactosidase (SA-β-Gal).

CITATION LIST

- Patent Literature

[0005]

Patent Literature 1: JP 2019-218377 A

Non-Patent Literature

[0006]

Non-Patent Literature 1: Herbig U, Ferreira M, Condel L, Carey D, Sedivy JM., Cellular Senescence in Aging Primates. Science. 2006; 311 (5765): 1257-1257.

SUMMARY OF INVENTION

- Technical Problem

[0007]

The present invention aims to provide a composition for inhibiting cellular senescence, which can effectively inhibit cellular senescence. The present invention also aims to provide a method of inhibiting cellular senescence.

- Solution to Problem

[0008]

As a result of extensive studies to solve the above issue, the present inventors found that a sesamin-class compound has an action to inhibit cellular senescence.

[0009]

The present invention also relates to, but is not limited to, a composition for inhibiting cellular senescence, a method of inhibiting cellular senescence, and the like described below.

(1) A composition for inhibiting cellular senescence, containing at least one sesamin-class compound as an active ingredient.

(2) The composition according to (1) above, wherein

the at least one sesamin-class compound includes at least one of sesamin or episesamin.

(3) The composition according to (1) or (2) above, wherein the composition is an oral composition.

(4) The composition according any one of (1) to (3) above, wherein the composition is a food or beverage.

(5) The composition according to (1) or (2) above, wherein the composition is a topical agent for skin.

(6) The composition according to (5) above, wherein the composition is a cosmetic.

(7) The composition according to any one of (1) to (6) above, wherein the composition is labeled with at least one selected from the group consisting of "inhibiting cellular senescence", "inhibiting cells from turning into senescent cells", "preventing cellular senescence", "preventing the formation of senescent cells", and "inhibiting an increase in the number of senescent cells".

(8) A method of inhibiting cellular senescence, including administering at least one sesamin-class compound.

(9) Use of at least one sesamin-class compound for inhibiting cellular senescence.

- Advantageous Effects of Invention

[0010]

The present invention can provide a composition for inhibiting cellular senescence, which can effectively inhibit cellular senescence. The present invention can also provide a method of inhibiting cellular senescence.

BRIEF DESCRIPTION OF DRAWINGS

[0011]

FIG. 1 is a graph showing SA-β-Gal activity of normal human fibroblasts treated with hydrogen peroxide and cultured in a medium with or without a sesamin-class compound.

DESCRIPTION OF EMBODIMENTS

[0012]

The composition for inhibiting cellular senescence of the present invention (hereinafter sometimes simply referred to as "the composition of the present invention") contains at least one sesamin-class compound as an active ingredient.

In the present invention, the term "sesamin-class compound" is the collective term for compounds including sesamin and its analogs. Sesamin is one of main lignan compounds found in sesame. Examples of the sesamin analogs include episesamin and dioxabicyclo[3.3.0]octane derivatives described in JP H04-9331 A. The at least one sesamin-class compound may include one of these compounds alone or two or more of these compounds. Specific examples of the sesamin-class compound include sesamin, episesamin, sesaminol, episesaminol, sesamol, and sesamolin. Stereoisomers or racemates of these compounds may be used alone or in mixture. In the present invention, the at least one sesamin-class compound preferably includes sesamin and/or episesamin, and more preferably includes sesamin and episesamin. When sesamin and episesamin are used, the ratio of these components is not limited. For example, the ratio of sesamin to episesamin by weight is preferably 1:0.1 to 1:9, more preferably 1:0.3 to 1:3, still more preferably 1:0.5 to 1:2.

[0013]

The sesamin-class compound for use in the present invention is not limited in any way by its form, production method, or the like. For example, when the sesamin-class compound is sesamin, sesamin extracted from sesame oil by a known method (e.g., the method described in JP H04-9331 A) can be used (hereinafter, such sesamin is called a sesamin extract or purified sesamin). Commercially available

sesame oil (in liquid form) can also be used as is. However, when sesame oil is used, the characteristic flavor of sesame oil is sometimes evaluated as being organoleptically undesirable. Thus, a tasteless and odorless sesamin extract (or purified sesamin) from sesame oil is preferably used. In addition, since sesame oil has a low sesamin content, use of sesame oil to incorporate a desired amount of sesamin results in excess volume per unit dosage of a composition to be prescribed. This sometimes causes inconvenience in ingestion. In particular, in the case where the composition is formulated for oral administration, the preparation (e.g., tablet or capsule) becomes so bulky that it causes trouble in ingestion. Thus, use of sesamin extract (or purified sesamin) from sesame oil is preferred because it does not require a large amount of ingestion. The sesamin-class compound can also be obtained by synthesis. For example, sesamin and episesamin can be synthesized by the method of Beroza et al. (J. Am. Chem. Soc., 78, 1242 (1956)).

[0014]

As described above, cellular senescence refers to arrest of cell growth. Factors for individual aging vary widely, and the association between aging at the individual level and cellular senescence is yet to be clarified. However, it is known that aged animals show an increase in cells undergoing senescence (senescent cells) with aging and that passages of cultured primary human cells eventually result in cells that have reached the limit of division and become senescent cells. Presumably, physiologically active factors secreted from senescent cells adversely affect surrounding normal cells. Senescent cells exhibit a decline in cellular function. Inhibition of cellular senescence is effective in preventing or alleviating conditions or diseases resulting from cellular senescence or an increase in senescent cells, such as a

decline in cellular function, a decline in organ function, and a decline in systemic function. Effects such as maintaining cellular function, organ function, and systemic function are expected by inhibiting cellular senescence and thus inhibiting an increase (accumulation) in senescent cells in subjects.

[0015]

As shown in examples described later, the sesamin-class compound inhibited an increase in senescence associated β-galactosidase (SA-β-Gal) activity, which is an indicator for cellular senescence, so that the sesamin-class compound has an action to inhibit cellular senescence. The sesamin-class compound can be used as an active ingredient for inhibiting cellular senescence in subjects.

The sesamin-class compound is found in natural products and food or beverages. It is a compound with a history of consumption as food. Thus, the sesamin-class compound is less likely to cause problems in terms of safety, for example, even if ingested daily. The present invention can provide, for example, a composition for inhibiting cellular senescence, which contains a highly safe material as an active ingredient and which has an action to inhibit cellular senescence.

[0016]

The effect of inhibiting cellular senescence in the present invention can be confirmed using a known cellular senescence marker. Phenomena associated with cellular senescence include an increase in SA-β-Gal activity, for example. In one embodiment, preferably, the composition for inhibiting cellular senescence of the present invention inhibits an increase in SA-β-Gal activity.

[0017]

Humans and other mammals usually undergo a reduction in metabolism and the like with aging, so that presumably the removal rate of senescent cells slows down with aging.

Presumably, inhibition of cellular senescence is particularly effective in inhibiting an increase in the number of senescent cells in middle-aged and older people, for example. The term "middle-aged and older people" includes the elderly.

[0018]

Inhibition of cellular senescence in subjects such as humans can inhibit an increase in senescent cells in the subjects. In one embodiment, the composition of the present invention can be used for preventing or alleviating conditions or diseases such as a decline in cellular function, a decline in organ function, and a decline in systemic function. In one embodiment, the composition of the present invention can be used for preventing or alleviating conditions or diseases such as a decline in organ function with aging and a decline in systemic function with aging by inhibiting cellular senescence.

The term "preventing" as used herein encompasses preventing disease or symptom onset, delaying disease or symptom onset, decreasing disease or symptom incidence, decreasing risk of disease or symptom onset, and the like. The phrase "alleviating conditions or diseases" encompasses helping the subject recover from conditions or diseases, alleviating conditions or disease symptoms, making positive changes in conditions or disease symptoms, delaying or preventing progression of conditions or diseases, and the like.

[0019]

The composition for inhibiting cellular senescence of the present invention is applicable for therapeutic use (medical use) and non-therapeutic use (non-medical use). The "non-therapeutic" is a concept that does not include medical activities, i.e., a concept that does not include methods of surgery, therapy, or diagnosis of humans.

The composition for inhibiting cellular senescence of

the present invention can be provided, for example, in the form of a food or beverage, a cosmetic, a pharmaceutical product, a quasi-pharmaceutical product, feed, or the like. The composition of the present invention may be a food or beverage, a cosmetic, a pharmaceutical product, a quasi-pharmaceutical product, feed, or the like to be used for inhibiting cellular senescence by itself; or the composition may be a formulation, material, or the like to be added to these products.

The composition for inhibiting cellular senescence of the present invention can be provided in the form of an agent for example, but it is not limited thereto. Such an agent may be provided as a composition directly, or as a composition containing the agent. In one embodiment, the composition of the present invention can also be referred to as an agent for inhibiting cellular senescence.

[0020]

The composition for inhibiting cellular senescence of the present invention may be an oral composition or a parenteral composition. In one embodiment, preferably, the composition of the present invention is an oral composition. The oral composition may be a food or beverage, an oral pharmaceutical product, an oral quasi-pharmaceutical product, or feed, preferably a food or beverage or an oral pharmaceutical product, more preferably a food or beverage.

In another embodiment, the composition for inhibiting cellular senescence can be used as a topical agent for skin (topical composition for skin). The topical agent for skin may be a cosmetic, a pharmaceutical product, a quasi-pharmaceutical product, or the like, preferably a cosmetic. In one embodiment, the composition of the present invention, when used for inhibiting skin cellular senescence, is preferably a topical agent for skin, more preferably a cosmetic.

[0021]

The composition for inhibiting cellular senescence of the present invention may contain optional additives and optional ingredients in addition to the at least one sesamin-class compound, as long as the effect of the present invention is not impaired. Such additives and ingredients may be selected depending on the form of the composition, for example, and those generally usable in food or beverages, cosmetics, pharmaceutical products, quasi-pharmaceutical products, feed, and the like can be used. When the composition of the present invention is provided as a food or beverage, a cosmetic, a pharmaceutical product, a quasi-pharmaceutical product, feed, or the like, any common method can be used for the production.

[0022]

For example, when the composition for inhibiting cellular senescence of the present invention is provided as a food or beverage, ingredients usable in food or beverages (e.g., food materials and optional food additives) can be added to the at least one sesamin-class compound to provide various food or beverages. The food or beverage is not limited. Examples thereof include general food or beverages, health foods, health drinks, foods with function claims, foods for specified health uses, health supplements, and foods for the sick. The health foods, foods with function claims, foods for specified health uses, health supplements, and the like can be used in various forms of formulations such as fine granules, tablets, granules, powders, capsules, chewable tablets, dry syrups, syrups, liquid agents, beverages, energy drinks, and liquid foods.

[0023]

When the composition for inhibiting cellular senescence of the present invention is provided as a cosmetic, ingredients usable in cosmetics (e.g., cosmetically acceptable carriers and additives) can be

added to the at least one sesamin-class compound to provide various cosmetics. The cosmetics may be provided in any product form. Examples thereof include skin care cosmetics such as skin lotions, essence lotions, face packs, emulsions, creams, and sunscreen lotions.

[0024]

When the composition for inhibiting cellular senescence of the present invention is provided as a pharmaceutical product or a quasi-pharmaceutical product, for example, a pharmacologically acceptable carrier, an optional additive, or the like can be added to the at least one sesamin-class compound to provide various dosage forms of pharmaceutical products or quasi-pharmaceutical products. Such a carrier, additive, or the like may be any pharmacologically acceptable one that can be used in pharmaceutical products or quasi-pharmaceutical products. Examples thereof include excipients, binders, disintegrants, lubricants, antioxidants, and colorants. One or more of these can be used. The form of administration (ingestion) of the pharmaceutical product or the quasi-pharmaceutical product may be oral or parenteral (e.g., transdermal, transmucosal, enteral, or injection) administration. In one embodiment, when the composition of the present invention is provided as a pharmaceutical product or a quasi-pharmaceutical product, it is preferably an oral pharmaceutical product or an oral quasi-pharmaceutical product. Examples of the dosage form for oral administration include liquids, tablets, powders, fine granules, granules, sugar-coated tablets, capsules, suspensions, emulsions, and chewable tablets.

In another embodiment, preferably, the pharmaceutical product or the quasi-pharmaceutical product is a topical agent for skin. The dosage form and the like of the topical agent for skin are not limited. The topical agent for skin can be provided in any form, such as a solution,

an emulsion, a cream, a gel, a powder, an aerosol, a mist, a capsule, or a sheet.

The pharmaceutical product may be for non-human animals.

[0025]

When the composition for inhibiting cellular senescence of the present invention is provided as feed, at least one sesamin-class compound is simply added to feed. The feed includes feed additives. Examples of the feed include feed for farm animals such as cows, pigs, chickens, sheep, and horses; feed for small animals such as rabbits, rats, and mice; and pet food for animals such as dogs, cats, and birds.

[0026]

The amount of the sesamin-class compound in the composition for inhibiting cellular senescence of the present invention is not limited. The amount can be set depending on the form of the composition or the like.

The total amount of the sesamin-class compound in the composition of the present invention is, for example, preferably 0.001 wt% or more, more preferably 0.01 wt% or more, still more preferably 0.05 wt% or more and is preferably 10 wt% or less, more preferably 5 wt% or less. In one embodiment, the total amount of the sesamin-class compound in the composition of the present invention is preferably 0.001 to 10 wt%, more preferably 0.01 to 5 wt%, still more preferably 0.05 to 5 wt%. When the composition contains two or more sesamin-class compounds, the total amount is the sum of the amounts of these compounds.

[0027]

The composition for inhibiting cellular senescence of the present invention can be ingested or administered using various methods known per se, depending on the form or dosage form thereof. In one embodiment, preferably, the composition of the present invention is orally ingested

(orally administered). In another embodiment, when the composition of the present invention is provided as a topical agent for skin, the composition is applicable to the skin.

The dosage (which can also be referred to as "intake") of the composition for inhibiting cellular senescence of the present invention is not limited. The dosage of the composition for inhibiting cellular senescence of the present invention may be any amount that achieves an effect of inhibiting cellular senescence. The dosage may be appropriately set according to the administration form, administration method, body weight of a subject, and the like.

[0028]

In one embodiment, when the composition for inhibiting cellular senescence of the present invention is ingested by or administered to a human (adult), the total intake of the sesamin-class compound is preferably 0.5 mg or more, more preferably 1 mg or more, still more preferably 3 mg or more, and is preferably 200 mg or less, more preferably 100 mg or less, still more preferably 80 mg or less per 60 kg body weight per day. In one embodiment, the total intake of the sesamin-class compound is preferably 0.5 to 200 mg, more preferably 1 to 100 mg, still more preferably 3 to 80 mg per 60 kg body weight per day for a human (adult). Preferably, the sesamin-class compound in the above amount is ingested or administered in one or more portions per day, for example, in one to several portions (e.g., two or three portions) per day. In one embodiment, preferably, the sesamin-class compound in the above amount is orally ingested by or administered to a human. In one embodiment, sesamin and/or episesamin is orally ingested by or administered to a human (adult) in an amount of preferably 0.5 to 200 mg, more preferably 1 to 100 mg, still more preferably 3 to 80 mg per 60 kg body

weight per day as the total intake of sesamin and episesamin. In one embodiment, the composition for inhibiting cellular senescence of the present invention can be used to allow the sesamin-class compound in the above amount to be ingested by or administered to a human per 60 kg body weight per day. When the composition contains two or more sesamin-class compounds, the total intake is the sum of these compounds.

[0029]

Preferably, the composition for inhibiting cellular senescence of the present invention is continuously ingested or administered. Continuous ingestion or administration of the sesamin-class compound is likely to result in a higher effect of inhibiting cellular senescence. In one embodiment, the composition for inhibiting cellular senescence of the present invention is continuously ingested or administered for preferably one week or more, more preferably four weeks or more, still more preferably eight weeks or more, particularly preferably 12 weeks or more.

[0030]

The subject (which can also be referred to as "administration subject") subjected to ingestion or administration of the composition for inhibiting cellular senescence of the present invention is not limited. The administration subject is preferably a human or non-human mammal, more preferably a human.

In one embodiment, the administration subject may be, for example, one needing or wanting to inhibit cellular senescence. Examples of such subject include middle-aged and older people. In one embodiment, the composition of the present invention is suitably used as a composition for inhibiting cellular senescence for middle-aged and older people. The middle-aged and older people may be those who are 40 years old and older, for example. In one embodiment,

the elderly are preferred subjects among the middle-aged and older people. The elderly may be people who are 60 years old and older or 65 years old and older, for example. The administration subject may be a healthy person. For example, the composition of the present invention can be used by healthy people for purposes such as preventing conditions or diseases that are likely to be prevented or alleviated by inhibiting cellular senescence.

[0031]

The type of cells as the target for inhibiting cellular senescence is not limited. Examples thereof include fibroblasts, epithelial cells, epidermal cells, basal cells, stem cells, adipocytes, neurons, muscle cells, skeletal muscle cells, smooth muscle cells, myofibroblasts, myosatellite cells, satellite cells, osteoblasts, hepatocytes, hepatic stellate cells, kidney cells, stromal cells, blood cells, immune system cells, endothelial cells, vascular endothelial cells, pericytes, lens cells, and retinal cells. In one embodiment, the composition for inhibiting cellular senescence of the present invention is suitably used for inhibiting fibroblast senescence. Fibroblasts are essential for tissue support and structure formation in almost all organs.

[0032]

For example, the composition for inhibiting cellular senescence of the present invention may be labelled with one or more function claims selected from the group consisting of "inhibiting cellular senescence", "inhibiting cells from turning into senescent cells", "preventing cellular senescence", "preventing the formation of senescent cells", and "reducing senescent cells".

In one embodiment of the present invention, the composition of the present invention is preferably a food or beverage or a topical agent for skin labeled with one or more of these function claims, more preferably a food or

beverage or a cosmetic labeled with one or more of these function claims, still more preferably a food or beverage labeled with one or more these function claims. The label may be one indicating use for obtaining one or more of these functions. The label may be attached to the composition itself or may be attached to a container or package of the composition.

[0033]

The present invention also encompasses the following method:

a method of inhibiting cellular senescence, including administering at least one sesamin-class compound.

Administering at least one sesamin-class compound to a subject can inhibit cellular senescence in the subject.

The method may be therapeutic or non-therapeutic.

[0034]

The present invention also encompasses the following use:

use of at least one sesamin-class compound for inhibiting cellular senescence.

The at least one sesamin-class compound can be used for inhibiting cellular senescence.

The use may be therapeutic or non-therapeutic.

[0035]

In the method and use, the sesamin-class compound and its preferred embodiments are the same as those of the composition for inhibiting cellular senescence of the present invention. The at least one sesamin-class compound may include one sesamin-class compound or two or more sesamin-class compounds. In the above method and use, preferably, the at least one sesamin-class compound is administered to (injected by) a subject at least once a day, for example, one to several times (e.g., two or three times) a day. In one embodiment, in the above method and use, preferably, the sesamin-class compound is orally

administered (ingested). In another embodiment, the at least one sesamin-class compound is preferably applied to the skin, for example, when used for inhibiting skin cellular senescence.

The above use is preferably for humans or non-human mammals, more preferably for humans.

[0036]

The above method and use only require use of the at least one sesamin-class compound in an amount (which can also be referred to as "effective amount") that achieves a desired effect. Preferred intake, preferred administration subjects, and the like of the sesamin-class compound are as described above for the composition for inhibiting cellular senescence of the present invention. The sesamin-class compound may be administered directly or may be administered in the form of a composition containing the sesamin-class compound. For example, the composition for inhibiting cellular senescence of the present invention described above may be used. In one embodiment, the at least one sesamin-class compound can be used for preventing or alleviating conditions or diseases such as a decline in cellular function, a decline in organ function, and a decline in systemic function. In one embodiment, the at least one sesamin-class compound can be used for preventing or alleviating a decline in organ function with aging or a decline in systemic function with aging, for example, by inhibiting cellular senescence.

[0037]

The present invention also encompasses use of at least one sesamin-class compound for producing the composition for inhibiting cellular senescence. The composition for inhibiting cellular senescence, its preferred embodiments, and the like are as described above.

EXAMPLES

[0038]

The present invention is described in further detail below with reference to examples. The present invention is not limited to these examples.

[0039]

<Example 1>

(Preparation of test substance)

A sesamin-class compound (a mixture of sesamin and episesamin produced at a sesamin to episesamin ratio (weight ratio) of 1:1; purity: 98%) was used as a test substance. The sesamin-class compound was dissolved in dimethyl sulfoxide (DMSO) such that the concentration was 10 mM, and the solution was diluted with a medium (Dulbecco's modified Eagle's medium (DMEM) containing 10% fetal bovine serum (FBS) and a 1% penicillin-streptomycin mixed solution) such that the final concentration of the sesamin-class compound was 0.1, 0.3, 1, 3, or 10 μM, whereby a medium containing the test substance was prepared. A medium in which only DMSO was dissolved was provided as a medium without the test substance.

[0040]

(Cell culture)

Normal human fibroblasts (C0135C available from Thermo Fiher Scientific) were seeded onto a 96-well black plate at 10,000 cells/0.1 mL/well using a medium (DMEM containing 10% FBS and a 1% Penicillin-Streptomycin mixed solution) and cultured in a CO_2 incubator (37°C, 5% CO_2, the same applies below). Twenty-four hours later, the medium was replaced with 0.1 mL of the medium with or without the test substance (concentration of the sesamin-class compound: 0.1, 0.3, 1, 3, or 10 μM), and the cells were cultured in a CO_2 incubator for 24 hours. Then, the medium was replaced with DMEM containing 100 μM H_2O_2 (hydrogen peroxide) or DMEM not containing H_2O_2. The cells were treated with H_2O_2 in a CO_2 incubator for one hour to

induce cellular senescence. To exclude results from a direct antioxidant action, the medium containing H_2O_2 was washed with a phosphate buffer solution (PBS), and then replaced with 0.1 mL of the medium with or without the test substance. The cells were cultured in a CO_2 incubator for three days and used for analysis. The concentration of the test substance in the medium with or without the test substance was the same before and after H_2O_2 treatment. For example, the cells cultured in the medium with a concentration of the sesamin-class compound of 0.1 μM before H_2O_2 treatment were cultured in the medium with a concentration of the sesamin-class compound of 0.1 μM after H_2O_2 treatment. The cells cultured in the medium without the test substance before H_2O_2 treatment were cultured in the medium without the test substance after H_2O_2 treatment.

[0041]

(Measurement of SA-β-Gal activity)

A cellular senescence marker, SA-β-Gal activity, was measured.

First, the cell number was measured using a Cell Count Normalization Kit (Dojindo Laboratories). A working solution (prepared by diluting a staining solution 500 times with a quenching buffer) was added to wells at 100 μL/well, and incubated in a CO_2 incubator for 30 minutes for nuclear staining. Then, the fluorescence intensity (cell count RFU) was measured with a fluorescent plate reader (Ex: 350 nm, Em: 461 nm). Then, the wells were washed with PBS. Subsequently, SA-β-Gal activity was measured using a Cellular Senescence Plate Assay Kit (Dojindo Laboratories). A lysis buffer was added to the well at 50 μL/well, and the cells were incubated for 10 minutes at room temperature and dissolved. Then, SPiDER-β Gal working solution was added to the wells at 50 μL/well and incubated at 37°C for 30 minutes. Then, the fluorescence intensity (SA-β-Gal RFU) was measured with a

fluorescent plate reader (Ex: 535 nm, Em: 580 nm). The fluorescent value of SPiDER-β Gal were corrected with the fluorescent value of the nuclear staining, whereby the SA-β-Gal activity was calculated. Significance was tested by Student's t-test (vs H_2O_2-untreated) or Dunnet's test (vs H_2O_2-treated, without addition of the test substance). FIG. 1 shows the results.

[0042]

(Results)

FIG. 1 is a graph showing SA-β-Gal activity of normal human fibroblasts treated with hydrogen peroxide and cultured in a medium with or without the test substance (sesamin-class compound). The results shown in FIG. 1 are represented as means ± standard error (N = 3). In FIG. 1, # and * denote significant difference (#: $p < 0.05$, Student's t-test (vs H_2O_2-untreated); *: $p < 0.05$, Dunnet's test (vs H_2O_2-treated, without addition of the test substance)). The vertical axis (SA-β-Gal RFU/cell count RFU) shows SA-β-Gal activity per cell. The "Without addition" denotes the cells cultured in the medium without addition of the test substance.

H_2O_2 treatment significantly increased SA-β-Gal activity. The sesamin-class compound significantly inhibited an increase in SA-β-Gal activity. These results show that sesamin and episesamin each have an effect of inhibiting cellular senescence.

CLAIMS

Claim 1. A composition for inhibiting cellular senescence, comprising:

at least one sesamin-class compound as an active ingredient.

Claim 2. The composition according to claim 1,

wherein the at least one sesamin-class compound includes at least one of sesamin or episesamin.

Claim 3. The composition according to claim 1 or 2,

wherein the composition is an oral composition.

Claim 4. The composition according to any one of claims 1 to 3,

wherein the composition is a food or beverage.

Claim 5. The composition according to claim 1 or 2,

wherein the composition is a topical agent for skin.

Claim 6. The composition according to claim 5,

wherein the composition is a cosmetic.

Claim 7. The composition according to any one of claims 1 to 6,

wherein the composition is labeled with at least one selected from the group consisting of "inhibiting cellular senescence", "inhibiting cells from turning into senescent cells", "preventing cellular senescence", "preventing the formation of senescent cells", and "inhibiting an increase in the number of senescent cells".

Claim 8. A method of inhibiting cellular senescence, comprising

administering at least one sesamin-class compound.

Claim 9. Use of at least one sesamin-class compound for inhibiting cellular senescence.