

COMPOSITION CONTAINING TANGERETIN FOR EXTERNAL APPLICATION TO
THE SKIN

TECHNICAL FIELD

5 The present invention relates to a composition containing
tangeretin for external application to the skin. More
particularly, the present invention relates to a composition
containing tangeretin and epigallocatechin gallate (EGCG) for
external application to the skin.

BACKGROUND ART

10 As for the damages from active oxygen species definitely
generated during the energy metabolism using oxygen on all the
aerobic organisms including humans, the generation of active
15 oxygen species fundamentally free from the self-defense ability
is the cause of various diseases such as Alzheimer's disease in
addition to arthritis or circulatory disorders recently known as
adult diseases.

20 Active oxygen species generally known as harmful oxygen
molecules are unpaired free radicals, such as superoxide anion
radical ($^1\text{O}_2^-$), hydrogen peroxide (H_2O_2) and hydroxyl radical ($\cdot\text{OH}$),
which are singlet oxygen produced from the reduction of triplet
oxygen in the ground state as the most stable oxygen form during
the oxidation-reduction process. These active oxygen species do

damage to proteins, DNAs, enzymes, or the factors in the immune system such as T cells to cause diseases.

For this reason, many studies have been made on the antioxidants to find out a variety of antioxidants, including enzyme-based preventative antioxidants, such as superoxide dismutase, catalase, and glutathione peroxidase, natural antioxidants, such as vitamin E, vitamin C, carotenoid, glutathione, synthetic antioxidants, such as butylhydroxyanisole (t-butyl-4-hydroxyanisole, BHA), dibutylhydroxytoluene (3,5-(t-butyl)-4-hydroxytoluene, BHT), etc. However, the antioxidant enzymes tend to have deterioration in the defensive power against active oxygen species with aging, and the synthetic antioxidants are known to be mutagenic and toxic. There is thus a demand for development of natural antioxidants more stable and effective. Accordingly, the inventors of the present invention have completed the present invention while screening natural materials with high antioxidant activity.

DISCLOSURE OF INVENTION

For solving the problem, it is therefore an object of the present invention to provide a composition containing tangeretin for external application to the skin or a composition containing tangeretin and epigallocatechin gallate (EGCG) for external application to the skin to have antioxidant activity.

The present invention provides a composition containing tangeretin for external application to the skin as an active ingredient.

5 The present invention also provides a composition containing tangeretin and EGCG for external application to the skin.

The present invention also provides a composition for external application that includes a tangerine peel extract containing tangeretin.

10 The present invention also provides a composition for external application that further includes a green tea extract containing epigallocatechin gallate (EGCG) in addition to the tangerine peel extract containing tangeretin.

15 The composition for external application according to the present invention has such a good antioxidant effect as to be applicable as a cosmetic composition, a pharmaceutical composition, or a health food composition. The composition of the present invention also has a good effect to prevent skin erythema, improve the skin tone, and suppress skin aging.

20

BRIEF DESCRIPTION OF DRAWINGS

FIG. 1 is a flow chart showing the process of preparing a tangerine peel extract containing tangeretin.

FIG. 2 is a graph showing the absorbance obtained by measuring DPPH as a function of the concentration of a tangerine peel extract, a green tea extract, and vitamin C.

FIG. 3 shows the experimental results obtained by measuring DPPH when using a tangerine peel extract and a green tea extract to demonstrate the antioxidant effect of the tangerine peel extract and the green tea extract and the synergy effect of the tangerine peel extract and the green tea extract used in combination with each other.

FIG. 4 shows the experimental results demonstrating the antioxidant synergy effect of tangeretin and epigallocatechin gallate (EGCG).

BEST MODES FOR CARRYING OUT THE INVENTION

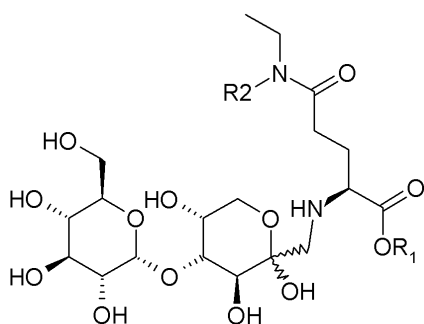
The composition for external application according to the present invention contains tangeretin as an active ingredient. Further, the present invention relates to a composition for external application containing tangeretin and EGCG. The present invention also relates to a composition for external application that includes a tangerine peel extract containing tangeretin as an active ingredient. The present invention also relates to a composition for external application that further includes a green tea extract containing epigallocatechin gallate (EGCG).

The composition for external application according to the present invention contains a tangerine peel extract containing tangeretin as an active ingredient. Also, the present invention provides a composition for external application that further includes a green tea extract containing EGCG in addition to the tangerine peel extract containing tangeretin so as to have an antioxidant activity.

Hereinafter, the present invention will be described in further detail.

The tangeretin used in the present invention is a citrus flavonoid that has a structure of O-polymethoxylated flavones. Among the flavones, polymethoxyflavones are uniquely found in citrus fruits rather than other fruits or vegetables. The polymethoxyflavones are a substance having a structure of flavonoid with five methoxy substituents. Hence, tangeretin is represented by the following chemical formula 1:

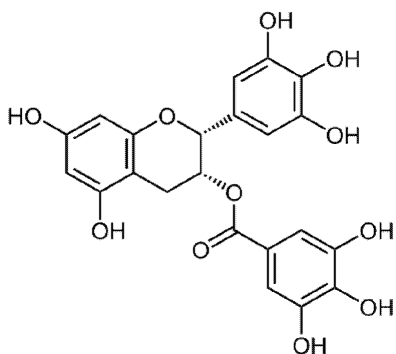
[Chemical Formula 1]



The green tea extract used in the present invention contains a catechin such as epigallocatechin gallate (EGCG).

EGCG is a constituent component of tannin or polyphenol that is strongly antioxidant and represented by the following chemical formula 2:

[Chemical Formula 2]



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In one embodiment of the present invention, the tangeretin may be obtained from a tangerine peel extract. In another embodiment of the present invention, the tangeretin may be included as a tangerine peel extract containing tangeretin. The tangerine peel extract is a mixture containing a plurality of oil-soluble components as a natural extract containing tangeretin.

In one embodiment of the present invention, the epigallocatechin gallate (EGCG) may be obtained from a green tea extract. In another embodiment of the present invention, the EGCG may be included as a green tea extract containing EGCG. The green tea extract is a mixture containing a plurality of oil-soluble components as a natural extract containing EGCG.

In one embodiment of the present invention, the raw material is soaked in an organic solvent for extraction and

subjected to filtration, decompression and then concentration to obtain a concentrate, which is used as the extract. Alternatively, the concentrate is dried and then processed into a brewed, decocted, stationary or floating extract. The deposit
5 containing an active ingredient can be obtained by soaking tangerine peels or green tea leaves in a solvent through any method, such as cold brewing, percolation, hot brewing, etc. The organic solvent may include, but is not limited to, at least one selected from C₁-C₄ anhydrous or water-containing alcohol,
10 acetone, ethylacetate, chloroform, glycerin, propylene glycol, and butylene glycol.

The tangerine peels are dried by any method, such as natural drying or reinforced drying and then chopped into small pieces.

15 The present invention relates to an antioxidant composition for external application containing tangeretin as an active ingredient. The present invention also relates to an antioxidant composition for external application containing tangeretin and EGCG. The present invention also relates to an antioxidant
20 composition for external application that includes a tangerine peel extract containing tangeretin as an active ingredient. The present invention also relates to an antioxidant composition for external application that further includes a green tea extract

containing epigallocatechin gallate (EGCG) in addition to a tangerine peel extract containing tangeretin.

In the antioxidant composition for external application according to the present invention, the tangeretin may be
5 contained in an amount of 0.001 to 10 wt.% with respect to the total weight of the composition. The content of the tangeretin less than 0.001 wt.% hardly gives an antioxidant effect, and the content of the tangeretin greater than 10 wt.% possibly causes deformation of the cosmetic preparation, such as foul odor,
10 makes it difficult to control the viscosity of the cosmetic formulation and leads to irritation of the skin due to the excessive use of the tangeretin.

In the antioxidant composition for external application according to the present invention, the EGCG may be contained in
15 an amount of 0.001 to 20 wt.% with respect to the total weight of the composition. The content of the EGCG less than 0.001 wt.% hardly offers an antioxidant effect, and the content of the EGCG greater than 20 wt.% possibly causes deformation of the cosmetic preparation, such as foul odor, makes it difficult to control
20 the viscosity of the cosmetic formulation, readily causes a phase inversion when the composition is formulated into an emulsion, making the composition hard to develop as cosmetic formulations, and brings about deterioration in the economic feasibility of production.

In the antioxidant composition for external application according to the present invention, the tangerine peel extract containing tangeretin may be contained in an amount of 0.001 to 10 wt.% with respect to the total weight of the composition. The content of the tangerine peel extract less than 0.001 wt.% hardly gives an antioxidant effect.

In the antioxidant composition for external application according to the present invention, the green tea extract containing EGCG may be contained in an amount of 0.001 to 99.9 wt.% with respect to the total weight of the composition. The content of the green tea extract less than 0.001 wt.% hardly gives an antioxidant effect.

The antioxidant effect of the composition for external application according to the present invention more greatly appears when using a composite extract of the tangerine peel extract containing tangeretin and the green tea extract containing EGCG. This is due to the synergy effect of the tangeretin contained in the tangerine peel extract and the EGCG contained in the green tea extract.

The present invention relates to an erythema-preventing composition for external application containing tangeretin as an active ingredient to prevent skin erythema. The present invention also relates to an erythema-preventing composition for external application containing tangeretin and EGCG to prevent

skin erythema. The present invention also relates to an erythema-preventing composition for external application that includes a tangerine peel extract containing tangeretin as an active ingredient to prevent skin erythema. The present invention also relates to an erythema-preventing composition for external application that further includes a green tea extract containing epigallocatechin gallate (EGCG) in addition to a tangerine peel extract containing tangeretin to prevent skin erythema.

In the erythema-preventing composition for external application according to the present invention, the tangeretin may be contained in an amount of 0.001 to 10 wt.% with respect to the total weight of the composition. The content of the tangeretin less than 0.001 wt.% hardly gives an erythema-preventing effect, and the content of the tangeretin greater than 10 wt.% does not secure the stability and safety of the composition. It is appropriate to have the content of the tangeretin within the above-defined range even when the erythema-preventing effect is weighed against the cost.

In the erythema-preventing composition for external application according to the present invention, the EGCG may be contained in an amount of 0.001 to 10 wt.% with respect to the total weight of the composition. The content of the EGCG less than 0.001 wt.% hardly offers an erythema-preventing effect, and

the content of the EGCG greater than 10 wt.% possibly causes deformation of the cosmetic preparation, such as foul odor, makes it difficult to control the viscosity of the cosmetic formulation, and ends up with irritations of the skin due to an excessive use of the tangeretin.

In the erythema-preventing composition for external application according to the present invention, the tangerine peel extract containing tangeretin may be contained in an amount of 0.001 to 10 wt.% with respect to the total weight of the composition. The content of the tangerine peel extract less than 0.001 wt.% hardly gives an erythema-preventing effect.

In the erythema-preventing composition for external application according to the present invention, the green tea extract containing EGCG may be contained in an amount of 0.001 to 99.9 wt.% with respect to the total weight of the composition. The content of the green tea extract less than 0.001 wt.% hardly gives an erythema-preventing effect.

The erythema-preventing effect of the composition for external application according to the present invention more greatly appears when using a composite extract of the tangerine peel extract containing tangeretin and the green tea extract containing EGCG. This is due to the synergy effect of the tangerine peel extract and the green tea extract.

The present invention relates to a composition for external application containing tangeretin as an active ingredient to improve skin tone. The present invention also relates to a composition for external application containing tangeretin and EGCG to improve skin tone. The present invention also relates to a composition for external application that includes a tangerine peel extract containing tangeretin as an active ingredient to improve skin tone. The present invention also relates to a composition for external application that further includes a green tea extract containing epigallocatechin gallate (EGCG) in addition to a tangerine peel extract containing tangeretin to improve skin tone.

In the composition for external application to improve skin tone according to the present invention, the tangeretin may be contained in an amount of 0.001 to 20 wt.% with respect to the total weight of the composition. The content of the tangeretin less than 0.001 wt.% hardly gives an effect of improving skin tone, and the content of the tangeretin greater than 20 wt.% does not secure the stability and safety of the composition. It is appropriate to have the content of the tangeretin within the above-defined range even when the effect of improving skin tone is weighed against the cost.

In the composition for external application to improve skin tone according to the present invention, the EGCG may be

contained in an amount of 0.01 to 20 wt.% with respect to the total weight of the composition. The content of the EGCG less than 0.01 wt.% hardly offers an effect of improving skin tone, and the content of the EGCG greater than 20 wt.% does not secure the stability and safety of the composition. It is appropriate to have the content of the EGCG within the above-defined range even when the effect of improving skin tone is weighed against the cost.

In the composition for external application to improve skin tone according to the present invention, the tangerine peel extract containing tangeretin may be contained in an amount of 0.001 to 10 wt.% with respect to the total weight of the composition. The content of the tangerine peel extract less than 0.001 wt.% hardly gives an effect of improving skin tone.

In the composition for external application to improve skin tone according to the present invention, the green tea extract containing EGCG may be contained in an amount of 0.001 to 99.9 wt.% with respect to the total weight of the composition. The content of the green tea extract less than 0.001 wt.% hardly gives an effect of improving skin tone.

The skin tone improving effect of the composition for external application according to the present invention more greatly appears when using a composite extract of the tangerine peel extract containing tangeretin and the green tea extract

containing EGCG. This is due to the synergy effect of the tangerine peel extract and the green tea extract.

In one embodiment of the present invention, the effects of the composition may include, but are not specifically limited to, increasing skin elasticity, improving skin wrinkles, improving skin complexion, tightening skin pores, alleviating skin irritations, enhancing homeostasis, slimming, improving atopic disease, increasing antibacterial function, improving allergies, elasticity, acne, skin regeneration, sebum, skin waste, and corneous tissue, skin moisturizing, and skin refreshing and tightening.

The composition for external application according to the present invention is a conception that inclusively refers to all the compositions generally used for topical application on the skin, such as, for example, cosmetic compositions, pharmaceutical compositions, or health food compositions.

The cosmetic compositions may include, for example, basic skin cosmetics, skin make-up cosmetics, hair cosmetics, body cosmetics, etc. The formulations of the cosmetic compositions are not specifically limited and can be appropriately selected according to the desired use purpose.

For example, the formulations of the cosmetic compositions may include, but are not limited to, solution, suspension, emulsion, paste, gel, cream, lotion, powder, soap, surfactant-

containing cleanser, oil, powder foundation, suspension foundation, wax foundation, spray, etc. More specifically, the cosmetic compositions may be formulated into basic skin cosmetics, such as skin softener, nutrient skin lotion, lotion, 5 body lotion, nutrient cream, massage cream, moisturizing cream, hand cream, essence, eye cream, cream cleanser, foam cleanser, liquid cleanser, facial pack, gel, patch, oil-in-water (O/W) type, water-in-oil (W/O) type, etc.; skin make-up cosmetics, such as lipstick, make-up base, foundation, etc.; cleansing 10 compositions, such as hair shampoo, hair conditioner, body cleanser, toothpaste, mouthwash, etc.; or hair cosmetics, such as hair tonic, hair styling products (e.g., hair gel, hair cream, etc.), hair restorer, hair dye, etc.

The cosmetic compositions contain a cosmetologically 15 acceptable carrier or base. The cosmetic compositions may be provided in the form of any formulation suitable for topical application, such as, for example, solution, gel, solid or paste anhydrous products, oil-in-water type emulsion, suspension, micro-emulsion, microcapsule, microgranule, ionic (liposome) 20 and/or nonionic vesicle dispersant, cream, skin toner, lotion, powder, ointment, spray, or concealer stick. These compositions may be prepared according to the general method known in the related art.

When the formulation of the present invention is a solution or an emulsion, the carrier component may be a solvent, a solubilizer, or an emulsifier, the examples of which include water, ethanol, isopropanol, ethyl carbonate, ethyl acetate, 5 benzyl alcohol, benzyl benzoate, propylene glycol, 1,3-butyl glycol oil, glycerol aliphatic ester, polyethylene glycol, or sorbitan fatty acid ester.

When the formulation of the present invention is a suspension, the carrier component may be a liquid diluent, such 10 as water, ethanol, or propylene glycol; a suspension, such as ethoxylated isocetearyl alcohol, polyoxyethylene sorbitol ester, or polyoxyethylene sorbitan ester; microcrystalline cellulose; aluminum metahydroxide; bentonite, agar; or tragacanth gum.

When the formulation of the present invention is a paste, a 15 cream, or a gel, the carrier component may be animal oil, vegetable oil, wax, paraffin, starch, tragacanth gum, cellulose derivative, polyethylene glycol, silicone, bentonite, silica, talc, zinc oxide, etc.

When the formulation of the present invention is a powder 20 or a spray, the carrier component may be lactose, talc, silica, aluminum hydroxide, calcium silicate, or polyamide powder. Particularly, the spray formulation may further include a propellant, such as chlorofluorohydrocarbon, propane/butane, or dimethyl ether.

When the formulation of the present invention is a surfactant-containing cleanser, the carrier component may be aliphatic alcohol sulfate, aliphatic alcohol ether sulfate, sulfosuccinic acid monoester, isethionate, imidazolinium
5 derivative, methyltaurate, sarcosinate, fatty acid amide ether sulfate, alkylamidobetaine, aliphatic alcohol, fatty acid glyceride, fatty acid diethanolamide, vegetable oil, lanolin derivative, ethoxylated glycerol fatty acid ester, etc.

In one exemplary embodiment of the present invention, the
10 cosmetic composition may further include a thickening agent. The thickening agent may be methylcellulose, carboxy methyl cellulose, carboxy methyl hydroxy guanine, hydroxy methyl cellulose, hydroxy ethyl cellulose, carboxy vinyl polymer, polyquaternium, cetearyl alcohol, stearic acid, carrageenan, etc.
15 The thickening agent is preferably at least one selected from carboxy methylcellulose, carboxy vinyl polymer, and polyquaternium, most preferably carboxy vinyl polymer.

In one exemplary embodiment of the present invention, the cosmetic composition may contain any kind of base and additive
20 appropriate upon necessity. The inventor may readily choose the type and quantity of the base and the additive. If needed, an acceptable additive can be used, including, for example, preservatives, colorants, additives, etc. More specifically, the

preservatives may include phenoxyethanol or 1,2-hexanediol, and the colorants may include artificial flavors.

In one exemplary embodiment of the present invention, the cosmetic composition may include a component selected from the group consisting of water-soluble vitamins, oil-soluble vitamins, 5 polymer peptides, polymer polysaccharides, sphingolipids, and seaweed extract. The other ingredients available for the composition may include oils, moisturizing agents, emollients, surfactants, organic/inorganic pigments, organic powder, UV 10 absorbers, preservatives, antibacterial agents, antioxidants, vegetable extracts, pH regulators, alcohols, colorants, fragrances, blood circulation accelerators, cold active agents, antifreezing agents, purified water, etc.

The other ingredients available for the composition are not 15 limited to those aforementioned and any of those ingredients can be blended together within a range not adversely affecting the purposes and effects of the present invention.

In one embodiment of the present invention, the pharmaceutical composition may be formulated into a parenteral 20 preparation in the solid, semisolid, or liquid state by using an inorganic or organic carrier commercially available. The preparation for parenteral administration may include, but is not limited to, any formulation for dermal administration

selected from the group consisting of drops, ointment, lotion, gel, cream, patch, spray, suspension, and emulsion.

In the composition based on the individual formulations, those skilled in the art can select and combine other ingredients than the composition of the present invention according to the formulation and use purpose of the composition for external application, in which case a synergy effect can be acquired when using the ingredients in combination with other materials.

When the composition of the present invention is used as a pharmaceutical composition, it may further include pharmaceutical adjuvants, such as a preservative, a stabilizer, a water-dispersible agent, an emulsion accelerator, a salt for osmoregulation, or a buffer, and other therapeutically useful substances. The composition of the present invention in this case can be formulated into various preparations for oral or parenteral administration.

It should be construed that the actual administration dosage of the active ingredient is determined depending on various related factors, such as severity of symptoms, administration route, the patient's age, sex, weight and health conditions, or the like.

Generally, the actual administration dosage of the active ingredient ranges from 0.001 mg/kg/day to approximately 2,000

mg/kg/day. More preferably, the actual administration dosage of the active ingredient is in the range of 0.5 mg/kg/day to 2.5 mg/kg/day.

MODES FOR CARRYING OUT THE INVENTION

Hereinafter, the present invention will be described further specifically with reference to the following examples, comparative examples and experimental examples. It is apparent to those skilled in the art that the examples, comparative
10 examples, and experimental examples are merely given for specific illustrations of the present invention and not intended to limit the scope of the present invention.

[Reference Example 1] Preparation of tangerine peel extract

Tangerine peels are washed with purified water and dried
15 out. The tangerine peels removed of water are pulverized and then cold-brewed at the room temperature for 40 to 48 hours to extract the active ingredient. The content extracted is subjected to a first filtration with a 250 μ m-mesh bed and then a centrifugal separation to collect the supernatant. The
20 supernatant collected is successively filtered through a 3 μ m-mesh filter bed, a 1 μ m-mesh filter bed and then a 0.5 μ m-mesh filter bed in a sequential order. To the supernatant are added 10 % of 1,3-butylene glycol, 0.5 % of phenoxyethanol, and 0.05 % of ethylhexyl glycerin. The resultant supernatant is then filtered

through a 0.2-0.3 μ m-mesh filterbed to obtain a tangerine peel extract.

[Reference Example 2] Preparation of green tea extract

Green tea leaves are washed with purified water and dried
5 out. The green tea leaves removed of water are pulverized and
then cold-brewed at the room temperature for 40 to 48 hours to
extract the active ingredient. The content extracted is
subjected to a first filtration with a 250 μ m-mesh bed and then a
centrifugal separation to collect the supernatant. The
10 supernatant collected is successively filtered through a 3 μ m-mesh
filter bed, a 1 μ m-mesh filter bed and then a 0.5 μ m-mesh filter
bed in a sequential order. To the supernatant are added 10 % of
1,3-butylene glycol, 0.5 % of phenoxyethanol, and 0.05 % of
ethylhexyl glycerin. The resultant supernatant is then filtered
15 through a 0.2-0.3 μ m-mesh filterbed to obtain a green tea extract.

[Reference Example 3] Preparation of tangeretin

The tangeretin used in the present invention is purchased
from Sigma-Aldrich; Tangeretin).

[Reference Example 4] Preparation of EGCG

20 The EGCG used in the present invention is purchased from
Sigma-Aldrich; EGCG).

[Experimental Example 1] Test for antioxidant effect

To evaluate the antioxidant efficacy of the tangerine peel
extract, the green tea extract, tangeretin and EGCG of the

respective reference examples used in the present invention,
1,1-diphenyl-2-picrylhydrazyl (hereinafter, referred to as
"DPPH") as a free radical is used. Vitamin C that is an
antioxidant agent generally known in the related art is used as
5 the positive control.

DPPH of which the color is purple reacts with an
antioxidant substance to receive hydrogen electrons from the
antioxidant substance and becomes changed in color, resulting in
a drop of absorbance at 517 nm.

10 Each sample of the tangerine peel extract, the green tea
extract, tangeretin and EGCG of the respective reference
examples and vitamin C is dissolved in ethanol at a desired
concentration. 10 μ L of each sample is put in a 96-well plate and,
after addition of 190 μ L of a 10 μ M DPPH solution, stored at 37
15 $^{\circ}$ C for 30 minutes. Then, a spectrophotometer is used to measure
the absorbance at 517 nm. The measurement results are presented
in Table 1. In addition, the absorbance (O.D.) is measured when
treated with the tangerine peel extract, the green tea extract,
and vitamin C, and the measurement results are presented in FIG.
20 1.

FIG. 3 shows the synergy effect and the color change of
DPPH when using 25 ppm of the tangerine peel extract alone, 5 μ M
of the green tea extract alone, or both 25 ppm of the tangerine
peel extract and 5 μ M of the green tea extract.

FIG. 4 shows the absorbance and the color change of DPPH when using tangeretin alone, 5 μM of EGCG alone, or both tangeretin and EGCG.

[Table 1]

	Concentration	O.D. value	
		Mean	Standard deviation (s.d.)
Control (CTL)	–	0.564	0.009
Vitamin C (ppm)	10.0	0.094	0.002
	5.0	0.302	0.010
	2.5	0.428	0.003
Green tea extract (μM) of reference example 2	5.0	0.259	0.022
Tangerine peel extract (ppm) of reference example 1	200.0	0.261	0.044
	100.0	0.381	0.008
	50.0	0.433	0.010
	25.0	0.491	0.006
	12.5	0.485	0.020
5 μM of green tea extract of reference example 2 + tangerine peel extract (ppm) of reference example 1	200.0	0.082	0.001
	100.0	0.095	0.005
	50.0	0.149	0.011
	25.0	0.190	0.007
	12.5	0.211	0.011
5 μM of EGCG of reference example 4		0.260	0.013

Tangeretin (ppm) of reference example 3	200.0	0.250	0.162
	100.0	0.388	0.035
	50.0	0.434	0.011
5 μ M of EGCG of reference example 4 + tangeretin (ppm) of reference example 3	200.0	0.256	0.671
	100.0	0.387	0.012
	50.0	0.152	0.013

As can be seen from Table 1 and FIG. 2, when compared to the control which is treated with nothing, the EGCG of the green tea extract greatly reduces the absorbance (O.D.) and 200 ppm of tangeretin reduces the absorbance by at least about 50 %, demonstrating their good antioxidant effect. Particularly, the composite use of 5 μ M of EGCG and tangeretin gives a good synergy effect to reduce the absorbance by at least 80 %, which synergy effect is specifically illustrated in FIG. 3.

[Experimental Example 2] Test of erythema

40 healthy adult subjects are selected for the skin irritation test, while those with psoriasis, acne, eczema, or other skin diseases, pregnant women, breastfeeding women, or those taking birth control pills, antihistaminic, etc. are ruled out.

The test substances are the reference examples 1 to 4, which are applied onto the back of each subject through the closed patch test. The dosage is 20 μ L/chamber (IQ chamber), and

the concentrations of the specific test substances are presented in Table 3 as below. The patch is attached to the back of each subject for 24 hours, and the skin irritation test is carried out 30 minutes and 24 hours after the removal of the patch. The response test is conducted according to the criteria as defined in Table 2 as below, which inspection criteria are modified from the inspection criteria of the CTFA guideline (1981) and Frosch & Kligman (1979). The test results are presented in Table 3 as follows.

[Table 2]

Score	Feature
0	No irritation
1	Slight redness (erythema), spots or dispersion
2	Mild uniform redness
3	Severe redness with swelling
4	Severe redness with swelling and vesicles
Grade I (non-irritation range): less than 1 Grade II (slight irritation range): less than 3 Grade III (mild irritation range): less than 5 Grade IV (severe irritation range): 5 or greater	

[Table 3]

Substance	Concentration	Score	Grade
Green tea extract of reference example 2	5 μ M	0.05	I
Tangerine peel extract of reference example 1	25 ppm	0.075	I

Green tea extract (5 μ M) of reference example 2 + Tangerine peel extract (25 ppm) of reference example 1		0.05	I
EGCG of reference example 4	5 μ M	0.2	I
Tangeretin (ppm) of reference example 3	50 ppm	0.25	I
EGCG (5 μ M) + tangeretin (50 ppm)		0.2	I

It can be seen from Table 3 that the tangeretin or EGCG according to the present invention leaves a very slight irritation and shows a considerably lower irritation level than the green tea extract or the tangerine peel extract.

5 [Examples 1 to 4]

The cosmetic composition for improving skin tone with the composition of Table 4 is prepared using the reference examples 1 to 4 (unit: wt.%).

[Table 4]

NO	Ingredient	Example 1	Example 2	Example 3	Example 4
1	Behenyl alcohol	0.8	0.8	0.8	0.8
2	Stearic acid	0.5	0.5	0.5	0.5
3	Cetyl alcohol/glycerylstearate/ PEG-75 stearate/Ceteth- 20/Steares-20	3	3	3	3
4	Vegetable squalane	5	5	5	5
5	Butyleneglycol dicaprylate/dicarprate	5	5	5	5
6	Purified water	to 100	to 100	to 100	to 100

7	Disodium EDTA	0.02	0.02	0.02	0.02
8	Glycerin (concentrated glycerin)	3	3	3	3
9	Butylene glycol	6	6	6	6
10	Polyacrylate-13/polyisobutene/polysorbate 20	0.75	0.75	0.75	0.75
11	Tangerine peel extract (reference example 1)	1	0.5	0	0
12	Green tea extract (reference example 2)	0	0.5	0	0
13	Tangeretin (reference example 3)	0	0	1	0.5
	EGCG (reference example 4)	0	0	0	0.5
14	Fragrance, preservative	Optimal	Optimal	Optimal	Optimal
	Total	100	100	100	100

[Experimental Example 3] Evaluation of skin complexion improvement

5 To evaluate the effect of improving the skin complexion, 60 healthy female subjects in their 20's, 30's or 40's are divided into six groups, each consisting of 10 female subjects. For each group, the respective formulations of Examples 1 to 4 are uniformly applied onto the whole face twice a day for 4 weeks. 4
10 weeks later, a chronometer (Minolta CM-3500d) is use to measure the change of brightness (ΔL) to evaluate the skin complexion

improvement. The results are presented in Table 5 as below. The numerals denoted in Table 5 are the average values of the individual groups.

[Table 5]

	ΔL value
Example 1	3.45
Example 2	4.05
Example 3	3.85
Example 4	4.43

As can be seen from Table 5, the formulation of Example 2 or Example 4 containing, as an active ingredient, both the tangerine peel extract and the green tea extract, or both tangeretin and EGCG has a high ΔL value. This shows that the composition containing both the tangerine peel extract and the green tea extract has a remarkably good effect of improving the skin complexion. In addition, the formulation of Example 4 that contains both EGCG and tangeretin is most effective in improving the skin complexion. This shows that the composite use of EGCG and tangeretin gives a synergy effect.

Hereinafter, the formulation examples of the cosmetic composition and the pharmaceutical composition according to the present invention will be described as follows. The cosmetic composition and the pharmaceutical composition of the present invention are applicable into other various formulations. The formulation examples are given merely for illustrations of the

present invention and not intended to limit the scope of the present invention.

[Formulation Example 1] Skin softener (skin lotion)

A skin softener is prepared according to a general method

5 using the composition given by Table 6 as below.

[Table 6]

Ingredient	Content (wt.%)
Tangerine peel extract	1.0
Green tea extract	1.0
Glycerin	3.5
Oleyl alcohol	1.5
Ethanol	5.5
Polysorbate 80	3.2
Carboxyvinyl polymer	1.0
Butylene glycol	2.0
Propylene glycol	2.0
Preservative, fragrance	qs
Purified water	qs
Total	100

[Formulation Example 2] Nutrient skin lotion (milk lotion)

A nutrient skin lotion is prepared according to a general

10 method using the composition given by Table 7 as below.

[Table 7]

Ingredient	Content (wt.%)
Tangerine peel extract	1.0
Green tea extract	1.0

Glycerin	3.0
Butylene glycol	3.0
Propylene glycol	3.0
Carboxyvinyl polymer	0.1
Wax	4.0
Polysorbate 60	1.5
Caprylic/Capric triglyceride	5.0
Squalane	5.0
Sorbitasesquiolate	1.5
Cetearyl alcohol	1.0
Triethanol amine	0.2
Preservative, fragrance	qs
Purified water	qs
Total	100

[Formulation Example 3] Nutrient cream

A nutrient cream is prepared according to a general method using the composition given by Table 8 as below.

5 [Table 8]

Ingredient	Content (wt.%)
Tangerine peel extract	1.0
Green tea extract	1.0
Glycerin	3.5
Butylene glycol	3.0
Liquid paraffin	7.0
β -Glucan	7.0
Carbomer	0.1
Caprylic/Capric triglyceride	3.0
Squalane	5.0

Cetearyl glucoside	1.5
Sorbitan stearate	0.4
Polysorbate 60	1.2
Triethanol amine	0.1
Preservative, fragrance	qs
Purified water	qs
Total	100

[Formulation Example 4] Massage cream

A massage cream is prepared according to a general method using the composition given by Table 9 as below.

5 [Table 9]

Ingredient	Content (wt.%)
Tangerine peel extract	1.0
Green tea extract	1.0
Glycerin	8.0
Butylene glycol	3.0
Liquid paraffin	45.0
β -Glucan	7.0
Carbomer	0.1
Caprylic/Capric triglyceride	3.0
Beeswax	4.0
Cetearyl glucoside	1.5
Sorbitan sesqui oleate	0.9
Paraffin	1.5
Preservative, pigment, fragrance	qs
Purified water	qs
Total	100

[Formulation Example 5] Facial pack

A facial pack is prepared according to a general method using the composition given by Table 10 as below.

[Table 10]

Ingredient	Content (wt.%)
Tangerine peel extract	1.0
Green tea extract	1.0
Glycerin	4.0
Polyvinyl alcohol	15.0
Hyaluronic acid extract	5.0
β -Glucan	7.0
Allantoic acid	0.1
Nonyl phenylether	0.4
Polysorbate 60	1.2
Ethanol preservative	qs
Preservative, fragrance	qs
Purified water	qs
Total	100

5

[Formulation Example 6] Drug for topical administration
(patch preparation)

A patch preparation is prepared according to a general method using the composition given by Table 11 as below.

10 [Table 11]

Ingredient	Content (wt.%)
Tangerine peel extract	1.0
Green tea extract	1.0

β -1,3-Glucan	3.0
Diethyl amine	0.7
Sodium sulfite	0.1
Polyoxyethylene laurylether (E.O=9)	1.0
Polyhydroxyethylene cetylstearyl ether (Cetomacrogol 1000)	1.0
Viscous paraffin oil	2.5
Caprylic acid ester/capric acid ester (Cetiol LC)	2.5
Polyethylene glycol 400	3.0
Polyacrylic acid (Carbopol 934P)	1.0
Purified water	qs
Total	100

It should be possible for those skilled in the art to make various applications and changes without departing from the scope of the present invention.

While the present invention has been particularly
5 illustrated, it is apparent to those skilled in the art that the above-specified techniques are merely a preferred exemplary embodiment and not intended to limit the scope of the present invention. Accordingly, the scope of the present invention should be defined by the scope of the following claims and
10 equivalents thereof.

Industrial Availability

The composition for external application according to the present invention has a good antioxidant effect and is thus applicable to a cosmetic composition, a pharmaceutical

composition, or a health food composition. The composition of the present invention also has good effects to prevent skin redness (erythema), improve skin tone, and prevent skin aging.

CLAIMS

1. An antioxidant composition for external application, containing tangeretin.

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2. The antioxidant composition for external application as claimed in claim 1, wherein the composition further contains epigallocatechin gallate (EGCG).

10 3. The antioxidant composition for external application as claimed in claim 1, wherein the tangeretin is contained at an amount of 0.001 to 10 wt.% with respect to the total weight of the composition.

15 4. The antioxidant composition for external application as claimed in claim 2, wherein the EGCG is contained at an amount of 0.001 to 20 wt.% with respect to the total weight of the composition.

20 5. The antioxidant composition for external application as claimed in claim 1, wherein the composition contains a tangerine peel extract containing tangeretin.

6. The antioxidant composition for external application as claimed in claim 2, wherein the composition contains a green tea extract containing EGCG.

5 7. The antioxidant composition for external application as claimed in claim 5, wherein the tangerine peel extract is contained at an amount of 0.001 to 10 wt.% with respect to the total weight of the composition.

10 8. The antioxidant composition for external application as claimed in claim 6, wherein the green tea extract is contained at an amount of 0.001 to 99.9 wt.% with respect to the total weight of the composition.

15 9. The antioxidant composition for external application as claimed in claim 5 or 6, wherein the extract is obtained by soaking a raw material in an organic solvent for extraction and then performing filtration, decompression, and concentration.

20 10. The antioxidant composition for external application as claimed in claim 9, wherein the organic solvent comprises at least one selected from the group consisting of C₁-C₄ anhydrous or water-containing alcohol, acetone, ethylacetate, chloroform, glycerin, propylene glycol, and butylene glycol.

11. An erythema-preventing composition for external application, containing tangeretin.

5 12. The erythema-preventing composition for external application as claimed in claim 11, wherein the composition further contains epigallocatechin gallate (EGCG).

10 13. The erythema-preventing composition for external application as claimed in claim 11, wherein the tangeretin is contained at an amount of 0.001 to 10 wt.% with respect to the total weight of the composition.

15 14. The erythema-preventing composition for external application as claimed in claim 12, wherein the EGCG is contained at an amount of 0.001 to 10 wt.% with respect to the total weight of the composition.

20 15. The erythema-preventing composition for external application as claimed in claim 11, wherein the tangeretin is contained as a tangerine peel extract containing tangeretin.

16. The erythema-preventing composition for external application as claimed in claim 12, wherein the EGCG is contained as a green tea extract containing EGCG.

5 17. The erythema-preventing composition for external application as claimed in claim 15, wherein the tangerine peel extract is contained at an amount of 0.001 to 10 wt.% with respect to the total weight of the composition.

10 18. The erythema-preventing composition for external application as claimed in claim 16, wherein the green tea extract is contained at an amount of 0.001 to 99.9 wt.% with respect to the total weight of the composition.

15 19. The erythema-preventing composition for external application as claimed in claim 15 or 16, wherein the extract is obtained by soaking a raw material in an organic solvent for extraction and then performing filtration, decompression, and concentration.

20 20. The erythema-preventing composition for external application as claimed in claim 19, wherein the organic solvent comprises at least one selected from the group consisting of C₁-

C₄ anhydrous or water-containing alcohol, acetone, ethylacetate, chloroform, glycerin, propylene glycol, and butylene glycol.

21. A composition for external application for improving
5 skin tone, containing tangeretin.

22. The composition for external application for improving skin tone as claimed in claim 21, wherein the composition further contains epigallocatechin gallate (EGCG).

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23. The composition for external application for improving skin tone as claimed in claim 21, wherein the tangeretin is contained at an amount of 0.001 to 20 wt.% with respect to the total weight of the composition.

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24. The composition for external application for improving skin tone as claimed in claim 22, wherein the EGCG is contained at an amount of 0.01 to 20 wt.% with respect to the total weight of the composition.

20

25. The composition for external application for improving skin tone as claimed in claim 21, wherein the tangeretin is contained as a tangerine peel extract containing tangeretin.

26. The composition for external application for improving skin tone as claimed in claim 22, wherein the EGCG is contained as a green tea extract containing EGCG.

5 27. The composition for external application for improving skin tone as claimed in claim 25, wherein the tangerine peel extract is contained at an amount of 0.001 to 10 wt.% with respect to the total weight of the composition.

10 28. The composition for external application for improving skin tone as claimed in claim 26, wherein the green tea extract is contained at an amount of 0.001 to 99.9 wt.% with respect to the total weight of the composition.

15 29. The composition for external application for improving skin tone as claimed in claim 25 or 26, wherein the extract is obtained by soaking a raw material in an organic solvent for extraction and then performing filtration, decompression, and concentration.

20 30. The composition for external application for improving skin tone as claimed in claim 29, wherein the organic solvent comprises at least one selected from the group consisting of C₁-

C₄ anhydrous or water-containing alcohol, acetone, ethylacetate, chloroform, glycerin, propylene glycol, and butylene glycol.

31. A method for providing an antioxidant effect on the
5 skin using a composition containing tangeretin.

32. The method as claimed in claim 31, wherein the composition further contains EGCG.

10 33. A method for providing an antioxidant effect on the skin using a composition comprising a tangerine peel extract containing tangeretin.

34. The method as claimed in claim 33, wherein the
15 composition further comprises a green tea extract containing EGCG.

35. A method for preventing skin erythema using a composition containing tangeretin.

20 36. The method as claimed in claim 34, wherein the composition further contains EGCG.

37. A method for preventing skin erythema using a composition containing a tangerine peel extract containing tangeretin.

5 38. The method as claimed in claim 37, wherein the composition further contains a green tea extract containing EGCG.

39. A method for improving skin tone using a composition containing tangeretin.

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40. The method as claimed in claim 39, wherein the composition further contains EGCG.

41. A method for improving skin tone using a composition
15 containing a tangerine peel extract containing tangeretin.

42. The method as claimed in claim 41, wherein the composition further contains a green tea extract containing EGCG.

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