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(54) Title: ANTI-AGING TREATMENT USING COPPER AND ZINC COMPOSITIONS

(57) Abstract: Composition and methods for alleviating or eliminating age related skin conditions by providing an effective amount of one or more copper, zinc and copper- zinc compositions are disclosed. Treatment is accomplished through the use of topical compositions containing one or more copper or zinc salts and/or copper-zinc compounds or complexes, particularly copper-zinc malonate active ingredient.

Anti-aging Treatment Using Copper and Zinc Compositions

CROSS REFERENCE TO RELATED APPLICATION

This Application claims priority benefit of U.S. Provisional Application No. 60/764,967 filed February 3, 2006 the entire disclosure of which is incorporated herein by this reference.

BACKGROUND

Technical Field

This disclosure relates to the use of compositions containing copper, zinc and/or copper-zinc active ingredients for pharmaceutical and cosmeceutical purposes.

Background of the Invention

Aging is a phenomenon which occurs in all living things. Unfortunately, with age comes a multitude of undesirable skin conditions which can adversely affect the appearance and health of skin. For example, as skin ages it becomes more susceptible to symptoms such as, *inter alia*, dryness, itchiness, thinning or thickening, wrinkles and/or fine lines, hyperpigmentation, telangietasias, and the like. Although there are known treatments for alleviating and curing age related skin conditions, known skin treatments are problematic in that results vary from patient to patient. Moreover, no one treatment, if ever, obtains maximum benefit for every patient. As a result, novel skin treatments are continuously sought after to thwart undesirable age related skin conditions.

Accordingly, there remains room for improvement in skin treatment regimens that enhance aged skin. What are needed are new skin care compositions and methods for treating age related skin conditions.

SUMMARY

Active ingredients such as copper-zinc salts of multifunctional organic acids and formulations containing them may be used to treat age related skin conditions. The copper constituent and zinc constituent, which may be cations, may be combined within a single molecule or used individually in separate molecules during topical application to treat age related skin conditions. For example, copper and zinc constituents may be topically applied simultaneously to the skin of the user in order to combine the catalytic properties of each constituent. Moreover, the copper and zinc constituents may be topically applied in the same molecule to combine the catalytic properties of each constituent. Accordingly, the combined application of copper and zinc constituents in the same topical treatment provides enhanced biological activity than the use of either constituent alone.

Skin having one or more undesirable age related conditions is treated in accordance with the present disclosure by the topical application of one or more active ingredients thereto. For example, compositions containing copper-zinc malonates can be directly applied to skin in need of treatment. Such conditioning by application of copper-zinc active ingredients may reduce or eliminate undesirable age related skin conditions, and promote or stimulate collagen, elastin, tropoelastin, and/or elastic fiber production in the dermis to make aged skin healthier, and/or appear younger.

In addition, dermatological treatment regimens in accordance with the present disclosure may improve characteristics of a user's aged skin. The regimens include the repeated topical application of one or more copper-zinc active ingredients. Suitable corrective compositions include, for example, compositions which help to reduce or eliminate age related conditions. In embodiments, compositions including a single molecule having both copper and zinc constituents are applied to the skin to increase levels of collagen, elastin, tropoelastin, and/or elastic fibers in the dermis layer. The resulting increase can improve the appearance of skin and/or give a more youthful look.

These and other aspects of this disclosure will be evident upon reference to the following detailed description.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a histogram comparing tropoelastin levels in skin after application of a 0.1% copper-zinc malonate formulation to skin at baseline (B) and at four weeks (C).

FIGS. 2A and 2B are photographs comparing elastic fibers in skin after application of a 0.1% copper-zinc malonate formulation to skin at baseline (Fig. 2A) and at four weeks (Fig. 2B).

FIGS. 3A, 3B and 3C are photographs that illustrate a comparison of wrinkles over treatment course which topically applied a composition in accordance with the present disclosure (0.1% copper-zinc malonate) to skin.

FIGS. 4A, 4B and 4C are photographs that illustrate a comparison of wrinkles over treatment course which topically applied a composition in accordance with the present disclosure (0.1% copper-zinc malonate) to skin.

FIGS. 5A, 5B and 5C are photographs that illustrate a comparison of wrinkles over treatment course which topically applied a composition in accordance with the present disclosure (0.1% copper-zinc malonate) to skin.

DETAILED DESCRIPTION OF PREFERRED EMBODIMENTS

Active ingredients are used in accordance with the present disclosure to treat age related skin conditions. As copper and zinc are biologically needed by the body to catalyze the production of collagen and elastin in the dermis, active ingredients having copper, zinc and/or copper-zinc constituents can be topically applied to treat age related skin conditions. For example, bimetal complexes having copper and/or zinc constituents can be applied to skin to penetrate the dermis to stimulate production of collagen, elastin, tropoelastin and/or elastic fibers resulting in improved skin appearance.

Suitable active ingredients for use in accordance with the present disclosure include non-toxic compounds containing both copper and zinc. Such copper, zinc, and copper-zinc active ingredients include, but are not limited to, water soluble

compounds that contain both copper and zinc. The water-soluble copper-zinc compounds include any copper-zinc salts formed from reacting any multifunctional organic or inorganic acid with any zinc or copper metal and/or their metallic bases. The organic acid can be aromatic or aliphatic. Suitable non-limiting examples of the water-soluble copper-zinc compounds include copper-zinc citrate, copper-zinc oxalate, copper-zinc tartarate, copper-zinc malate, copper-zinc succinate, copper-zinc malonate, copper-zinc maleate, copper-zinc aspartate, copper-zinc glutamate, copper-zinc glutarate, copper-zinc fumarate, copper-zinc glucarate, copper-zinc polyacrylic acid, and combinations thereof. Suitable non-water soluble copper-zinc compounds include any copper-zinc salts found from reacting any multifunctional water insoluble organic acid with zinc or copper metal and/or their metallic bases. Accordingly, suitable non-limiting examples of the non-water soluble copper-zinc compounds include copper-zinc adipate, copper-zinc pimelate, copper-zinc suberate, copper-zinc azealate, copper-zinc sebacate, copper-zinc dodecanoate, and combinations thereof. In embodiments, copper-zinc salts of organic multicarboxylic acids are suitable for use in accordance with the present disclosure. Accordingly, it is envisioned that multifunctional organic acids such as carboxylic acids may be reacted with any zinc or copper metal and/or their metallic bases to form the active ingredient of the present disclosure. In embodiments, the molar ratio of copper to zinc in the copper-zinc active ingredient is from about 1:1 to about 3:1. In other embodiments, the molar ratio of copper to zinc in the copper-zinc active ingredient is from about 1:1 to about 2:1.

In particular embodiments, non-limiting examples of suitable active ingredients include one or more copper-zinc malonates. As used herein "copper-zinc malonate" refers to any salt substances formed from malonic acid having

copper and zinc constituents at various mole ratios of copper and zinc in the same molecule. For example, in embodiments, the molar ratio of copper to zinc in the copper-zinc malonate active ingredient is from about 1:1 to about 3:1. In other embodiments, the molar ratio of copper to zinc in the copper-zinc malonate active ingredient is from about 1:1 to about 2:1. In embodiments, copper-zinc malonate includes about 16.5% copper and about 12.4% zinc. In general, the copper-zinc malonate active ingredients used in accordance with the present disclosure include ingredients that are compounds of copper and zinc with malonic acid. Non-limiting examples of suitable ingredients for the formation of suitable copper-zinc malonates include, but are not limited to, malonic acid, zinc base, copper base, and water.

In forming suitable copper-zinc malonates for use in accordance with the present disclosure, malonic acid is present in amounts that will react with metal cations such as copper and zinc in an aqueous solution. Suitable amounts of malonic acid also include excess amounts in relation to the amount of copper and zinc cations to force reactions. In embodiments, malonic acid is present in a 3:1:1 molar ratio in relation to the copper and zinc constituents. Two or more salts containing copper and zinc constituents can be present in amounts that will react with malonic acid in an aqueous solution. Suitable salts that may be employed in making copper-zinc malonate active ingredients in accordance with this disclosure include metal salts containing complex-forming metal ions of copper and/or zinc. Non-limiting examples of suitable metal basic salts are: copper (I) and (II) salts such as copper carbonate, copper oxide, and copper hydroxide; and zinc salts such as zinc carbonate, zinc oxide, zinc hydroxide, metallic copper and metallic zinc. In embodiments, the reaction media includes two metallic salts, such as cupric

carbonate ($CuCO_3 \cdot Cu(OH)_2$), zinc carbonate ($3Zn(OH)_2 \cdot 2ZnCO_3$), or metallic zinc and metallic copper.

In embodiments, any copper salt, zinc salt and/or combinations of copper salt and zinc salt may be topically applied as an active ingredient in amounts sufficient to reduce or eliminate undesirable age related skin conditions, stimulate collagen, elastin tropoelastin and/or elastic fiber production in the dermis and/or make aged skin healthier and appear younger. Additional suitable non-limiting examples of copper and/or zinc salts which may be used to treat skin include copper (II) malonate and any hydrated form thereof such as copper (II) malonate dihydrate, copper (II) malonate trihydrate, and copper malonate tetrahydrate. Other suitable non-limiting examples of suitable copper and/or zinc salt active ingredients for treating age related skin conditions in accordance with the present disclosure include copper or zinc salts of citrate, oxalate, tartarate, malate, succinate, malonate, maleate, aspartate, glutamate, glutarate, fumarate, glucarate, polyacrylic acid, adipate, pimelate, suberate, azealate, sebacate, dodecanoate. Combinations thereof are also possible.

The active ingredient or ingredients may be combined with numerous ingredients to form products to be applied to the skin, or other tissues of humans or other mammals. Such products may include a dermatologically or pharmaceutically acceptable carrier or diluent, vehicle or medium, for example, a carrier, vehicle or medium that is compatible with the tissues to which they will be applied. The term "dermatologically or pharmaceutically acceptable," as used herein, means that the compositions or components thereof so described are suitable for use in contact with these tissues or for use in patients in general

without undue toxicity, incompatibility, instability, allergic response, and the like. In embodiments, compositions in accordance with the present disclosure can contain any ingredient conventionally used in cosmetics and/or dermatology.

As an illustrative example, compositions can be formulated to contain active ingredient in amounts from about 0.001 to about 5% by weight of the total composition. In embodiments, products can be formulated to contain active ingredient in an amount from about 0.05 to about 1% by weight of the total composition. In other embodiments, the amount of active ingredient is from about 0.1 to about 0.5% by weight of the total composition. In such embodiments, the copper or zinc salt and/or copper-zinc present may be in a pharmaceutically acceptable salt form.

In embodiments, products containing active ingredients in accordance with the present disclosure can be in the form of solutions, emulsions (including microemulsions), suspensions, creams, fluid cream, oils, lotions, gels, powders, or other typical solid or liquid compositions used for treatment of age related skin conditions. Such compositions may contain, in addition to the copper and/or zinc salts and/or copper-zinc salts in accordance with this disclosure, other ingredients typically used in such products, such as other active cosmetic substances such as retinol, retinol derivatives, allantoin, tocopherol, tocopherol derivatives, niacinamide, phytosterols, isoflavones, panthenol, panthenol derivatives, bisabolol, farnesol, and combinations thereof, other active drug substances such as corticosteroid, metronidazole, sulfacetamide, sulfur, and combinations thereof, antioxidants, antimicrobials, coloring agents, detergents, dyestuffs, emulsifiers, emollients, fillers, fragrances, gelling agents, hydration agents, moisturizers, odor

absorbers, natural or synthetic oils, penetration agents, powders, preservatives, solvents, surfactants, thickeners, viscosity-controlling agents, water, distilled water, waxes, and optionally including anesthetics, anti-itch actives, botanical extracts, conditioning agents, darkening or lightening agents, glitter, humectant, mica, minerals, polyphenols, phytomedicinals, silicones or derivatives thereof, skin protectants, sunblocks, vitamins, and mixtures or combinations thereof. Such compositions may also contain, in addition to the copper or zinc salts and/or copper-zinc salts in accordance with this disclosure, one or more: fatty alcohols, fatty acids, organic bases, inorganic bases, wax esters, steroid alcohols, triglyceride esters, phospholipids, polyhydric alcohol esters, fatty alcohol ethers, hydrophilic lanolin derivatives, hydrophilic beeswax derivatives, cocoa butter waxes, silicon oils, pH balancers, cellulose derivatives, hydrocarbon oils, or mixtures and combinations thereof.

In embodiments, product forms can be formulated to contain humectant in amounts from about 1% to about 15% by weight of the total composition. For example glycerine can be added to the composition in amounts from about 1% to about 15% by weight of the total composition. In particular embodiments, glycerine can be added to the composition in amounts from about 1% to about 5% by weight of the total composition.

In embodiments, product forms can be formulated to contain solvent in amounts from about 1% to about 45% by weight of the total composition. For example petroleum derivatives such as propylene glycol can be added to the composition in amounts from about 1% to about 45% by weight of the total composition. In particular embodiments, propylene glycol can be added to the

composition in amounts from about 15% to about 30% by weight of the total composition.

In embodiments, product forms can be formulated to contain water in amounts from about 40% to about 99% by weight of the total composition. For example distilled water can be added to the composition in amounts from about 40% to about 99% by weight of the total composition. In particular embodiments, distilled water can be added to the composition in amounts from about 65% to about 80% by weight of the total composition.

The present active ingredients and formulations containing them in accordance with the present disclosure can be topically applied to skin in need of improvement in amounts sufficient to reduce or eliminate undesirable age related skin conditions, such as via stimulation of collagen, elastin, tropoelastin and/or elastic fiber production. As used herein the word "treat," "treating" or "treatment" refers to using the compositions of the present disclosure prophylactically to prevent outbreaks of any undesirable age related skin conditions, or therapeutically to ameliorate an existing undesirable age related skin condition. A number of different treatments are now possible, which reduce and/or eliminate age related skin conditions such as wrinkles.

As used herein "age related skin condition" refers to any detectable skin manifestations caused by skin aging. Such manifestations can appear due to a number of factors such as, for example, chronological aging, environmental damage, and/or other diseased or dysfunctional state. Non-limiting examples of such manifestations include the development of dryness, itchiness, thinning,

thickening, wrinkling, including both fine superficial wrinkles and coarse deep wrinkles, skin lines, crevices, bumps, large pores, scaliness, flakiness and/or other forms of skin unevenness or roughness, hyperpigmentation, mottled appearance, decreased healing times, cherry angioma, telangietasias, senile development, actinic purpura development, seborrheic keratoses, actinic keratoses, fatty tissue formation, fatty tissue deterioration, increased collagen, elastin, tropoelastin, and elastic fiber content, decreased collagen, elastin, tropoelastin or elastic fiber content, and combinations thereof. Such manifestations further include undesirable tactile conditions such as loss of skin elasticity, sagging, loss of skin firmness, loss of skin tightness, loss of skin recoil from deformation, and/or sallowness. Such manifestations further include undesirable visible conditions such as hyperpigmented skin regions such as age spots and freckles, keratoses, abnormal differentiation, hyperkeratinization, stretch marks, discoloration, blotching, and combinations thereof. It is understood, that the listed age related skin conditions are non-limiting and that only a portion of the skin conditions suitable for treatment in accordance with the present disclosure are listed herein.

In embodiments, compositions for use in accordance with the present disclosure contain one or more active ingredients capable of contacting skin with copper and/or zinc in an effective amount to improve undesirable age related skin conditions. As used herein "effective amount" refers to an amount of a compound or composition having active ingredients such as those having copper, zinc and/or copper-zinc constituents in accordance with the present disclosure that is sufficient to induce a particular positive benefit to skin having an age related skin condition. The positive benefit can be health-related, or it may be more cosmetic

in nature, or it may be a combination of the two. In embodiments, the positive benefit is achieved by contacting skin with a combination of copper and zinc which can be in the form of copper and zinc ions, and/or one or more salts having copper and zinc constituents, to improve an age related skin condition. In embodiments, the positive benefit is achieved by contacting skin with one or more active ingredients to enhance tropoelastin levels and/or increase insoluble elastic fibers in skin. In embodiments, the positive benefit is achieved by contacting skin with one or more active ingredients to increase insoluble elastin levels and/or reestablish firmness of skin. In embodiments, the positive benefit is achieved by contacting skin with one or more active ingredients to improve wrinkles.

The particular active ingredient or ingredients employed, and the concentration in the compositions, generally depends on the purpose for which the composition is to be applied. For example, the dosage and frequency of application can vary depending upon the type and severity of the age related skin condition.

Treatments in accordance with the present disclosure contact skin with one or more active ingredients such as those containing copper and zinc in an effective amount to improve undesirable age related skin conditions. In embodiments, patients are treated by topically applying to skin suffering from an age related condition, one or more copper-zinc malonates. In embodiments, patients are treated by topically applying to skin suffering from an age related condition, one or more copper, zinc and/or copper-zinc salts. The active ingredient is applied until the treatment goals are obtained. However, the duration of the treatment can vary depending on the severity of the condition. For example, treatments can last

several weeks to months depending on whether the goal of treatment is to reduce or eliminate an age related skin condition.

Treatments in accordance with the present disclosure contact skin with one or more active ingredients such as those containing copper and zinc in an effective amount to increase collagen, elastin (insoluble/soluble), elastic fiber and/or tropoelastin levels therein. As used herein "elastin" refers to a protein in the skin that helps maintain resilience and elasticity. Generally, elastin is a protein in connective tissue that is elastic and allows tissues in the body, including skin, to resume their shape after stretching or contracting. For example, when pressure is applied to skin to change its shape, elastin helps skin to return to its original shape. Elastin may be made by linking multiple tropoelastin protein molecules to make a large insoluble cross-linked aggregate. As used herein "tropoelastin" refers to a water-soluble precursor to the elastin molecule, having a molecular weight of about 70000 Daltons. As used herein, "collagen" refers to a fibrous protein that contributes to the physiological functions of connected tissues in the skin, tendon, bones, and cartilage. Generally, the structural unit is tropocollagen composed of 3-polypeptide chains, designated A1, A2, and A3 that form a triple helical structure stabilized by hydrogen bonds. The term collagen further refers to collagen types, such as type I collagen, type II collagen, and type III collagen.

In embodiments, patients are treated by topically applying to skin in need of collagen, elastin, tropoelastin and/or elastic fibers one or more copper, zinc and/or copper-zinc salts, such as copper-zinc malonate. The active ingredient is applied until the treatment goals are obtained. However, the duration of the treatment can vary depending on the severity of the condition. For example, treatments can last

several weeks to months depending on whether the goal of treatment is to promote or repair collagen, elastin, tropoelastin and/or elastic fiber levels in the skin. In treatment embodiments, 1 to 5 drops of a composition containing 0.1% copper-zinc malonate may be applied to wrinkled skin twice a day for 4 weeks. In such treatments, some users should expect tropoelastin levels in the skin to increase in amounts of about 5% to about 30% and/or insoluble elastin content to be increased in amounts of about 20% to about 30%. Accordingly, some users should expect the treatment to diminish wrinkles and cause the skin to appear healthier and look younger. Moreover, some users should expect firmness of the wrinkled skin to be reestablished.

In embodiments, the active agents are applied for cosmetic purposes only.

In some embodiments, use of a compound including copper-zinc ingredients such as copper-zinc malonate may be included in the manufacture of a medicament for treatment of an age related skin condition. In such embodiments, copper-zinc ingredients described in accordance with the present disclosure can be manufactured into a pure medicament, compositions containing medicament, and/or formulations containing medicament and any excipients and/or ingredients described herein.

The following non-limiting examples further illustrate methods in accordance with this disclosure.

Example 1

A 72 year old woman is suffering from wrinkling on her face. A gel composition suitable for treatment of skin containing an effective amount of

copper-zinc malonate active ingredient is routinely applied to her face twice daily. Wrinkling is reduced or eliminated.

Example 2

A copper-zinc malonate formulation has the following make-up:

COMPONENT	% BY WEIGHT
Copper-zinc malonate* (Active ingredient)	0.1%
Glycerine	3.0%
Propylene Glycol	25.0%
Distilled Water	71.9%

* Copper-zinc malonate was made by mixing 1 mole Zn/ 1 mole Cu/ 3 moles malonic acid.

Example 3

A 28-day, split-face, right and left forearm punch biopsy study to investigate the efficacy of composition of Example 2 to increase the collagen, elastin, tropoelastin and/or elastic fiber levels in the skin was performed. Pre-determined treatment areas were assigned around eyes and on forearms.

The following application protocol was used on some subjects:

Treatment Protocol:

A trained technician applied the composition of Example 2 to pre-assigned eye areas and forearm areas wearing a clear polyethylene disposable glove to rub product uniformly onto the test site. Product and total amounts applied were:

Formulation of Example 2 applied to eye area	1 drop
Formulation of Example 2 applied to forearm	2 drops
Formulation of Example 2 without active applied to eye area	1 drop
Formulation of Example 2 without active applied to forearm	2 drops

After application, the subjects were instructed to avoid washing areas for a minimum of 8 hours.

Treatments for all subjects included daily product applications (Monday – Friday) at the clinic starting at baseline (Day 1) through Day 27. Skin elasticity measurements were taken by a trained technician using the cutometer® (Courage + Khazaka) as well as ultrasound recordings. Cutometer and ultrasound measurements were taken at baseline (Day 1), week 2 (Day 14), and week 4 (Day 28). Punch biopsy skin samples were obtained at baseline and at week 4 (Day 28) on the right and left forearms of some subjects. A total of 2 punch biopsies (1 on the right forearm and 1 on the left forearm) were taken by a Board Certified Dermatologist at each visit.

Results:

Individuals that utilized the formulation of example 2 (with active ingredient) show increased levels tropoelastin and elastic fibers in skin after 27 days of product application. For example, elevated levels of tropoelastin were observed. Referring to Fig. 1, a histogram compares tropoelastin levels at baseline (B) and at four weeks (C). The results demonstrate that the application of copper-zinc malonate composition of Example 2, increases tropoelastin levels by approximately 19%. Moreover, for 8 of 13 subjects where composition of Example 2 with active ingredient was applied to the forearm, an increase in insoluble elastic fibers of approximately 29% was observed.

Referring now to Figs. 2A and 2B, photographs of skin tissue comparing elastic fibers at baseline (arrow in Fig. 2A) to elastic fibers after four weeks (arrow in Fig. 2B) are shown. Accordingly, treatment with composition in accordance with Example 2 increased elastic fibers in skin.

Referring now to Figs. 3A, 3B, and 3C, a series of progressive photographs are shown of the face of a 67 year old female having Fitzpatrick Type I skin type at baseline, two weeks, and 4 weeks respectively during treatment in accordance with the present disclosure. Here, the treatment included applying 1 drop of a formulation in accordance with Example 2 to skin immediately adjacent to the right eye (O.D.). The photographs show reduced wrinkling of skin around the right eye where composition in accordance with the present disclosure (Example 2) was applied. Skin in Fig. 3C after four weeks of treatment looked healthier and younger and reduced wrinkling was observed.

Referring now to Figs. 4A, 4B, and 4C a series of progressive photographs are shown of the face of a 50 year old female having Fitzpatrick Type I skin type at baseline, two weeks, and 4 weeks respectively during treatment in accordance with the present disclosure. Here, the treatment included applying 1 drop of a formulation in accordance with Example 2 to skin immediately adjacent to the left eye (O.S.). The photographs show reduced wrinkling of skin around the left eye where composition in accordance with the present disclosure (Example 2) was applied. Skin in Fig. 4C after four weeks of treatment looked healthier and younger and reduced wrinkling was observed.

Referring now to Figs. 5A, 5B, and 5C a series of progressive photographs are shown of the face of a 59 year old female having Fitzpatrick Type I skin type at baseline, two weeks, and 4 weeks respectively during treatment in accordance with the present disclosure. Here, the treatment included applying 1 drop of a formulation in accordance with Example 2 to skin immediately adjacent to the right

eye (O.D.). The photographs show reduced wrinkling of skin around the right eye where composition in accordance with the present disclosure (Example 2) was applied. Skin in Fig. 5C after four weeks of treatment with composition of Example 2 looked healthier and younger and reduced wrinkling was observed.

While several embodiments of the disclosure have been described, it is not intended that the disclosure be limited thereto, as it is intended that the disclosure be as broad in scope as the art will allow and that the specification be read likewise. Therefore, the above description should not be construed as limiting, but merely as exemplifications of embodiments. Those skilled in the art will envision other modifications within the scope and spirit of the claims appended hereto.

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WHAT IS CLAIMED IS:

1. A method comprising topically applying to a user's skin a composition comprising a copper-zinc active ingredient.

2. A method as in claim 1 wherein the copper-zinc active ingredient is a water soluble copper-zinc compound.

3. A method as in claim 1 wherein the copper-zinc active ingredient comprises copper-zinc salts of organic multifunctional carboxylic acids.

4. A method as in claim 1 wherein the copper-zinc active ingredient comprises copper-zinc citrate, copper-zinc oxalate, copper-zinc tartarate, copper-zinc malate, copper-zinc succinate, copper-zinc malonate, copper-zinc maleate, copper-zinc aspartate, copper-zinc glutamate, copper-zinc glutarate, copper-zinc fumarate, copper-zinc glucarate, copper-zinc polyacrylic acid, copper-zinc adipate, copper-zinc pimelate, copper-zinc suberate, copper-zinc azealate, copper-zinc sebacate, copper-zinc dodecanoate, or combinations thereof.

5. A method as in claim 1 wherein the copper-zinc active ingredient is a copper-zinc malonate.

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6. A method as in claim 5 wherein the copper-zinc malonate comprises about 16.5% copper and about 12.4% zinc.

7. The method of claim 1 wherein the molar ratio of copper to zinc in the copper-zinc active ingredient is from about 1:1 to about 3:1.

8. The method of claim 1 wherein the molar ratio of copper to zinc in the copper-zinc active ingredient is from about 1:1 to about 2:1.

9. The method of claim 1 wherein the copper-zinc active ingredient is present in an amount from about 0.001 to about 5% by weight of the composition.

10. The method of claim 1 wherein the copper-zinc active ingredient is present in an amount from about 0.05 to about 1% by weight of the composition.

11. The method of claim 1 wherein the copper-zinc active ingredient is present in an amount from about 0.1 to about 0.5% by weight of the composition.

12. The method according to claim 1 wherein an effective amount of copper-zinc malonate composition is applied to the skin of a user to treat skin afflicted with one or more age related conditions.

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13. A method as in claim 12 wherein the age related condition comprises wrinkling, fine line formation, or combinations thereof.

14. A method as in claim 1 wherein the composition is a solution, emulsion, microemulsion, suspension, cream, lotion, gel, powder, solid composition, or combinations thereof.

15. A method as in claim 14 wherein the composition further comprises one or more secondary ingredients including active cosmetic substances, active drug substances, anesthetics, anti-itch actives, antioxidants, antimicrobials, botanical extracts, conditioning agents, coloring agents, darkening or lightening agents, detergents, dyestuffs, emulsifiers, emollients, fillers, fragrances, gelling agents, glitter, hydration agents, humectant, mica, minerals, moisturizers, odor absorbers, natural or synthetic oils, penetration agents, polyphenols, phytomedicinals, powders, preservatives, silicones or derivatives thereof, solvents, skin protectants, surfactants, sunblocks, thickeners, viscosity-controlling agents, vitamins, water, distilled water, waxes, or combinations thereof.

16. The method according to claim 1, wherein the composition comprises a dermatologically acceptable carrier or diluent.

17. A method for forming collagen, elastic fibers, elastin, or tropoelastin in the skin of a patient comprising contacting an area of the skin in need thereof with an effective

amount of a composition wherein the composition comprises one or more copper-zinc active ingredients.

18. The method according to claim 17, wherein the composition comprises a dermatologically acceptable carrier or diluent.

19. The method according to claim 17, wherein the copper-zinc active ingredient is a water soluble copper-zinc compound.

20. The method according to claim 17, wherein the copper-zinc active ingredient is selected from the group consisting of copper-zinc organic acid salts, copper-zinc inorganic acid salts, and combinations thereof.

21. The method according to claim 17, wherein the copper-zinc active ingredient is selected from the group consisting of copper-zinc citrate, copper-zinc oxalate, copper-zinc tartarate, copper-zinc malate, copper-zinc succinate, copper-zinc malonate, copper-zinc maleate, copper-zinc aspartate, copper-zinc glutamate, copper-zinc glutarate, copper-zinc fumarate, copper-zinc glucarate, copper-zinc polyacrylic acid, copper-zinc adipate, copper-zinc pimelate, copper-zinc suberate, copper-zinc azealate, copper-zinc sebacate, copper-zinc dodecanoate, and combinations thereof.

22. The method according to claim 17, wherein the copper-zinc active ingredient is a copper-zinc malonate.

23. The method according to claim 22, wherein the copper-zinc malonate comprises about 16.5% copper and about 12.4% zinc.

24. The method according to claim 17, comprising from about 0.001 to about 5 percent by weight of the copper-zinc active ingredient.

25. The method according to claim 17, comprising from about 0.05 to about 1 percent by weight of the copper-zinc active ingredient.

26. The method according to claim 17, comprising from about 0.1 to about 0.5% percent by weight of the copper-zinc active ingredient.

27. The method according to claim 17, further comprising one or more secondary ingredients selected from the group consisting of active cosmetic substances, active drug substances, anesthetics, anti-itch actives, antioxidants, antimicrobials, botanical extracts, conditioning agents, coloring agents, darkening or lightening agents, detergents, dyestuffs, emulsifiers, emollients, fillers, fragrances, gelling agents, glitter, hydration agents, humectant, mica, minerals, moisturizers, odor absorbers, natural or synthetic oils, penetration agents, polyphenols, phytomedicinals, powders, preservatives, silicones or derivatives thereof, solvents, skin protectants, surfactants, sunblocks, thickeners, viscosity-controlling agents, vitamins, water, distilled water, waxes, and combinations thereof.

28. The method of claim 17 wherein the composition further comprises an active drug substance.

29. The method of claim 17 wherein the composition further comprises an active cosmetic substance.

30. The method of claim 17 wherein the composition further comprises a skin lightening agent, a sunscreen agent, a skin conditioning agent, a skin protectant, an emollient, a humectant, or a mixture thereof.

31. The method of claim 17 wherein the composition further comprises a fatty alcohol, a fatty acid, an organic base, an inorganic base, a preserving agent, a wax ester, a steroid alcohol, a triglyceride ester, a phospholipid, a polyhydric alcohol ester, a fatty alcohol ether, a hydrophilic lanolin derivative, a hydrophilic beeswax derivative, a cocoa butter wax, a silicon oil, a pH balancer, a cellulose derivative, a hydrocarbon oil, or a mixture thereof.

32. The method of claim 17 wherein the composition further comprises humectant, solvent, water, or combinations thereof.

33. The method of claim 17 wherein the composition is in the form of a liquid, cream, oil, gel, fluid cream, lotion, emulsion or microemulsion.

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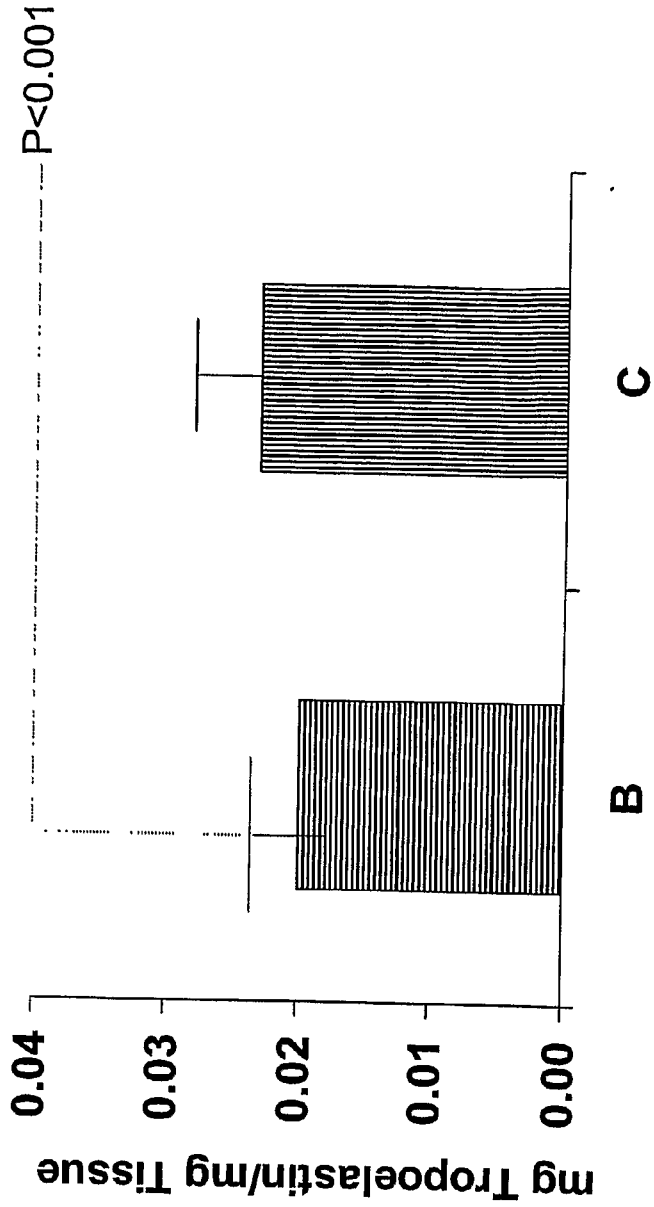
34. A method of treating an age related skin condition comprising topically applying to a user's skin an effective amount of copper-zinc malonate, wherein the molar ratio of copper to zinc in the copper-zinc malonate is from about 1:1 to about 2:1.

35. The method according to claim 34 wherein the copper-zinc malonate was formed in a reaction media including about 1 mole copper from cupric carbonate, about 1 mole of zinc from zinc carbonate and about 3 moles of malonic acid.

36. Use of a copper-zinc compound in the manufacture of a medicament for treatment of an age related skin condition.

37. The use in accordance with claim 36 wherein the copper-zinc compound is characterized as a copper-zinc malonate.

FIG. 1



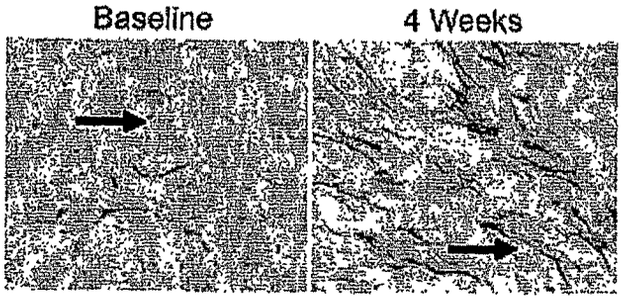


Fig 2A Fig 2B

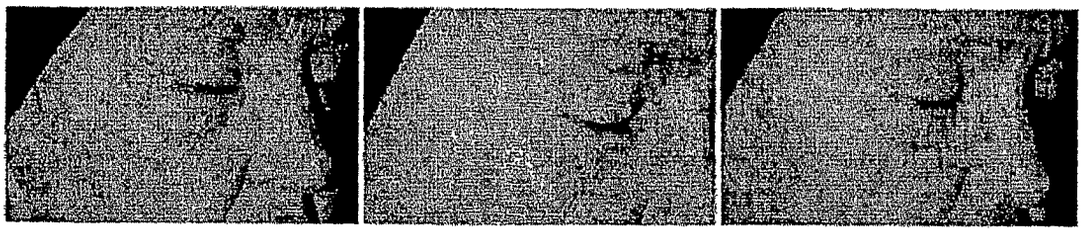


Fig. 3A Fig. 3B Fig. 3C

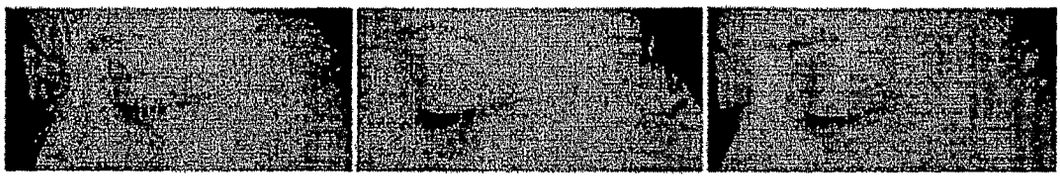


Fig. 4A Fig. 4B Fig. 4C

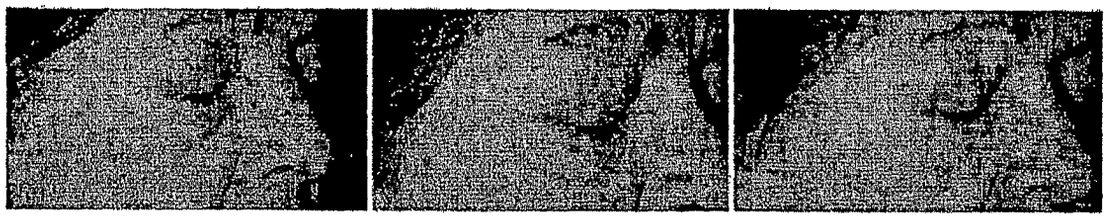


Fig. 5A Fig. 5B Fig. 5C

INTERNATIONAL SEARCH REPORT

International application No.
PCT/US06/23208

A. CLASSIFICATION OF SUBJECT MATTER
IPC: **A61K 33/34**(2006.01)

USPC: 424/630;514/937
According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
U.S. : 424/630; 424/67

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X --- Y	US 2,194,218 (THURSTAN) 19 March 1940 (19.03. 1940), page 1, column 1, lines 1-9; page 2, column 2, lines 36-71; page 5, column 1, line 33 to column 2, line 16	1-37 --- 1-37
X --- Y	US 6,361,800 B1 (COOPER et al) 26 March 2002 (26.03. 2002), column 3, line 48 to column 4, line 5; column 7, lines 7-8; column 7, lines 9-20; column 7, lines 28-31; column 8, lines 32-42; column 8, lines 27-34; column 9, lines 5-15	1-37 --- 1-37

☐ Further documents are listed in the continuation of Box C. ☐ See patent family annex.

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