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[Continued on next page]

(54) Title: HAIR REGROWTH TREATMENT AND GROWTH STIMULANT

FIGURE 1B - AFTER

(57) Abstract: A composition for hair regrowth and hair growth stimulation, a method of use therefore, and a method of making. In an embodiment, the invention is directed toward 5 a hair regrowth and growth stimulant containing the active ingredient minoxidil in combination with a stem cell activating hair growth/regrowth promoter in a non-irritating vehicle/carrier formulation. The non-irritating and scalp-friendly embodiments of the invention are particularly useful in methods for treating all hair types and ethnicities, and are especially useful in the treatment of 10 African-American patients suffering from various forms of non-androgenetic alopecia.

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HAIR REGROWTH TREATMENT AND GROWTH STIMULANT

CROSS-REFERENCE TO RELATED APPLICATION

This application claims benefit of priority to U.S. Provisional Patent Application Ser. No. 62/163,026, filed May 18, 2015, the contents of which is incorporated herein by reference in its entirety.

FIELD OF THE INVENTION

This invention generally relates to a composition for hair regrowth and hair growth stimulation, a method of use therefore, and a method of making the composition. The invention more particularly relates to a hair regrowth and growth stimulant containing Minoxidil in a non-irritating carrier formulation useful for all hair types, ethnicities and types of alopecia. The invention most particularly relates to a hair regrowth and growth stimulant formulation particularly formulated to be effective in the treatment of non-androgenetic alopecia which may be experienced by all hair types and ethnicities, but is particularly troublesome for African-American patients suffering therefrom.

BACKGROUND OF THE INVENTION

Millions of men and women worldwide experience hair thinning or hair loss. The scalp has approximately 110,000 hair follicles, which are growing and falling on a daily basis. When the balance between the growing and the falling hair is altered, hair loss starts and baldness appears.

Androgenetic alopecia or pattern hair loss results from miniaturization of hair follicles in androgen-sensitive areas of the scalp in genetically predisposed persons. Arresting the process of miniaturization remains the goal of medical treatment.

At the present time, topical 6-(piperidin-1-yl)pyrimidine-2,4-diamine 3-oxide, having the common name Minoxidil, and sold under the tradename ROGAINE® by Johnson & Johnson Corporation, and oral finasteride are the only options currently approved by the Food and Drug Administration (USA). In use since 1980, Minoxidil topical solution (MTS) has been a proven treatment for androgenetic alopecia. However, adverse effects have been reported with MTS primarily due to irritation of the scalp, such irritation manifesting as dryness, scaling, itching and redness, which occurs in approximately 7% of patients who use the 2% solution and a greater percentage of those who use the 5% solution because of its higher content of propylene glycol as well as alcohol contents of about 60%. The vehicle in MTS consists of water, alcohol and propylene glycol, of which propylene glycol was found to be the agent most frequently responsible for allergic contact dermatitis. High percentages of alcohol generally tend to exacerbate the irritation by causing scalp dryness. While these adverse effects are prevalent in patient populations exhibiting all hair types and ethnicities, they are particularly prevalent in the African-American population.

While all ethnicities fall victim to androgenetic alopecia, the African-American population is particularly prone to non-androgenetic alopecia. Typically, hair and hair follicles of African-Americans are tightly curled, thus producing hair that spirals. African-American hair also typically has a larger diameter and retains less water, thus it is relatively coarse. Furthermore, the many styling methods utilized on African-American hair cause concern with hair loss. African American hair is very strong, however because the hair cuticle is so thin it is easier for the hair to become damaged with the use of chemicals and tight hair styles.

Most particularly, African-American woman are prone to a variety of hair maladies, specifically traction alopecia, chemical or traumatic alopecia and Central centrifugal cicatricial alopecia (CCCA).

Traction alopecia is a form of hair loss caused by gradual pulling of the hair from tight hairstyles such as ponytails, braids, weaves, dreadlocks, and hair extensions. This type of hair loss is very common among African-American women and is evident by the loss of hair around the temples and the side of the head. Although traction hair loss usually appears in the temporal and parietal areas, it may also be present in the frontal scalp and occipital scalp, as well as the vertex. This is due to prolonged tension from tight braiding or weaving. Traction hair loss also can stem from use of tight rollers, ponytail extensions and aggressive combing or relaxer application. It is also exacerbated by excessive use of relaxers, Brazilian Keratin treatments, texturizers, and other hair chemicals.

Relaxers used to straighten hair can cause a great deal of heat and chemical damage to the hair and scalp, which can also cause Central centrifugal cicatricial alopecia (CCCA), and over time can cause permanent hair loss. Additionally, the use of hot curling irons can lead to traction alopecia. Relaxers, whether with or without lye, have a very high pH. Relaxers break the hair down because they break the bonds that actually give strength to the hair. This causes the hair to straighten. Therefore, relaxed hair is, by definition, weaker than natural hair. Relaxers also deplete the hair of sebum, and this fragile condition, combined with heat from blowdryers and flat irons act in concert to damage the hair and scalp. Hair that has been straightened will be weaker, as opposed to if it were natural, and will be more susceptible to hair breakage (Trichorrhexis Nodosa).

A recently introduced product which appears to show some benefit in hair regrowth is REDENSYL® Hair Regrowth Serum, manufactured by Induchem Corporation.

REDENSYL® assists in re-launching stem cell activity and proliferation. The proposed mechanism of action is that the outer root sheath stem cells (ORSc) are vitalized, thus triggering a new hair cycle and increasing the dermal papilla's fibroblast metabolism. Hair follicles are nourished resulting in the stem cells switching on the anagen phase faster.

If a product having the hair regrowth properties of an active ingredient such as Minoxidil could be coupled with a product having the stem cell simulating properties of a product such as REDENSYL®, in a carrier vehicle which was non-irritating and scalp friendly, a long felt need in the treatment of non-androgenetic alopecia would be met.

DESCRIPTION OF THE PRIOR ART

US Patent 6,482,257 relates to compositions containing i) from about 0.0001% to about 99.9% of certain compounds selected from the group consisting of lupane triterpenes, derivatives of lupane triterpenes, derivatives of oleanane triterpenes, derivatives of ursane triterpenes, and salts and mixtures thereof, and ii) a vehicle.

US Patent 6,596,266, particularly Examples 2,3,4,5 and 9 relates to compositions and/or formulations containing Minoxidil as an active ingredient in combination with other active agents and/or enhancer agents (e.g., saw palmetto extract and nettle root extract). The compositions and/or formulations increase the hair growth capability of the composition. Also disclosed are methods of using the compositions to treat male patterned baldness and to stimulate hair growth on the scalp, including both the apex and frontal regions of the scalp.

US Patent 8,951,507 relates to formulations having an irritation-reducing action, due to inclusion of bisabolol, corresponding cosmetic and pharmaceutical products as well as associated methods and uses thereof.

US Published Patent Application 2012/0114583 relates to a hair treatment agent comprising a combination of dihydroquercetin and/or a dihydroquercetin derivative (a constituent of REDENSYL®) with at least one amino acid. A preferred hair treatment agent disclosed therein comprises a combination of dihydroquercetin (taxifolin) with a six-amino acid mixture consisting of taurine, proline, valine, arginine, lysine, and glycine.

US Published Patent Application 2012/0301527 and International Application WO/11/095970A1 (see Example 9) provides topical pharmaceutical or cosmetic compositions, and uses thereof in treating a disease or condition of the hair follicle. The compositions of this invention are emulsions of an oil-in-polyol with a mean particle size of below one micron, and further comprising at least one oil, one polyol, and one stabilizer.

US Published Patent Application 2012/0283233 relates to a carrier composition comprising a phosphate compound of an electron transfer agent and a polar aprotic solvent. Biologically active compounds formulated with the carrier composition have been shown to have improved properties.

International Application WO14/122436A1 relates to a topical pharmaceutical composition comprising Minoxidil and at least one or more pharmaceutically acceptable excipients. Specifically, the reference teaches topical formulations containing Minoxidil, which are essentially devoid of higher amounts of propylene glycol and lower alcohols in order to avoid scalp irritation.

The references fail to teach or suggest a hair regrowth and hair growth stimulating composition which both mitigates miniaturization of hair follicles in androgen-sensitive areas of the scalp and re-launches stem cell activity and proliferation, without substantial scalp irritation, thereby avoiding contact dermatitis of the scalp.

SUMMARY OF THE INVENTION

The present invention is directed towards a composition for men and women of all hair types and ethnicities worldwide, who experience hair thinning or hair loss. The invention illustrates a product that is effective for providing hair regrowth and hair growth stimulation, a method of use therefore, and a method of making.

In an embodiment, the invention is directed toward a hair regrowth and growth stimulant containing the active ingredient Minoxidil, or a compound functionally equivalent thereto, in a non-irritating vehicle/carrier formulation. Although the non-irritating and scalp-friendly embodiment of the invention is useful for all types of hair and ethnicities, it finds particular utility in methods for treating African-American patients suffering from various forms of non-androgenetic alopecia.

In an embodiment, a stem cell activating composition, illustrated by, albeit not limited to a composition having properties similar to REDENSYL®, is combined with a Minoxidil containing non-irritating vehicle in order to provide a multi-faceted therapeutic composition.

In an embodiment, a process is taught for manufacturing a formulation in accordance with the instant invention.

In an embodiment, a method of application and treatment is taught for treatment of a patient population in need of the formulation in accordance with the present invention.

Other objects and advantages of this invention will become apparent from the following description taken in conjunction with any accompanying drawings wherein are set forth, by

way of illustration and example, certain embodiments of this invention. Any drawings contained herein constitute a part of this specification and include exemplary embodiments of the present invention and illustrate various objects and features thereof.

BRIEF DESCRIPTION OF THE DRAWINGS

The accompanying figures, where like reference numerals refer to identical or functionally similar elements throughout the separate views and which together with the detailed description below are incorporated in and form part of the specification, serve to further illustrate various embodiments and explain various principles and advantages all in accordance with the present invention.

Figure 1A illustrates a view of vertex alopecia prior to treatment;

Figure 1B illustrates a view of vertex alopecia after treatment;

Figure 2A illustrates a view of vertex alopecia prior to treatment;

Figure 2B illustrates a view of vertex alopecia after treatment;

Figure 3A illustrates a view of traction alopecia prior to treatment;

Figure 3B illustrates a view of traction alopecia after treatment.

DETAILED DESCRIPTION OF THE INVENTION

The compositions of the present invention can comprise, consist of, or consist essentially of the essential elements and limitations of the invention described herein, as well any of the additional or optional ingredients, components, or limitations described herein.

The term "comprising" (and its grammatical variations) as used herein is used in the inclusive sense of "having" or "including" and not in the exclusive sense of "consisting only of" The terms "a" and "the" as used herein are understood to encompass the plural as well as the singular.

All percentages, parts and ratios are based upon the total weight of the composition of the present invention, unless otherwise specified. All such weights as they pertain to the listed ingredients are based on the active level and, therefore, do not include carriers or by-products that may be included in commercially available materials, unless otherwise specified.

The term "safe and effective amount" or "therapeutically effective amount" as used herein means an amount of a compound or composition such as a topical or system active sufficient to significantly induce a positive benefit, for example, hair growth or regrowth, but low enough to avoid serious side effects, i.e., to provide a reasonable benefit to risk ratio, within the scope of sound judgment of the skilled artisan.

The topical compositions useful in this invention contain formulations suitable for topical application to skin and scalp. The term "topical" as employed herein relates to the use of a composition along with a suitable pharmaceutical carrier, and applied according to the method of the present invention at the site of hair loss, reduced hair growth or baldness for exertion of local action. Accordingly, such topical compositions useful in the methods of the present invention include those pharmaceutical forms in which the compound is applied externally by direct contact with the skin surface to be treated.

In certain embodiments, a topical pharmaceutical composition according to the instant invention may be in the form of a solution, shampoo, ointment, cream, lotion, emulsion, dispersion, suspension or gel.

In certain embodiments, the compositions according to this invention may further contain one or more additional cosmetically active agent(s) as well as the particularly-mentioned components. What is meant by a "cosmetically acceptable active agent" is a compound, which may be a synthetic compound or a compound isolated, purified or concentrated from a natural source, or a natural extract containing a mixture of compounds, that has a cosmetic effect on the tissue, including, but not limited to: anti-aging agents, sunscreens, photoprotectors, antioxidants, keratolytic agents, detergents/surfactants, moisturizers, nutrients, vitamins, minerals, energy enhancers, anti-perspiration agents, astringents, hair growth enhancing agents, hair coloring agents, pigments, firming agents, agents for skin conditioning, and odor-control agents such as odor masking or pH-changing and buffering agents.

In certain embodiments, the cosmetically acceptable active is a hair growth active, including, albeit not limited to compounds known to promote hair growth and available as drugs, such as diazoxide, pinacidil, bimatoprost, finasteride, a type 2 5-alpha-reductase inhibitor, and dutasteride, a type 1- and 2-5-alpha-reductase inhibitor, as well as flutamide, bicalutamide, pregnane derivatives, progesterone derivatives, experimental agents such as FCE 28260 and the like. Spironolactone and other diuretics may also be utilized as it is indicated for women in some cases (also known as aldactone: an aldosterone receptor antagonist).

The topical compositions or topical pharmaceutical compositions useful in this invention contain formulations suitable for topical application to skin and scalp. The term "topical" as employed herein relates to the use of a composition along with a suitable pharmaceutical carrier, and applied according to the method of the present invention at the site of hair loss, reduced hair growth or baldness for exertion of local action. Accordingly, such topical compositions useful in the methods of the present invention include those pharmaceutical

forms in which the compound is applied externally by direct contact with the skin surface to be treated.

Suitable carrier forms include ointments, pastes, gels, jellies, serums, aerosol and non-aerosol sprays, foams, creams, lotions, solutions, suspensions and the like. The term "ointment" embraces formulations (including creams) having oleaginous, absorption, water-soluble and emulsion-type bases, e.g., petrolatum, lanolin, polyethylene glycols, as well as mixtures of these.

Various other materials may also be present in the compositions useful in the subject invention. These include any manner of humectants, proteins and polypeptides, an alkaline agent and mixtures thereof. The compositions of the present invention may also comprise one or more of various additives and excipients including plant extracts, oily ingredients, surfactants, alcohols, fatty acids, preservatives, antioxidants, colorants, fragrances, UV absorbers, viscosity modifiers, chelating agents(e.g., EDTA), pH-adjusting agents, and vitamins. In addition, the topical compositions useful herein can contain conventional cosmetic adjuvants, such as dyes, sunscreen (e.g., titanium dioxide), pigments, and fragrances.

In a particular embodiment, the pharmaceutically acceptable excipients may include one or more solvents, one or more surfactants, one or more penetration enhancers, one or more pH regulators, one or more preservatives, one or more viscosity modifiers, one or more anti-inflammatory agents, one or more moisturizers, one or more conditioning agents, one or more colorants, one or more fragrances, and one or more chelating agents

In one or more embodiments of the present disclosure, illustrative, albeit non-limiting examples of chelating agents may be at least one of ethylenediaminetetraacetic acid ("EDTA") and salts thereof such as disodium EDTA, tetrasodium EDTA and calsium

disodium EDTA; diethylenetriaminepentaacetic acid ("DTPA") and salts thereof; hydroxyethlethylenediaminetriacetic acid ("HEDTA") and salts thereof and nitrilotriacetic acid ("NTA"); more preferably EDTA, HEDTA and their salts; most preferably EDTA and its saltsacetyl trihexyl citrate, aminotrimethylene phosphonic acid, beta-alanine diacetic acid, bismuth citrate, citric acid, cyclohexanediamine tetraacetic acid, diammonium citrate, dibutyl oxalate, diethyl oxalate, diisobutyl oxalate, diisopropyl oxalate, dilithium oxalate, dimethyl oxalate, dipotassium oxalate, dipropyl oxalate, disodium pyrophosphate, etidronic acid, methyl cyclodextrin, oxalic acid, pentapotassium, triphosphate, pentasodium aminotrimethylene phosphonate, pentasodium pentetate, pentasodium triphosphate, pentetic acid, phytic acid, potassium citrate, sodium citrate, sodium dihydroxyethylglycinate, sodium gluceptate, sodium gluconate, sodium hexametaphosphate, sodium metaphosphate, sodium metasilicate, sodium oxalate, sodium trimetaphosphate, tetrahydroxypropyl ethylenediamine, tetrapotassium etidronate, tetrapotassium pyrophosphate, tetrasodium etidronate, tetrasodium pyrophosphate, trisodium NTA, trisodium phosphate, malic acid, fumaric acid, maltol, succimer, penicillamine, dimercaprol, and desferrioxamine mesilate.

In one or more embodiments of the present disclosure, illustrative, albeit non-limiting examples of moisturizing agents may be at least one of amino acids, chondroitin sulfate, diglycerin, erythritol, fructose, glucose, glycerin, glycerol polymers, glycol, 1,2,6-hexanetriol, honey, hyaluronic acid, hydrogenated honey, hydrogenated starch hydrolysate, inositol, lactitol, maltitol, maltose, mannitol, natural moisturizing factor, PEG-15 butanediol, polyglyceryl sorbitol, salts of pyrollidone carboxylic acid, potassium PCA, propylene glycol, sodium glucuronate, sodium PCA, sorbitol, sucrose, trehalose, urea, and xylitol, acetylated lanolin, acetylated lanolin alcohol, acrylates/C_{10-30} alkyl acrylate crosspolymer, acrylates copolymer, alanine, algae extract, aloe barbadensis, aloe-barbadensis extract, aloe barbadensis gel, althea officinalis extract, aluminum starch octenylsuccinate, aluminum

stearate, apricot (prunus armeniaca) kernel oil, arginine, arginine aspartate, arnica montana extract, ascorbic acid, ascorbyl palmitate, aspartic acid, avocado (persea gratissima) oil, barium sulfate, barrier sphingolipids, butyl alcohol, beeswax, behenyl alcohol, beta-sitosterol, BHT, birch (betula alba) bark extract, borage (borago officinalis) extract, 2-bromo-2-nitropropane-1,3-diol, butcherbroom (ruscus aculeatus) extract, butylene glycol, calendula officinalis extract, calendula officinalis oil, candelilla (euphorbia cerifera) wax, canola oil, caprylic/capric triglyceride, cardamon (elettaria cardamomum) oil, carnauba (copernicia cerifera) wax, carrageenan (chondrus crispus), carrot (daucus carota sativa) oil, castor (ricinus communis) oil, ceramides, ceresin, ceteareth-5, ceteareth-12, ceteareth-20, cetearyl octanoate, ceteth-20, ceteth-24, cetyl acetate, cetyl octanoate, cetyl palmitate, chamomile (anthemis nobilis) oil, cholesterol, cholesterol esters, cholesteryl hydroxystearate, citric acid, clary (salvia sclarea) oil, cocoa (theobroma cacao) butter, coco-caprylate/caprate, coconut (cocos nucifera) oil, collagen, collagen amino acids, corn (zea mays) oil, fatty acids, decyl oleate, dextrin, diazolidinyl urea, dimethicone copolyol, dimethiconol, dioctyl adipate, dioctyl succinate, dipentaerythrityl hexacaprylate/hexacaprate, DMDM hydantoin, DNA, erythritol, ethoxydiglycol, ethyl linoleate, eucalyptus globulus oil, evening primrose (oenothera biennis) oil, fatty acids, tructose, gelatin, geranium maculatum oil, glucosamine, glucose glutamate, glutamic acid, glycereth-26, glycerin, glycerol, glyceryl distearate, glyceryl hydroxystearate, glyceryl laurate, glyceryl linoleate, glyceryl myristate, glyceryl oleate, glyceryl stearate, glyceryl stearate SE, glycine, glycol stearate, glycol stearate SE, glycosaminoglycans, grape (vitis vinifera) seed oil, hazel (corylus americana) nut oil, hazel (corylus avellana) nut oil, hexylene glycol, honey, hyaluronic acid, hybrid safflower (carthamus tinctorius) oil, hydrogenated castor oil, hydrogenated coco-glycerides, hydrogenated coconut oil, hydrogenated lanolin, hydrogenated lecithin, hydrogenated palm glyceride, hydrogenated palm kernel oil, hydrogenated soybean oil, hydrogenated tallow

glyceride, hydrogenated vegetable oil, hydrolyzed collagen, hydrolyzed elastin, hydrolyzed glycosaminoglycans, hydrolyzed keratin, hydrolyzed soy protein, hydroxylated lanolin, hydroxyproline, imidazolidinyl urea, iodopropynyl butylcarbamate, isocetyl stearate, isocetyl stearoyl stearate, isodecyl oleate, isopropyl isostearate, isopropyl lanolate, isopropyl myristate, isopropyl palmitate, isopropyl stearate, isostearamide DEA, isostearic acid, isostearyl lactate, isostearyl neopentanoate, jasmine (jasminum officinale) oil, jojoba (buxus chinensis) oil, kelp, kukui (aleurites moluccana) nut oil, lactamide MEA, laneth-16, laneth-10 acetate, lanolin, lanolin acid, lanolin alcohol, lanolin oil, lanolin wax, lavender (lavandula angustifolia) oil, lecithin, lemon (citrus medica limonum) oil, linoleic acid, linolenic acid, macadamia ternifolia nut oil, magnesium stearate, magnesium sulfate, maltitol, matricaria (chamomilla recutita) oil, methyl glucose sesquistearate, methylsilanol PCA, microcrystalline wax, mineral oil, mink oil, mortierella oil, myristyl lactate, myristyl myristate, myristyl propionate, neopentyl glycol dicaprylate/dicaprate, octyldodecanol, octyldodecyl myristate, octyldodecyl stearoyl stearate, octyl hydroxystearate, octyl palmitate, octyl salicylate, octyl stearate, oleic acid, olive (olea europaea) oil, orange (citrus aurantium dulcis) oil, palm (elaeis guineensis) oil, palmitic acid, pantethine, panthenol, panthenyl ethyl ether, paraffin, PCA, peach (prunus persica) kernel oil, peanut (arachis hypogaea) oil, PEG-8 C12-18 ester, PEG-15 cocamine, PEG-150 distearate, PEG-60 glyceryl isostearate, PEG-5 glyceryl stearate, PEG-30 glyceryl stearate, PEG-7 hydrogenated castor oil, PEG-40 hydrogenated castor oil, PEG-60 hydrogenated castor oil, PEG-20 methyl glucose sesquistearate, PEG40 sorbitan peroleate, PEG-5 soy sterol, PEG-10 soy sterol, PEG-2 stearate, PEG-8 stearate, PEG-20 stearate, PEG-32 stearate, PEG40 stearate, PEG-50 stearate, PEG-100 stearate, PEG-150 stearate, pentadecalactone, peppermint (mentha piperita) oil, petrolatum, phospholipids, polyamino sugar condensate, polyglyceryl-3 diisostearate, polyquaternium-24, polysorbate 20, polysorbate 40,

polysorbate 60, polysorbate 80, polysorbate 85, potassium myristate, potassium palmitate, potassium sorbate, potassium stearate, propylene glycol, propylene glycol dicaprylate/dicaprate, propylene glycol dioctanoate, propylene glycol dipelargonate, propylene glycol laurate, propylene glycol stearate, propylene glycol stearate SE, PVP, pyridoxine dipalmitate, quaternium-15, quaternium-18 hectorite, quaternium-22, retinol, retinol palmitate, rice (oryza sativa) bran oil, RNA, rosemary (rosmarinus officinalis) oil, rose oil, safflower (carthamus tinctorius) oil, sage (salvia officinalis) oil, salicylic acid, sandalwood (santalum album) oil, serine, serum protein, sesame (sesamum indicum) oil, shea butter (butyrospermum parkii), silk powder, sodium chondroitin sulfate, sodium hyaluronate, sodium lactate, sodium palmitate, sodium PCA, sodium polyglutamate, sodium stearate, soluble collagen, sorbic acid, sorbitan laurate, sorbitan oleate, sorbitan palmitate, sorbitan sesquioleate, sorbitan stearate, sorbitol, soybean (glycine soja) oil, sphingolipids, squalane, squalene, stearamide MEA-stearate, stearic acid, stearoxy dimethicone, stearoxytrimethylsilane, stearyl alcohol, stearyl glycyrrhetinate, stearyl heptanoate, stearyl stearate, sunflower (helianthus annuus) seed oil, sweet almond (prunus amygdalus dulcis) oil, synthetic beeswax, tocopherol, tocopheryl acetate, tocopheryl linoleate, tribehenin, tridecyl neopentanoate, tridecyl stearate, triethanolamine, tristearin, urea, vegetable oil, water, waxes, wheat (triticum vulgare) germ oil, and ylang ylang (cananga odorata) oil.

In one or more embodiments of the present disclosure, illustrative, albeit non-limiting examples of thickening agents (viscosity modifiers) may be at least one of thickener or gelling agents, including substances that can increase the viscosity of a composition. Thickeners include those that can increase the viscosity of a composition without substantially modifying the efficacy of the active ingredient within the composition. Thickeners can also increase the stability of the compositions of the present invention. Non-limiting examples of thickening agents that can be used in the context of the present

invention include carboxylic acid polymers, crosslinked polyacrylate polymers, polyacrylamide polymers, polysaccharides, and gums. Examples of carboxylic acid polymers include crosslinked compounds containing one or more monomers derived from acrylic acid, substituted acrylic acids, and salts and esters of these acrylic acids and the substituted acrylic acids, wherein the crosslinking agent contains two or more carbon-carbon double bonds and is derived from a polyhydric alcohol (see U.S. Pat. Nos. 5,087,445; 4,509,949; 2,798,053; CTFA International Cosmetic Ingredient Dictionary, Fourth edition, 1991, pp. 12 and 80). Examples of commercially available carboxylic acid polymers include carbomers, which are homopolymers of acrylic acid crosslinked with allyl ethers of sucrose or pentaerytritol (e.g., CARBOPOL^{TM} 900 series from B. F. Goodrich).

In one or more embodiments of the present disclosure, illustrative, albeit non-limiting examples of preservatives may be at least one of benzoic acid, the esters and salts thereof, propionic acid and salts thereof, salicylic acid and salts thereof, 2,4-hexanoic acid (sorbic acid) and salts thereof, formaldehyde and paraformaldehyde, 2-hydroxybiphenyl ether and salts thereof, 2-zincsulphidopyridine-N-oxide, inorganic sulphites and bisulphites, sodium iodate, chlorobutanolum, 4-hydroxybenzoic acid, the salts and esters thereof, dehydroacetic acid, formic acid, 1,6-bis(4-amidino-2-bromophenoxy)-n-hexane and salts thereof, the sodium salt of ethylmercury-(II)-thiosalicylic acid, phenylmercury and salts thereof, 10-undecylenic acid and salts thereof, 5-amino-1,3-bis(2-ethylhexyl)-5-methylhexahydropyrimidine, 5-bromo-5-nitro-1,3-dioxane, 2-bromo-2-nitro-1,3-propanediol, 2,4-dichlorobenzyl alcohol, N-(4-chlorophenyl)-N'-(3,4-dichlorophenyl)urea, 4-chloro-m-cresol, 2,4,4'-trichloro-2'-hydroxy-diphenyl ether, 4-chloro-3,5-dimethylphenol, 1,1'-methylene-bis(3-(1-hydroxymethyl-2,4-dioximidazolidin-5-yl)urea), poly-(hexamethylene diguanide) hydrochloride, 2-phenoxyethanol, hexamethylentetramine, 1-(3-chloroallyl)-3,5,7-triaza-1-azonia-adamantane chloride, 1 (4-chloro-phenoxy)-1(1H-

imidazol-1-yl)-3,3-dimethyl-2-butanone, 1,3-bis-(hydroxy-methyl)-5,5-dimethyl-2,4-imidazolidinedione, benzyl alcohol, Octopirox, 1,2-dibromo-2,4-dicyanobutane, 2,2'-methylene-bis(6-bromo-4-chloro-phenol), bromochlorophene, mixture of 5-chloro-2-methyl-3(2H)-isothiazolinone and 2-methyl-3(2H)isothiazolinone with magnesium chloride and magnesium nitrate, 2-benzyl-4-chlorophenol, 2-chloracetamide, chlorhexidine, chlorhexidine acetate, chlorhexidine gluconate, chlorhexidine hydrochloride, 1-phenoxy-propan-2-ol, N-alkyl(C_{12}-C_{22}) trimethylammonium bromide and chloride, 4,4-dimethyl-1,3-oxazolidine, N-hydroxymethyl-N-(1,3-di(hydroxymethyl)-2,5-dioxo-imidazolidin-4-yl)-N'--hydroxymethylurea, 1,6-bis(4-amidino-phenoxy)-n-hexane and salts thereof, glutaraldehyde 5-ethyl-1-aza-3,7-dioxa-bicyclo(3.3.0)octane, 3-(4-chlorphenoxy)-1,2-propanediol, hyamine, alkyl-(C_8-C_{18})-dimethylbenzylammonium chloride, alkyl-(C_8-C_{18})-dimethylbenzylammonium bromide, alkyl-(C_8-C_{18})-dimethyl-benzyl-ammonium saccharinate, benzylhemiformal, 3-iodo-2-propinylbutyl carbamate, sodium hydroxymethylaminoacetate or sodium hydroxy-methylaminoacetate.

Minoxidil (i.e. 2,4-diamino-6-piperidinylpyrimidine-3-oxide is a well-known pharmaceutical compound. It is marketed by The Upjohn Company as the active ingredient in LONITEN® tablets for the treatment of hypertension. It is also useful in topical compositions for the treatment of baldness and is sold under the tradename ROGAINE® by Johnson & Johnson Corporation. The structure and use of this compound for this purpose, and topical compositions containing it, are described in US Patent 4139619 and US Patent 4,596,812. In particular, US Patent 4,139,619 discloses topical Minoxidil compositions containing carriers selected from ointments, lotions, pastes, jellies, sprays and aerosols.

It is within the purview of this invention to further utilize, either alone, or in combination, compounds which are similar in structure and function to Minoxidil, exemplified by, albeit

not limited to PDPO (Pyrrolidinyl Diaminopyrimidine Oxide -- trade name Triaminodil™) and diaminopyrimidine oxide, trade name Aminexil.

It is further within the purview of this invention to utilize minoxidil in the form of a pharmaceutically acceptable derivative which optionally comprises pharmaceutically acceptable salts, solvates, hydrates, isomers, esters, tautomers, anhydrates, enantiomers, complexes, polymorphs or prodrugs.

It is noted that products such as liquid ROGAINE® (a commercially available Minoxidil containing scalp treatment for both men and women) contains about 60% alcohol and ROGAINE® foam contains about 30% alcohol, while the formulation of the instant invention only contains about 20% alcohol.

Example I

In one illustrative, albeit non-limiting embodiment of the invention, the active ingredient Minoxidil- at about 5% (wt/wt) is combined with the following additional ingredients (all ingredients are % (wt/wt)):

about 30 % (wt/wt) Propylene Glycol;

about 15 % (wt/wt) Isopropyl Alcohol (Anhydrous);

about 9.00 % (wt/wt)Dimethyl Isosorbide (ARLASOLVE DMI);

about 3.00 % (wt/wt) Trimethylpentanediol/Adipic Acid Copolymer (LEXOREZ TL-8);

about 3.50 % (wt/wt) Cetearyl Alcohol, Dicetyl Phosphate, and Ceteth-10 Phosphate (CRODAFOS CES-PA);

about 3.0% (wt/wt) of a stem cell activating hair growth/regrowth promoter exemplified by, albeit not limited to REDENSYL® hair growth promoter, which is an aqueous composition including about 50-55 % (wt/wt) Glycerin, about 1% (wt/wt) Larix Europaea Wood Extract, about 1% (wt/wt) Glycine, about 0.1% (wt/wt) Zinc Chloride, about 0.1% (wt/wt) Camellia Sinensis Leaf Extract and 45-50% (wt/wt) purified water;

about 1.4% (wt/wt) Cetyl Alcohol;

about 0.7% (wt/wt) Argania spinosa (Argan) Nut Oil;

about 0.28% (wt/wt) Perfume (e.g. Fragrance79734);

about 0.07% (wt/wt) Cocos Nucifera Oil/Aloe Barbadensis Leaf Extract- (Aloe Butter);

about 0.525% (wtlwt) Cetrimonium Chloride;

about 0.2% (wtlwt) Disodium EDTA;

about 0.7% (wtlwt) Bisabolol;

about 0.07% (wt/wt)Hydroxypropyl Guar (N-HANCE HP-40);

Citric Acid in an amount sufficient to maintain pH in range of 6.4 - 6.6;

about 0.0175 Methylchloroisothiazolinone, Methylisothiazolinone - (KATHON CG);

approximately 0.0001 - 0.0002 FD&C Yellow #6- (to achieve desired coloration); and

purified water to dilute to 100 % (wt/wt).

In this illustrative embodiment, the formulation may be manufactured in accordance with the following steps:

Part A

Add into the main tank A the following ingredients one at a time and mix well until completely dissolved.

DI Water	to 100
Disodium EDTA	0.20
FD&C Yellow #6	q.c.

Mix for 15 minutes. Add the follow ingredient and mix until completely hydrated.

N-HANCE® HP40	0.07

Start to heat the main tank to 175°F while mixing.

Part B

Add all ingredients from part B. Start to heat the tank to 175°F while mixing until all ingredients are melted.

Crodafos CES-PA	3.50
Cetyl Alcohol	1.40
Aloe Butter	0.07
Argan Oil	0.70

Keep mixing with moderate speed for 45 minutes.

Part C

Start to cool down the tank to 104°F and add the ingredients form Part C to the tank one at a time while mixing after each ingredients.

Cetrimonium Chloride	0.525

KATHON® CG	0.0175
Fragrance 79734	0.28
Bisabolol	0.07

Part D

Keep mixing until uniform smooth cream.

Part E

In a separate container dissolve Minoxidil in Propylene Glycol and IPA (Isopropyl alcohol)

Minoxidil	5.00
Propylene Glycol	30.00
ARLASOLVE® DMI	9.00
IPA Anhydrous	15.00
LEXOREZ® TL-8	3.00

Part F

Add Conditioner into Part E and mix well until the cream becomes uniform again. Use homogenizer if needed.

Part G

Add the following ingredient and mix well until uniform.

REDENSYL®	3.00
Citric Acid	q.s.

Typical Properties

pH: 4.5-5.0 Viscosity: TBD cPs @20 RPM Spindle 5

Example 2

In another illustrative, albeit non-limiting embodiment of the invention, the active ingredient Minoxidil- at about 5% (wt/wt) is combined with the following additional ingredients (all ingredients are % (wt/wt)):

about 50 % (wt/wt) Propylene Glycol;

about 20 % (wt/wt) Ethanol (SDA 40/200 proof);

about 3.00 % (wt/wt) Trimethylpentanediol/Adipic Acid Copolymer (LEXOREZ TL-8);

about 2.40 % (wt/wt) Cetearyl Alcohol, Dicetyl Phosphate, and Ceteth-10 Phosphate (CRODAFOS CES-PA);

about 3.0% (wt/wt) of a stem cell activating hair growth/regrowth promoter exemplified by, albeit not limited to REDENSYL® hair growth promoter, which is an aqueous composition including about 50-55 % (wt/wt) Glycerin, about 1% (wt/wt) Larix Europaea Wood Extract, about 1% (wt/wt) Glycine, about 0.1% (wt/wt) Zinc Chloride, about 0.1% (wt/wt) Camellia Sinensis Leaf Extract and 45-50% (wt/wt) purified water -

about 0.8% (wt/wt) Cetyl Alcohol;

about 0.2% (wt/wt) Argania spinosa (Argan) Nut Oil;

about 0.14% (wt/wt) Perfume (e.g. Fragrance79734);

about 0.20% (wt/wt) Cocos Nucifera Oil/Aloe Barbadensis Leaf Extract- (Aloe Butter);

about 0.30% (wtlwt) Cetrimonium Chloride;

about 0.2% (wtlwt) Disodium EDTA;

about 0.2% (wtlwt) Bisabolol;

about 0.04% (wt/wt)Hydroxypropyl Guar (N-HANCE HP-40);

Citric Acid in an amount sufficient to maintain pH in range of 6.4 - 6.6;

about 0.01 Methylchloroisothiazolinone, Methylisothiazolinone - (KATHON CG);

approximately 0.0001 - 0.0002 FD&C Yellow #6- (to achieve desired coloration); and

purified water to dilute to 100 % (wt/wt).

In this illustrative embodiment, the formulation may be manufactured in accordance with the following steps:

Part A

Add into the main tank A the following ingredients one at a time and mix well until completely dissolve.

DI Water	to 100
Disodium EDTA	0.20
FD&C Yellow #6	q.c.

Mix for 15 minutes. Add the follow ingredient and mix until completely hydrate

N-Hance HP40	0.04

Start heats the main tank to 175°F while mixing.

Part B

Add all ingredients from part B. Start heat the tank to 175°F while mixing until all ingredients are melted.

Crodafos CES-PA	2.40
Cetyl Alcohol	0.80
Aloe Butter	0.20
Argan Oil	0.20

Keep mixing with moderate speed for 45 minutes.

Part C

Start cool down the tank to 104°F and add the ingredients form Part C to the tank one at a time while mixing after each ingredients.

Cetrimonium Chloride	0.30
Kathon CG	0.01
Fragrance 79734	0.14
Bisabolol	0.20

Part D

Keep mixing until uniform smooth cream.

Part E

In a separate container dissolve Minoxidil in Propylene Glycol and IPA

Minoxidil	5.00
Propylene Glycol	50.00
SDA 40/200 proof	20.00
Lexorez TL-8	3.00

Part F

Add Conditioner into Part E and mix well until cream uniform again. Use homogenizer if need it.

Part G

Add the following ingredient and mix well until uniform.

Redensyl	3.00
Citric Acid	q.s.

Typical Properties

pH: 4.5-5.0 Viscosity: TBD cPs @20 RPM Spindle 5

Specifically recited ingredients are commercially available as follows:

TRADE NAME	INCI	MANF.	ACTION
DI Water	Aqua		Solvent
Disodium EDTA	Disodium EDTA	Prochem	Chelating Agent
N-HANCE® HP40	Hydroxypropyl Guar	Ashland Specialties	Conditioner
Argan Oil	Argania spinosa (Argan) Nut Oil	CAC Farpint	Moisturizer ,Regenerate
Crodafos CES-PA	Cetearyl Alcohol (and) Dicetyl Phosphate (and) Ceteth-10 Phosphate	Croda	Conditioning Agent
Cetyl Alcohol	Cetyl Alcohol	Lipo Chemicals/Protameen	Viscosity Modifier
Aloe Butter	Cocos Nucifera Oil / Aloe Barbadensis Leaf Extract	Hall Star	Moisturizer
Cetrimonium Chloride	Cetrimonium Chloride	Essential Ingredients	Conditioning Agent
KATHON® CG	Methyl chloro isothiazolinone; Methyl isothiazolinone	Rohm&Haas; Dow Chemicals	Preservative
Fragrance 79734	Fragrance	Belle-Aire Fragrances	Aroma
FD&C Yellow #6	FD&C Yellow	Essential Ingredients	Colorant

	#6		
LEXOREZ® TL-8	Trimethylpentanediol/Adipic Acid Copolymer	Inolex	Delivery System
Minoxidil	Minoxidil	Letco Medical	Hair Growth
REDENSYL®	Glycerin (and) Aqua (and) Sodium Metabisulfite (and) Larix Europaea Wood Extract (and) Glycine (and) Zinc Chloride (and) Camellia Sinensis Leaf Extract	Induchem USA	Hair Growth
Bisabolol	Bisabolol	BASF	Anti-inflammatory
ARLASOLVE® DMI	Dimethyl Isosorbide	Croda	Solvent,Delivery for actives
Citric Acid	Citric Acid	Prochem	Chelating Agent
SDA40/200 Proof	Ethanol	Univar	Solvent
IPA Isopropyl Alcohol	Isopropanol	Sigma-Aldrich	Solvent

In an illustrative embodiment of the instant invention, the formulation is provided for use in a bottle pump. An illustrative method of treatment is outlined in the following steps:

• With the bottle pump, apply one pump (approximately 1 mL) of the formulation two times a day (once in the morning and one hour before bedtime) to the scalp in the hair loss area.

• Massage into scalp with fingers, then wash hands well.

• Continue daily use in order to maintain hair regrowth and mitigate continued hair loss.

Patients generally begin to see results in about four months. Up to eight months of usage may be needed to achieve the best results. Those patients who achieve a positive response will need to continue to use the formulation two times a day to keep and continue the hair regrowth.

Figure 1A illustrates a view of vertex alopecia prior to treatment;

Figure 1B illustrates a view of vertex alopecia after 4-6 months of treatment;

Figure 2A illustrates a view of vertex alopecia prior to treatment;

Figure 2B illustrates a view of vertex alopecia after 4-6 months of treatment;

Figure 3A illustrates a view of traction alopecia prior to treatment;

Figure 3B illustrates a view of traction alopecia after 4-6 months of treatment.

All patents and publications mentioned in this specification are indicative of the levels of those skilled in the art to which the invention pertains. All patents and publications are herein incorporated by reference to the same extent as if each individual publication was specifically and individually indicated to be incorporated by reference.

It is to be understood that while a certain form of the invention is illustrated, it is not to be limited to the specific form or arrangement herein described and shown. It will be apparent to those skilled in the art that various changes may be made without departing from the scope of the invention and the invention is not to be considered limited to what is shown and described in the specification and any drawings/figures included herein.

One skilled in the art will readily appreciate that the present invention is well adapted to carry out the objectives and obtain the ends and advantages mentioned, as well as those inherent therein. The embodiments, methods, procedures and techniques described herein are presently representative of the preferred embodiments, are intended to be exemplary and are not intended as limitations on the scope. Changes therein and other uses will occur to those skilled in the art which are encompassed within the spirit of the invention and are defined by the scope of the appended claims. Although the invention has been described in connection with specific preferred embodiments, it should be understood that the invention as claimed should not be unduly limited to such specific embodiments. Indeed, various modifications of the described modes for carrying out the invention which are obvious to those skilled in the art are intended to be within the scope of the following claims.

CLAIMS

What is claimed is:

Claim 1. A topical pharmaceutical composition comprising minoxidil or a pharmaceutically acceptable derivative thereof, in combination with a stem cell activating hair growth/regrowth promoter, which comprises an aqueous composition including about 50-55 % (wt/wt) Glycerin, about 1% (wt/wt) Larix Europaea Wood Extract, about 1% (wt/wt) Glycine, about 0.1% (wt/wt) Zinc Chloride, about 0.1% (wt/wt) Camellia Sinensis Leaf Extract and 45-50% (wt/wt) purified water.

Claim 2. The composition of claim 1 wherein said pharmaceutically acceptable derivative of minoxidil may comprise one or more pharmaceutically acceptable salts, solvates, hydrates, isomers, esters, tautomers, anhydrates, enantiomers, complexes, polymorphs or prodrugs.

Claim 3. The composition of claim 1, further including one or more pharmaceutically acceptable excipients, including one or more solvents, one or more surfactants, one or more penetration enhancers, one or more pH regulators, one or more preservatives, one or more viscosity modifiers, one or more anti-inflammatory agents, one or more moisturizers, one or more conditioning agents, one or more colorants, one or more fragrances, and one or more chelating agents.

Claim 4. A topical pharmaceutical composition comprising:

a) a therapeutically effective amount of minoxidil or a pharmaceutically acceptable derivative thereof;

b) a therapeutically effective amount of a stem cell activating hair growth/regrowth promoter,

which is an aqueous composition including about 50-55 % (wt/wt) Glycerin, about 1% (wt/wt) Larix Europaea Wood Extract, about 1% (wt/wt) Glycine, about 0.1% (wt/wt) Zinc Chloride, about 0.1% (wt/wt) Camellia Sinensis Leaf Extract and 45-50% (wt/wt) purified water.; and

c) a pharmaceutically acceptable carrier.

Claim 5. The topical pharmaceutical composition in accordance with claim 4, wherein the minoxidil or a pharmaceutically acceptable derivative thereof is present in an amount of about 5% (wt/wt).

Claim 6. The topical pharmaceutical composition in accordance with claim 4, wherein the stem cell activating hair growth/regrowth promoter is present in an amount of about 3% (wt/wt).

Claim 7. The topical pharmaceutical composition in accordance with claim 4, further including an alcohol solvent selected from the group consisting of ethanol and isopropanol.

Claim 8. The topical pharmaceutical composition according to claim 1,

wherein said composition is in the form of a solution, shampoo, ointment, cream,

lotion, emulsion, dispersion, suspension or gel.

Claim 9. A topical pharmaceutical composition comprising:

about 5% (wt/wt) minoxidil, or a pharmaceutically acceptable derivative thereof;

about 30 % (wt/wt) Propylene Glycol;

about 15 % (wt/wt) Isopropyl Alcohol (Anhydrous);

about 9.00 % (wt/wt) Dimethyl Isosorbide;

about 3.00 % (wt/wt) Trimethylpentanediol/Adipic Acid Copolymer;

about 3.50 % (wt/wt) Cetearyl Alcohol, Dicetyl Phosphate, and Ceteth-10 Phosphate;

about 3.0% (wt/wt) of a stem cell activating hair growth/regrowth promoter, which is an aqueous composition comprising about 50-55 % (wt/wt) Glycerin, about 1% (wt/wt) Larix Europaea Wood Extract, about 1% (wt/wt) Glycine, about 0.1% (wt/wt) Zinc Chloride, about 0.1% (wt/wt) Camellia Sinensis Leaf Extract and 45-50% (wt/wt) purified water;

about 1.4% (wt/wt) Cetyl Alcohol;

about 0.7% (wt/wt) Argania spinosa (Argan) Nut Oil;

about 0.28% (wt/wt) fragrance;

about 0.07% (wt/wt) Cocos Nucifera Oil/Aloe Barbadensis Leaf Extract;

about 0.525% (wt/wt) Cetrimonium Chloride;

about 0.2% (wt/wt) Disodium EDTA;

about 0.7% (wt/wt) Bisabolol;

about 0.07% (wt/wt) Hydroxypropyl Guar;

citric Acid in an amount sufficient to maintain pH in a range of 6.4 - 6.6;

about 0.0175 Methylchloroisothiazolinone, Methylisothiazolinone;

approximately 0.0001 - 0.0002 of a colorant; and

purified water to dilute to 100 % (wt/wt).

Claim 10. A topical pharmaceutical composition comprising:

about 5% (wt/wt) minoxidil, or a pharmaceutically acceptable derivative thereof;

about 50 % (wt/wt) Propylene Glycol;

about 20 % (wt/wt) Ethanol;

about 3.00 % (wt/wt) Trimethylpentanediol/Adipic Acid Copolymer;

about 2.40 % (wt/wt) Cetearyl Alcohol, Dicetyl Phosphate, and Ceteth-10 Phosphate;

about 3.0% (wt/wt) of a stem cell activating hair growth/regrowth promoter, which comprises an aqueous composition including about 50-55 % (wt/wt) Glycerin, about 1% (wt/wt) Larix Europaea Wood Extract, about 1% (wt/wt) Glycine, about 0.1% (wt/wt) Zinc Chloride, about 0.1% (wt/wt) Camellia Sinensis Leaf Extract and 45-50% (wt/wt) purified water;

about 0.8% (wt/wt) Cetyl Alcohol;

about 0.2% (wt/wt) Argania spinosa (Argan) Nut Oil;

about 0.14% (wt/wt) fragrance;

about 0.20% (wt/wt) Cocos Nucifera Oil/Aloe Barbadensis Leaf Extract;

about 0.30% (wt/wt) Cetrimonium Chloride;

about 0.2% (wt/wt) Disodium EDTA;

about 0.2% (wt/wt) Bisabolol;

about 0.04% (wt/wt) Hydroxypropyl Guar;

Citric Acid in an amount sufficient to maintain pH in a range of 6.4 - 6.6;

about 0.01 of a mixture of Methylchloroisothiazolinone and Methylisothiazolinone;

approximately 0.0001 - 0.0002 of a colorant; and

purified water to dilute to 100 % (wt/wt).

Claim 11. Use of a topical pharmaceutical composition according to claim 1 in the manufacture of a medicament for inducing and/or stimulating hair growth, reducing hair loss, and/or treating androgenetic or non-androgenetic alopecia.

Claim 12. A process for preparing a topical pharmaceutical composition according to claim 1, wherein the process comprises blending minoxidil or a pharmaceutically acceptable derivative thereof, in combination with a stem cell activating hair growth/regrowth promoter, with at least one pharmaceutically acceptable excipient.

FIGURE 1A - BEFORE

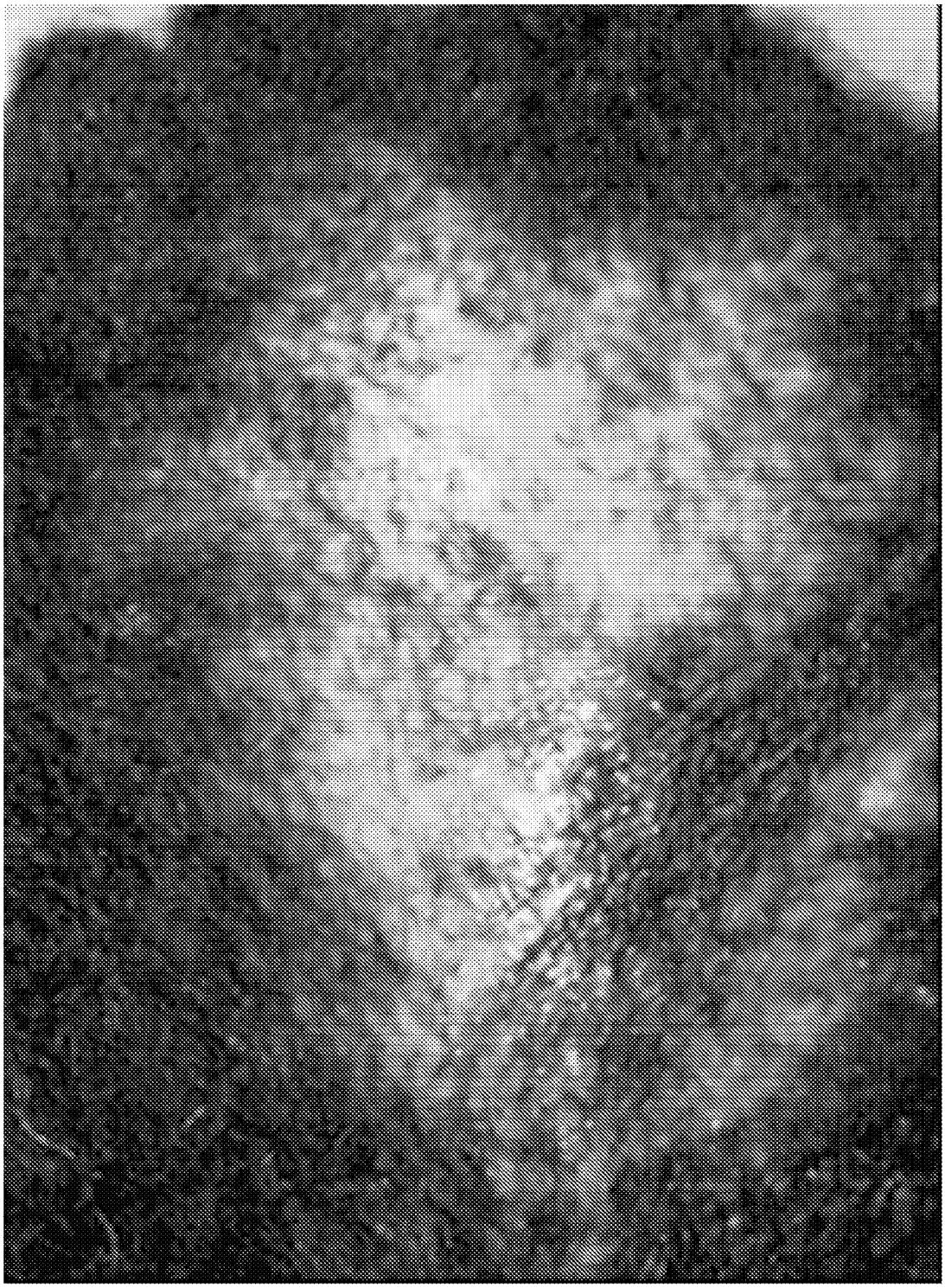


FIGURE 1B - AFTER

FIGURE 2A - BEFORE

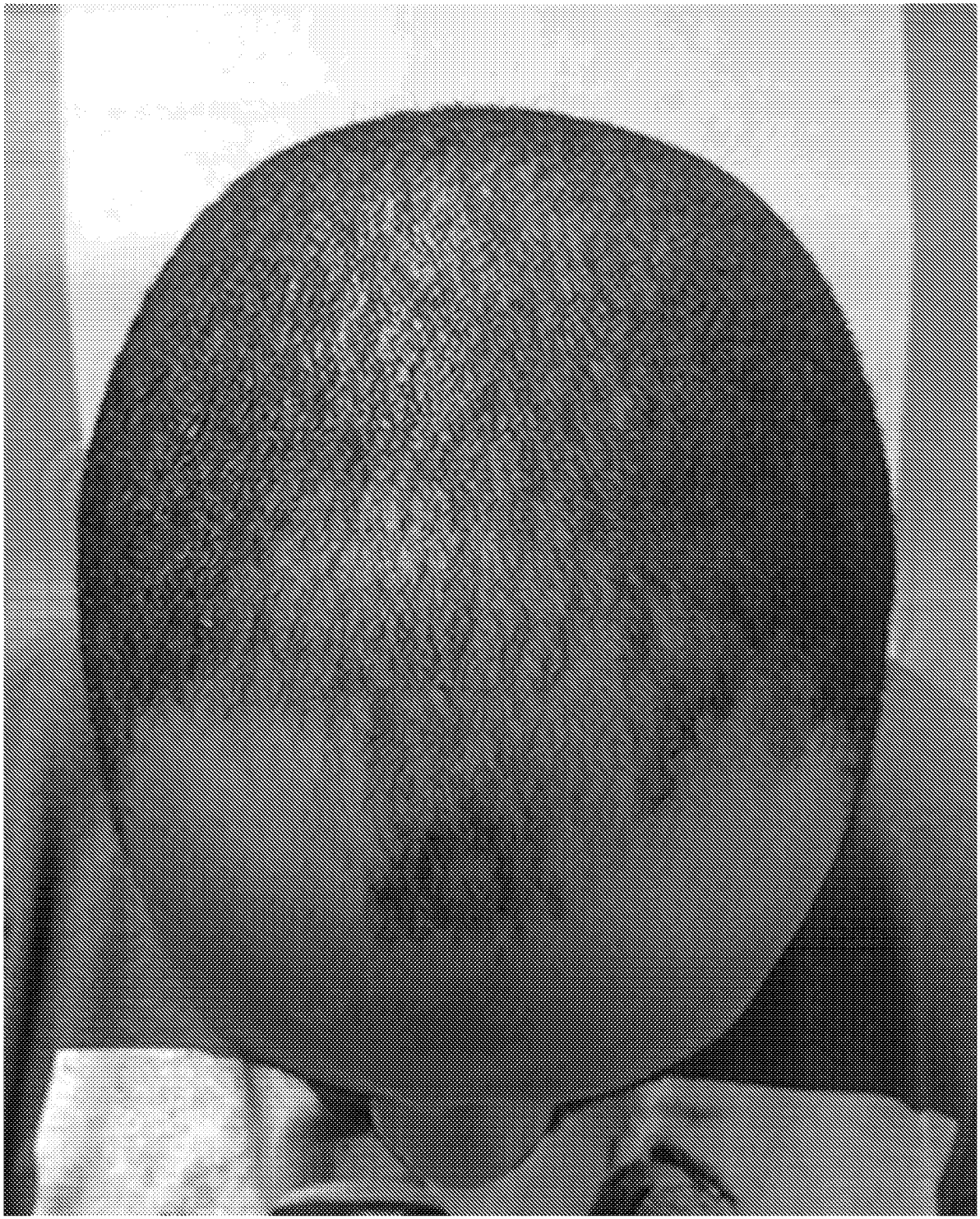


FIGURE 2B - AFTER

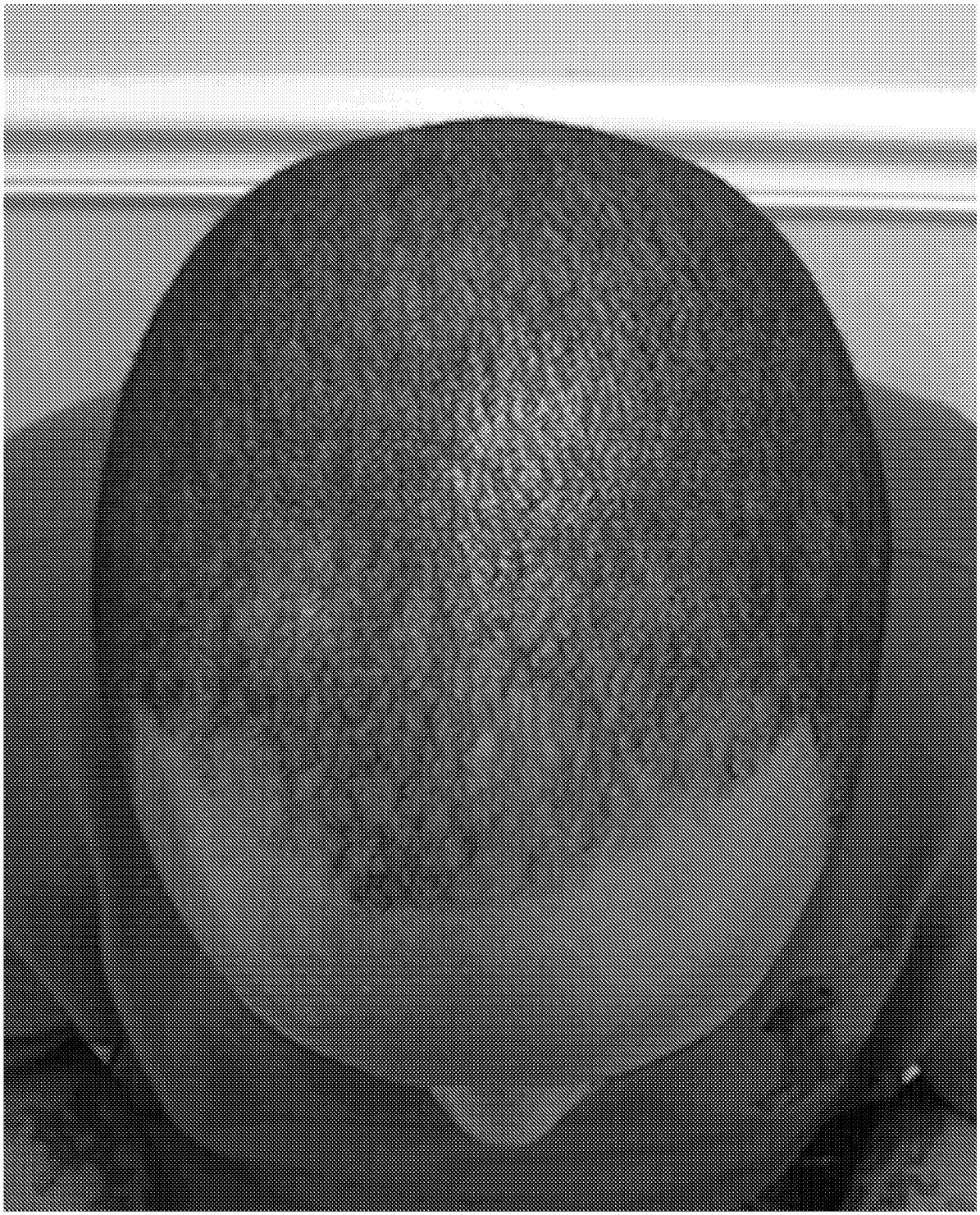
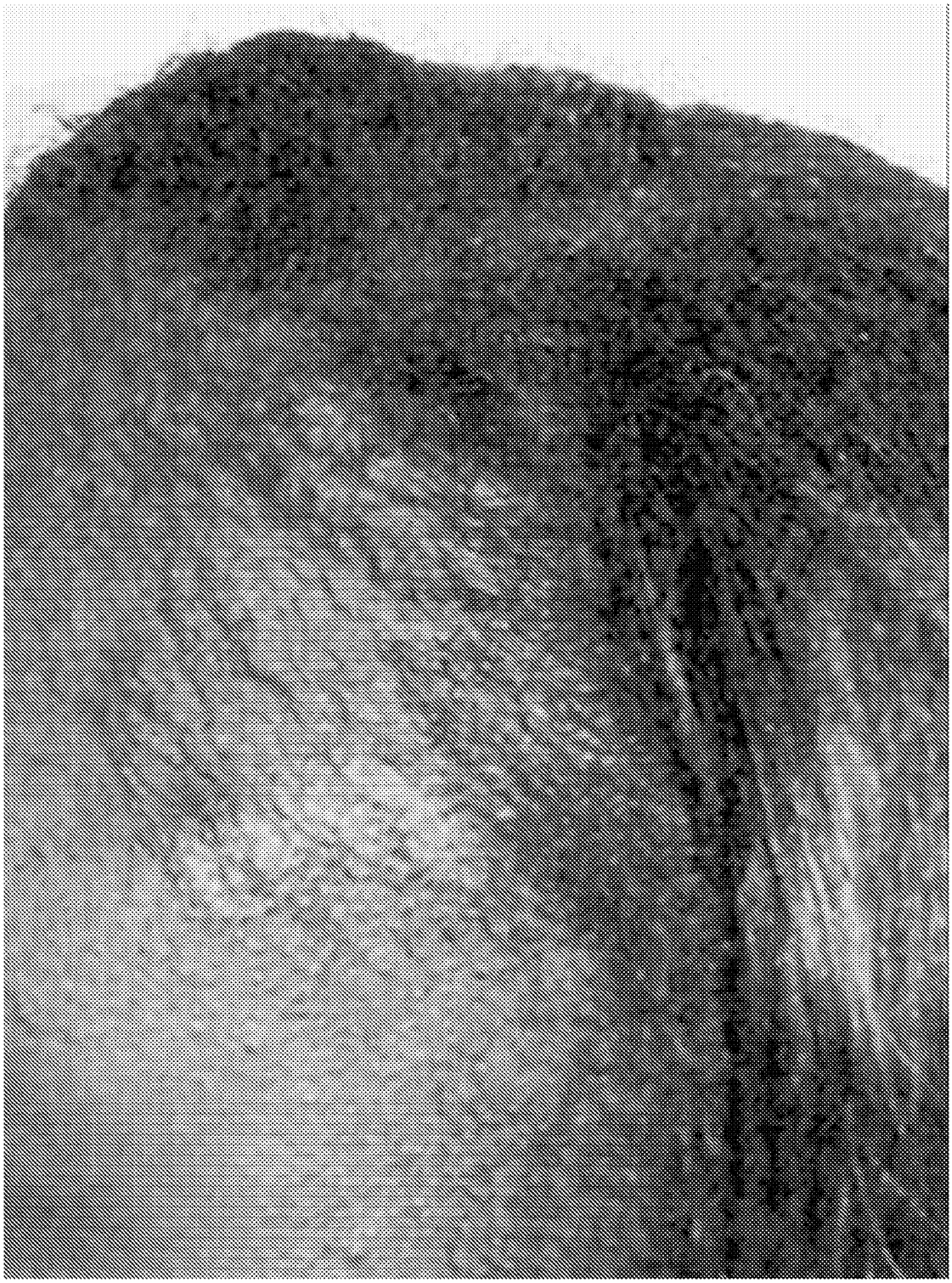
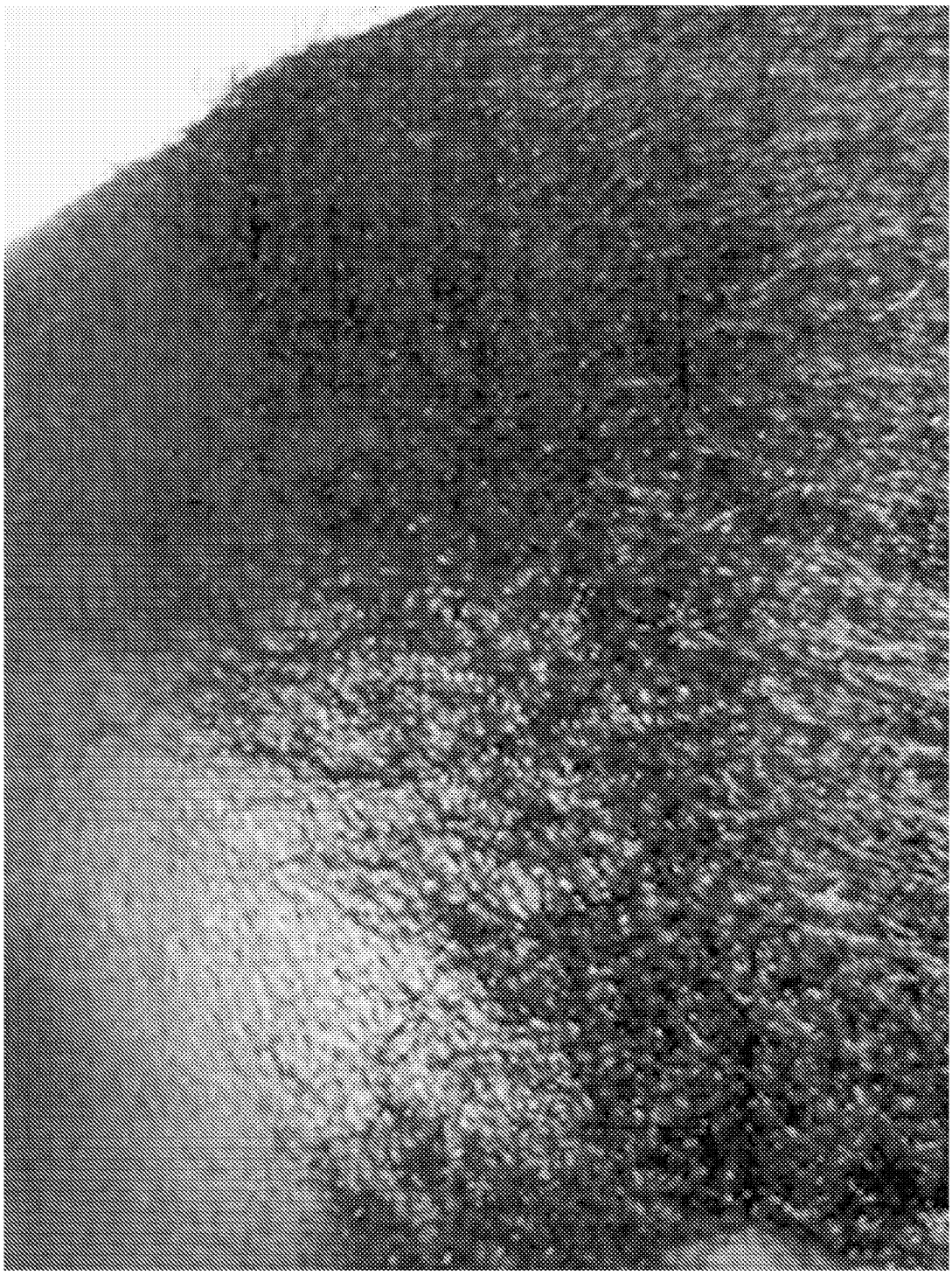


FIGURE 3A - BEFORE



FIBURE 3B - AFTER



INTERNATIONAL SEARCH REPORT

International application No.
PCT/US2016/031589

A. CLASSIFICATION OF SUBJECT MATTER
IPC(8) - A61K 31/13; A61K 31/33; A61K 36/00 (2016.01)
CPC - A61K 31/13; A61K 31/33; A61K 36/00 (2016.05)
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)
IPC(8) - A61K 31/13, A61K 31/33, A61K 36/00 (2016.01)
CPC - A61K 31/13, A61K 31/33, A61K 36/00 (2016.05)

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched
USPC - 424/70.4; 424/74; 424/725; 424/729; IPC(8) - A61K 31/13, A61K 31/33, A61K 36/00; CPC - A61K 31/13, A61K 31/33, A61K 36/00 (keyword delimited)

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)
Orbit, Google Scholar
Search terms used: Larix, Europaea, minoxidil, extract, topical, green tea, camellia sinensis, rogaine, propylene glycol, zinc chloride, stem cell, argania, glycine, glycerin, glycerine, hair growth, pharmaceutical, activator, alcohol

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	US 6,596,266 B2 (CATALFO et al) 22 July 2003 (22.07.2003) entire document	1-12
A	US 8,729,052 B2 (CHOI et al) 20 May 2014 (20.05.2014) entire document	1-12
A	US 2006/0018867 A1 (KAWASAKI et al) 26 January 2006 (26.01.2006) entire document	1-12
A	US 8,444,960 B2 (MALEK) 21 May 2013 (21.05.2013) entire document	1-12
A	US 8,202,556 B2 (RANA et al) 19 June 2012 (19.06.2012) entire document	1-12

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

* Special categories of cited documents:
"A" document defining the general state of the art which is not considered to be of particular relevance
"E" earlier application or patent but published on or after the international filing date
"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)
"O" document referring to an oral disclosure, use, exhibition or other means
"P" document published prior to the international filing date but later than the priority date claimed
"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art
"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
30 June 2016	12 AUG 2016
Name and mailing address of the ISA/ Mail Stop PCT, Attn: ISA/US, Commissioner for Patents P.O. Box 1450, Alexandria, VA 22313-1450 Facsimile No. 571-273-8300	Authorized officer Blaine R. Copenheaver PCT Helpdesk: 571-272-4300 PCT OSP: 571-272-7774

Form PCT/ISA/210 (second sheet) (January 2015)