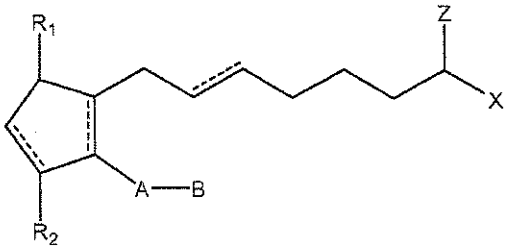
What is claimed is:

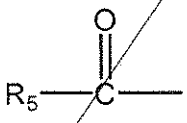
1. A composition for growing hair by topical application comprising:

at least one penetration enhancer; and

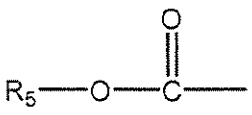
0.01% to 0.3% w/w cyclopentane heptanoic acid, 2-cycloalkyl or arylalkyl compound represented by the formula I:



wherein the dashed bonds represent the presence or absence of a double bond which can be in the cis or trans configuration, A is an alkylene or alkenylene radical having from two to six carbon atoms, which radical can be interrupted by one or more oxa radicals and substituted with one or more hydroxy, oxo, alkyloxy or akylcarboxy groups wherein the alkyl radical comprises from one to six carbon atoms; B is a cycloalkyl radical having from three to seven carbon atoms, or an aryl radical, selected from the group consisting of hydrogen, a lower alkyl radical having from four to ten carbon atoms wherein the heteroatom is selected from the group consisting of nitrogen, oxygen and sulfur atoms; X is $--N(R_4)_2$ wherein R_4 is selected from the group consisting of hydrogen, a lower alkyl radical having from one to six carbon atoms,



and



wherein R_5 is a lower alkyl radical having from one to six carbon atoms; Z is =O; one of R_1 and R_2 is =O, --OH or a $--O(CO)R_6$ group, and the other one is --OH or $--O(CO)R_6$, or R_1 is =O and R_2 is H, wherein R_6 is a saturated or unsaturated acyclic hydrocarbon group having from 1 to about 20 carbon atoms, or $--(CH_2)mR_7$ wherein m is 0 or an integer of from 1 to 10, and R_7 is cycloalkyl radical, having from three to seven carbon atoms, or a hydrocarbyl aryl or heteroaryl radical, as defined

above in free form or a pharmaceutically acceptable salt thereof, in association with a penetration enhancer in particular formulations adapted for topical application to mammalian skin;

wherein said composition is formulated for topical administration to the skin.

2. The composition according to claim 1 wherein said cyclopentane heptanoic acid, 2-cycloalkyl or arylalkyl compound represented by the formula I is bimatoprost.

3. The composition according to claim 1 wherein the penetrating enhancer is selected from the group consisting of propylene glycol, diethylene glycol monoether, ethyl alcohol and glycerin.

4. The composition according to claim 1 wherein the penetrating enhancer is selected from the group consisting of at least two compounds selected from the group consisting of propylene glycol, diethylene glycol monoether, ethyl alcohol and glycerin.

5. A composition according to claim1 wherein the penetrating enhancer consists of the following compounds: propylene glycol, diethylene glycol monoether, ethyl alcohol and glycerin.

6. A composition according to claim 1 comprising from 0.03 – 0.3% w/w bimatoprost, about 10% w/w propylene glycol, about 10% w/w diethylene glycol monoether, about 30% w/w ethyl alcohol, about 2% w/w glycerin, about 0.15% w/w carbomer, about 0.16% w/w triethanolamine, and purified water.

7. The composition according to claim 6 comprising 0.03% w/w bimatoprost.

8. The composition of claim 6 wherein the composition comprises 0.1% w/w bimatoprost.

9. The composition of claim 6 wherein the composition comprises 0.2% bimatoprost.

10. The composition of claim 6 wherein the composition consists of 0.3% w/w bimatoprost.

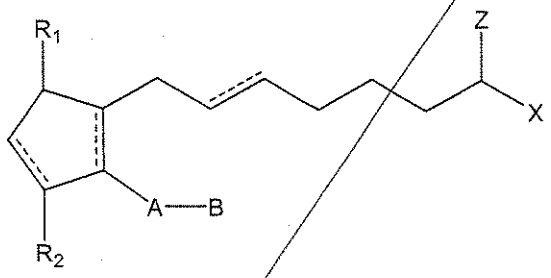
11. The composition according to claim 6 wherein the composition is in the form of one selected from the group consisting of solutions, gels, ointments, foams, films, liniments, creams, shampoos, lotions, pastes, jellies, sprays and aerosols.

12. The composition of claim 11 wherein the composition is packaged in a kit with an applicator for application to the skin.

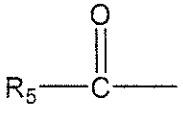
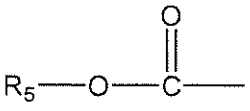
13. The use of a composition comprising:

at least one penetration enhancer; and

a cyclopentane heptanoic acid, 2-cycloalkyl or arylalkyl compound represented by the formula I:



wherein the dashed bonds represent the presence or absence of a double bond which can be in the cis or trans configuration, A is an alkylene or alkenylene radical having from two to six carbon atoms, which radical can be interrupted by one or more oxa radicals and substituted with one or more hydroxy, oxo, alkyloxy or akylcarboxy groups wherein the alkyl radical comprises from one to six carbon atoms; B is a cycloalkyl radical having from three to seven carbon atoms, or an aryl radical, selected from the group consisting of hydrogen, a lower alkyl radical having from four to ten carbon atoms wherein the heteroatom is selected from the group consisting of nitrogen, oxygen and sulfur atoms; X is $-N(R_4)_2$ wherein R_4 is selected from the group consisting of hydrogen, a lower alkyl radical having from one to six carbon atoms,

 and 

wherein R_5 is a lower alkyl radical having from one to six carbon atoms; Z is =O; one of R_1 and R_2 is =O, --OH or a --O(CO)R_6 group, and the other one is --OH or --O(CO)R_6, or R_1 is =O and R_2 is H, wherein R_6 is a saturated or unsaturated acyclic hydrocarbon group having from 1 to about 20 carbon atoms, or --(CH_2)mR_7 wherein m is 0 or an integer of from 1 to 10, and R_7 is cycloalkyl radical, having from three to seven carbon atoms, or a hydrocarbyl aryl or heteroaryl radical, as defined above in free form or a pharmaceutically acceptable salt thereof, in the manufacture of a medicament for stimulating hair growth, wherein the medicament is to be topically administered to the skin in association with a penetration enhancer in particular formulations adapted for topical application to mammalian skin;

wherein said composition is formulated for topical administration to the skin.

14. The use according to claim 13 wherein said cyclopentane heptanoic acid, 2-cycloalkyl or arylalkyl compound represented by the formula I is bimatoprost.

15. The use according to claim 14 comprising bimatoprost at a concentration of about 0.03% w/w to about 0.3% w/w.

16. The use according to claim 14 comprising bimatoprost at about 0.1 % w/w; about 10% w/w propylene glycol, about 10% w/w diethylene glycol monoether, about 30% w/w ethyl alcohol, about 2% w/w glycerin, about 0.15% w/w carbomer, about 0.16% w/w triethanolamine, and purified water.

17. The use according to according to claim 14 comprising bimatoprost at about 0.3 % w/w; about 10% w/w propylene glycol, about 10% w/w diethylene glycol monoether, about 30% w/w ethyl alcohol, about 2% w/w glycerin, about 0.15% w/w carbomer, about 0.16% w/w triethanolamine, and purified water.

18. The use according to claim 14, wherein the composition is applied at least once daily to the scalp.

19. The use according to claim 14, wherein the composition is applied at least once daily to the scalp for treatment of one of the following conditions selected from the group consisting of alopecia areata, telogen effluvium, anagen effluvium, cicatricial alopecia, scarring alopecia; hair shaft abnormalities, trichorrexis nodosa, loose anagen syndrome, trichotillomania, traction alopecia; infectious hair disorders, tiniea capitis, sebohorreic dermatitis, follicullitus of the scalp, and androgenetic alopecia.

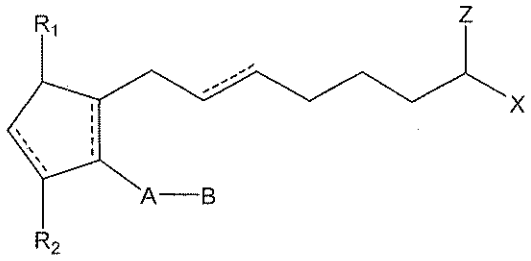
20. The use according to claim 14 wherein the composition is applied at least once a day to both the scalp and the eyebrows for patients experiencing hair loss due to chemotherapy, hormonal imbalance, fungal infection of the scalp, anti-coagulants, medicine for gout, depression, high blood pressure and heart disease.

Claims

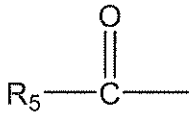
1. A composition for growing hair by topical application comprising:

at least one penetration enhancer; and

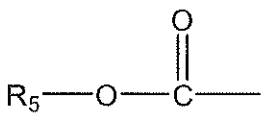
0.01% to 5% w/w cyclopentane heptanoic acid, 2-cycloalkyl or arylalkyl compound represented by the formula I:



wherein the dashed bonds represent the presence or absence of a double bond which can be in the cis or trans configuration, A is an alkylene or alkenylene radical having from two to six carbon atoms, which radical can be interrupted by one or more oxa radicals and substituted with one or more hydroxy, oxo, alkyloxy or alkylcarboxy groups wherein the alkyl radical comprises from one to six carbon atoms; B is a cycloalkyl radical having from three to seven carbon atoms, or an aryl radical, selected from the group consisting of hydrogen, a lower alkyl radical having from four to ten carbon atoms wherein the heteroatom is selected from the group consisting of nitrogen, oxygen and sulfur atoms; X is --$N(R_4)_2$ wherein R_4 is selected from the group consisting of hydrogen, a lower alkyl radical having from one to six carbon atoms,



and



wherein R_5 is a lower alkyl radical having from one to six carbon atoms; Z is =O; one of R_1 and R_2 is =O, --OH or a --$O(CO)R_6$ group, and the other one is --OH or --$O(CO)R_6$, or R_1 is =O and R_2 is H, wherein R_6 is a saturated or unsaturated acyclic hydrocarbon group having from 1 to about 20 carbon atoms, or --$(CH_2)mR_7$ wherein m is 0 or an integer of from 1 to 10, and R_7 is cycloalkyl radical, having from three to seven carbon atoms, or a hydrocarbyl aryl or heteroaryl radical, as defined above in free form or a pharmaceutically acceptable salt thereof, in association with

a penetration enhancer in particular formulations adapted for topical application to mammalian skin;

wherein said composition is formulated for topical administration to the skin;

wherein said cyclopentane heptanoic acid, 2-cycloalkyl or arylalkyl compound represented by the formula I is bimatoprost;

wherein the penetration enhancer comprises a combination of ethanol, propylene glycol and at least one of diethylene glycol monoethyl ether, glycerol monooleate, oleic acid and benzyl alcohol.

2. A composition according to claim 1, wherein the penetration enhancer comprises a combination of ethanol, propylene glycol, diethylene glycol monoethyl ether, glycerol monooleate, and at least one of oleic acid and benzyl alcohol.

3. A composition according to claim 2, wherein the penetration enhancer comprises a combination of ethanol, propylene glycol, diethylene glycol monoethyl ether, glycerol monooleate, and benzyl alcohol.

4. A composition according to claim 3, wherein the penetration enhancer comprises a combination of ethanol, propylene glycol, diethylene glycol monoethyl ether, glycerol monooleate, oleic acid and benzyl alcohol.

5. The composition of any one of claims 1 to 4, wherein the composition comprises 0.1% to 5% w/w bimatoprost.

6. The composition of claim 5 wherein the composition comprises 1% w/w bimatoprost.

7. The composition of claim 5 wherein the composition comprises 5% w/w bimatoprost.

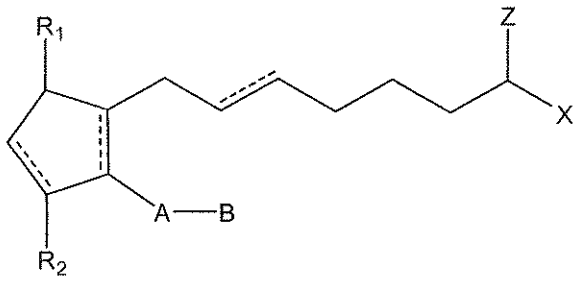
8. The composition according to any one of claims 1 to 7 wherein the composition is in the form of one selected from the group consisting of solutions, gels, ointments, foams, films, liniments, creams, shampoos, lotions, pastes, jellies, sprays and aerosols.

9. The composition of claim 8 wherein the composition is packaged in a kit with an applicator for application to the skin.

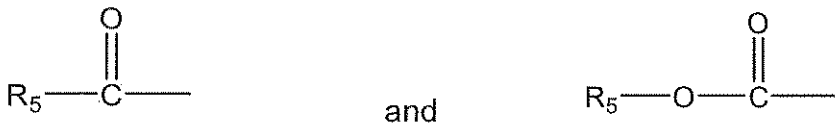
10. The use of a composition comprising:

at least one penetration enhancer; and

a cyclopentane heptanoic acid, 2-cycloalkyl or arylalkyl compound represented by the formula I:



wherein the dashed bonds represent the presence or absence of a double bond which can be in the cis or trans configuration, A is an alkylene or alkenylene radical having from two to six carbon atoms, which radical can be interrupted by one or more oxa radicals and substituted with one or more hydroxy, oxo, alkyloxy or alkylcarboxy groups wherein the alkyl radical comprises from one to six carbon atoms; B is a cycloalkyl radical having from three to seven carbon atoms, or an aryl radical, selected from the group consisting of hydrogen, a lower alkyl radical having from four to ten carbon atoms wherein the heteroatom is selected from the group consisting of nitrogen, oxygen and sulfur atoms; X is $--N(R_4)_2$ wherein R_4 is selected from the group consisting of hydrogen, a lower alkyl radical having from one to six carbon atoms,



wherein R_5 is a lower alkyl radical having from one to six carbon atoms; Z is =O; one of R_1 and R_2 is =O, --OH or a $--O(CO)R_6$ group, and the other one is --OH or $--O(CO)\ R_6$, or R_1 is =O and R_2 is H, wherein R_6 is a saturated or unsaturated acyclic hydrocarbon group having from 1 to about 20 carbon atoms, or $--(CH_2)mR_7$

wherein m is 0 or an integer of from 1 to 10, and R_7 is cycloalkyl radical, having from three to seven carbon atoms, or a hydrocarbyl aryl or heteroaryl radical, as defined above in free form or a pharmaceutically acceptable salt thereof, in association with a penetration enhancer in particular formulations adapted for topical application to mammalian skin in the manufacture of a medicament for stimulating hair growth;

wherein said medicament is formulated for topical administration to the skin;

wherein said cyclopentane heptanoic acid, 2-cycloalkyl or arylalkyl compound represented by the formula I is bimatoprost;

wherein the penetration enhancer comprises a combination of ethanol, propylene glycol and at least one of diethylene glycol monoethyl ether, glycerol monooleate, oleic acid and benzyl alcohol.

11. The use according to claim 10, wherein the penetration enhancer comprises a combination of ethanol, propylene glycol, diethylene glycol monoethyl ether, glycerol monooleate, and at least one of oleic acid and benzyl alcohol.

12. The use according to claim 11, wherein the penetration enhancer comprises a combination of ethanol, propylene glycol, diethylene glycol monoethyl ether, glycerol monooleate, and benzyl alcohol.

13. The use according to claim 12, wherein the penetration enhancer comprises a combination of ethanol, propylene glycol, diethylene glycol monoethyl ether, glycerol monooleate, oleic acid and benzyl alcohol.

14. The use according to any one of claims 10 to 13 comprising bimatoprost at a concentration of about 0.03% w/w to about 5% w/w.

15. The use according to any one of claims 10 to 14, wherein the composition is applied at least once daily to the scalp.

16. The use according to claim 15, wherein the medicament is to be applied at least once daily to the scalp for treatment of one of the following conditions selected from the group consisting of alopecia areata, telogen effluvium, anagen effluvium, cicatricial alopecia, scarring alopecia; hair shaft abnormalities, trichorrexis nodosa,

loose anagen syndrome, trichotillomania, traction alopecia; infectious hair disorders, tiniea capitis, sebohorreic dermatitis, folliculitus of the scalp, and androgenetic alopecia.

17. The use according to claim 15 wherein the medicament is to be applied at least once a day to both the scalp and the eyebrows for patients experiencing hair loss due to chemotherapy, hormonal imbalance, fungal infection of the scalp, anti-coagulants, medicine for gout, depression, high blood pressure and heart disease.

18. The composition of any one of claims 1 to 9, wherein the composition comprises about 1 to about 5% w/w bimatoprost.

19. The use of any one of claims 10 to 17 comprising bimatoprost at a concentration of 0.3% w/w.

20. The use of any one of claims 10 to 17 comprising bimatoprost at a concentration of 1% w/w.

21. The use of any one of claims 10 to 17 comprising bimatoprost at a concentration of 5% w/w.

22. The use of any one of claims 10 to 17 comprising bimatoprost at a concentration of about 1 to about 5% w/w.