


**Note:** Text based on automatic Optical Character Recognition processes.

Select Language 

Please use the PDF version for legal matters

Powered by  [Translate](#)

---

What is Claimed is:

1. A therapeutic sun-protecting composition, comprising: (a) at least one sun-protecting agent; (b) at least one vitamin D compound present in a therapeutically effective amount to increase serum vitamin D levels when administered to a mammal; and (c) a pharmaceutical carrier effective for topical administration of said at least one sun-protecting agent and said at least one vitamin D compound.
2. A therapeutic sun-protecting composition according to Claim 1, wherein said at least one vitamin D compound is present in an amount to compensate for a reduction in said mammal's natural vitamin D production due to decreased sun exposure resulting from said at least one sun-protecting agent.
3. A therapeutic sun-protecting composition according to Claim 1, wherein said mammal has a vitamin D deficiency or has a vitamin D insufficiency.
4. A therapeutic sun-protecting composition according to Claim 3, wherein said mammal has a serum (25 -hydroxy) vitamin D concentration of less than about 20 ng/mL.
5. A therapeutic sun-protecting composition according to Claim 1, wherein administration of said at least one vitamin D compound to said mammal results in a serum (25 -hydroxy) vitamin D concentration in said mammal in a range of about 20 ng/mL to about 100 ng/mL.
6. A therapeutic sun-protecting composition according to Claim 1, wherein said at least one vitamin D compound is present in said composition at a concentration that results in administration of said at least one vitamin D compound to the skin of said mammal at a concentration of about 0.1 IU/cm<sup>2</sup> to about 1000 IU/cm<sup>2</sup>.
7. A therapeutic sun-protecting composition according to Claim 1, wherein said at least one vitamin D compound is present in said composition at a concentration that results in administration of said at least one vitamin D compound to the skin of said mammal at a concentration of about 0.1 IU/cm<sup>2</sup> to about 10.0 IU/cm<sup>2</sup>.
8. A therapeutic sun-protecting composition according to Claim 1, wherein said at least one sun-protecting agent is selected from the group consisting of aminobenzoic acid, avobenzene, benzophenone, benzophenone-3, cinnamates, cinoxate, dioxybenzone, ecamsule, ensulizole, ethylhexyl/?-methoxycinnamate, homosalate, menthyl anthranilate, meradimate, octinoxate, octisalate, octocrylene, octyl dimethyl paba, octyl methoxycinnamate (OMC), octyl salicylate (OCS), oxybenzone, padimate-O, /?αα-

aminobenzoic acid (PABA), parsol<sup>®</sup> 1789, salicylates, sulisobenzone, titanium dioxide, trolamine salicylate, UVAII, UVB, and zinc oxide.

9. A therapeutic sun-protecting composition according to Claim 1, wherein said at least one vitamin D compound is selected from the group consisting of vitamin D<sub>2</sub> (ergocalciferol), vitamin D<sub>3</sub> (cholecalciferol), vitamin D precursors, inactive forms, active forms, and metabolites thereof.

10. A therapeutic sun-protecting composition according to Claim 1, wherein said at least one sun-protecting agent, said at least one vitamin D compound, and said pharmaceutical carrier are provided in combination in the form of a cream, gel, liquid, lotion, solution, spray, emulsion, aerosol, or a combination thereof.

11. A therapeutic sun-protecting composition according to Claim 1, wherein said pharmaceutically effective carrier is selected from the group consisting of water, alcohol, other oil-free carriers, or mixtures thereof.

12. A therapeutic sun-protecting composition according to Claim 1, further comprising at least one emollient.

13. A therapeutic sun-protecting composition according to Claim 12, wherein said at least one emollient is selected from the group consisting of fatty esters, fatty alcohols, mineral oils, polyether siloxane copolymers, polypropylene glycol ("PPG")- 15 stearyl ether, PPG-10 acetyl ether, steareth-10, oleth-8, PPG-4 lauryl ether, vitamin E acetate, PEG-7 glyceryl

cocotate, lanolin, cetyl alcohol, octyl hydroxystearate, dimethicone, cetyl alcohol, octyl hydroxystearate, dimethicone, derivatives, combinations, and mixtures thereof.

14. A therapeutic sun-protecting composition according to Claim 1, further comprising at least one skin condition agent.

15. A therapeutic sun-protecting composition according to Claim 14, wherein said at least one skin condition agent is selected from the group consisting of colloidal oatmeal, olive leaf, sulfonated shale oil, elubiol, 6-(1-piperidiny)-2,4-pyrimidinediamine-3-oxide, finasteride, ketoconazole, zinc pyrithione, coal tar, benzoyl peroxide, selenium sulfide, hydrocortisone, pramoxine hydrochloride, tricetyl ammonium chloride, polyquaternium 10, panthenol, panthenol triacetate, vitamin B, vitamin C, vitamin D, vitamin E, vitamin K, keratin, lysine, arginine, hydrolyzed wheat proteins, hydrolyzed silk proteins, octyl methoxycinnamate, oxybenzone, minoxidil, titanium dioxide, zinc dioxide, erythromycin, tretinoin, derivatives, combinations, and mixtures thereof.

16. A therapeutic sun-protecting composition according to Claim 1, further comprising at least one stabilizing agent.

17. A therapeutic sun-protecting composition according to Claim 16, wherein said at least one stabilizing agent is selected from the group consisting of butylated hydroxy toluene (BHT), ethylene diamine tetra acetic acid (EDTA), triethanolamine (TEA),

glycerin, propylene glycol, derivatives, combinations, and mixtures thereof.

18. A therapeutic sun-protecting composition according to Claim 1, further comprising at least one humectant.

19. A therapeutic sun-protecting composition according to Claim 18, wherein said at least one humectant is a polyhydric alcohol selected from the group consisting of glycerol/ glycerin, polyalkylene glycols, alkylene polyols, including butylene glycol, propylene glycol, dipropylene glycol, polypropylene glycol, and polyethylene glycol, sorbitol, hydroxypropyl sorbitol, hexylene glycol, 1,3-dibutylene glycol, 1,2,6,-hexanetriol, ethoxylated glycerol, propoxylated glycerol, derivatives, combinations, and mixtures thereof.

20. A therapeutic sun-protecting composition according to Claim 1, further comprising at least one emulsifying agent.

21. A therapeutic sun-protecting composition according to Claim 20, wherein said at least one emulsifying agent is selected from the group consisting of polysorbate 80, glyceryl distearate, POE 10 stearyl ether, ceateareth 20, stearyl alcohol, cetareth 20, cetaryl alcohol, other oil-free emulsifying agents, derivatives, combinations, and mixtures thereof.

22. A therapeutic sun-protecting composition according to Claim 1, further comprising at least one conditioning agent.

23. A therapeutic sun-protecting composition according to Claim 22, wherein said at least one conditioning agent is selected from the group consisting of octyl hydroxystearate;

emollients, such as cholesterol NF, petrolatum, mineral oils and esters, including isopropyl myristate, isopropyl palmitate, 1-decene polymer (hydrogenated), and C<sub>12</sub>-C<sub>15</sub> alcohol benzoates, derivatives, combinations, and mixtures thereof.

24. A therapeutic sun-protecting composition according to Claim 1, further comprising at least one thickening agent.

25. A therapeutic sun-protecting composition according to Claim 24, wherein said at least one thickening agent is selected from the group consisting of polyacrylamide, C<sub>13</sub>-C<sub>14</sub> isoparaffin, laureth-7, and derivatives, combinations, and mixtures thereof.

26. A therapeutic sun-protecting composition according to Claim 1, further comprising at least one antioxidant.

27. A therapeutic sun-protecting composition according to Claim 26, wherein said at least one antioxidant is selected from the group consisting of ascorbic acid, ascorbyl palmitate, BHT, tocopheryl acetate, butylated hydroanisole (BHA), phenyl- $\alpha$ -naphthylamine, hydroquinone, propyl gallate, nordihydroquaric acid, Garcinia Mangostana (Mangosteen) Peel Extract, Camellia Sinensis (Green and White Tea) Leaf Extract, Punica Granatum (Pomegranate) Extract, and derivatives, combinations, and mixtures thereof.

28. A therapeutic sun-protecting composition according to Claim 1, further including the antioxidants Garcinia Mangostana (Mangosteen) Peel Extract, Camellia Sinensis (Green and White Tea) Leaf Extract, and Punica Granatum (Pomegranate) Extract

together in combination.

29. A therapeutic sun-protecting composition according to Claim 1, further comprising at least one UV stabilizer or at least one UV radiation absorber.

30. A method of preventing disorders and diseases associated with vitamin D deficiency or vitamin D insufficiency, comprising topically administering to a mammal a sun-protecting composition, said sun-protecting composition comprising: (a) at least one sun-protecting agent; (b) at least one vitamin D compound present in a therapeutically effective amount to increase serum vitamin D levels when administered to said mammal; and (c) a

pharmaceutical carrier effective for topical administration of said at least one sun-protecting agent and said at least one vitamin D compound to said mammal.

31. A method of preventing disorders and diseases associated with vitamin D deficiency or vitamin D insufficiency according to Claim 30, wherein said sun-protecting composition is topically administered to said mammal in a single application, or is topically administered to said mammal in multiple applications.

32. A method of treating disorders and diseases associated with vitamin D deficiency or vitamin D insufficiency, comprising topically administering to a mammal having at least one disorder or disease associated with vitamin D deficiency a sun-protecting composition, said sun-protecting composition comprising: (a) at least one sun-protecting agent; (b) at least one vitamin D compound present in a therapeutically effective amount to increase serum vitamin D levels when administered to said; and (c) a pharmaceutical carrier effective for topical administration of said at least one sun-protecting agent and said at least one vitamin D compound to said mammal.

33. A method of treating disorders and diseases associated with vitamin D deficiency or vitamin D insufficiency according to Claim 32, wherein said at least one disorder or disease state associated with vitamin D deficiency or vitamin D insufficiency is selected from the group consisting of disorders and diseases associated with low calcium uptake, bone-related disorders and diseases, vascular disorders and diseases, autoimmune disorders and diseases, tuberculosis, periodontal disease, chronic pain, seasonal affective disorder, cognitive impairment, depression, type I diabetes, chronic renal disease, hypoparathyroid, Parkinson's disease, and cancer.

34. A method of treating disorders and diseases associated with vitamin D deficiency or vitamin D insufficiency according to Claim 32, wherein said sun-protecting composition is topically administered to said mammal in a single application, or is topically administered to said mammal in multiple applications.