

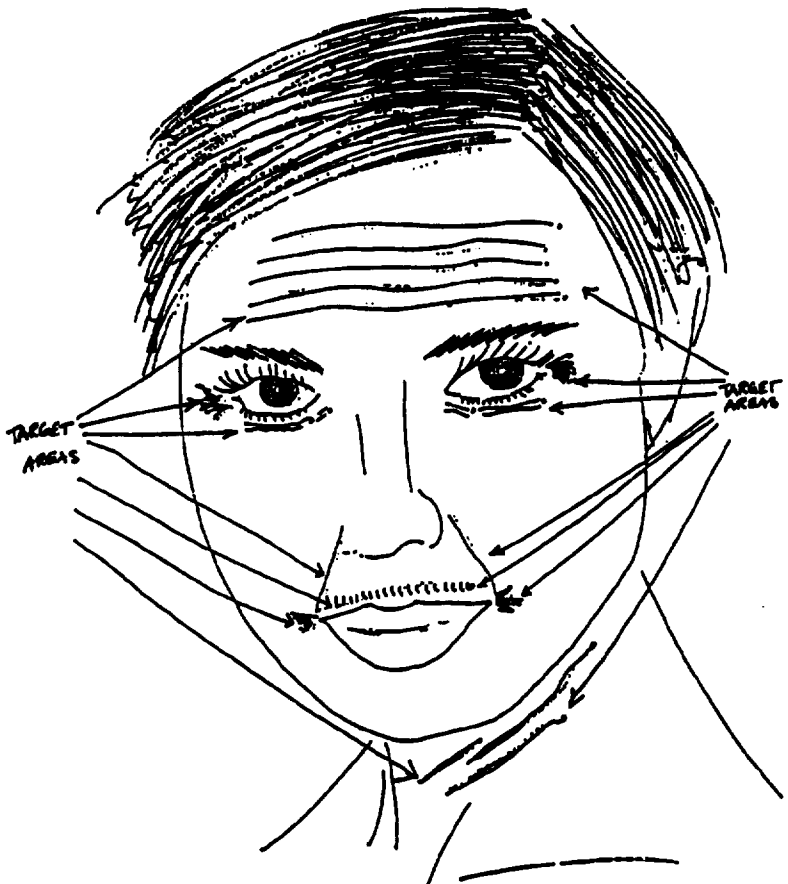
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(54) Title: SKIN CARE COMPOSITIONS AND METHODS

(57) Abstract

Skin care compositions and methods are provided for improving the appearance of skin affected by aging, photodamage and/or oxidative stress. Specifically, adhesive materials containing cosmetically active ingredients, e.g., one or more antioxidants such as Vitamins A, C and/or E, or moisturizers are applied to target areas including the frowline area of the forehead, the front of the neck, the crows-feet area near the eyes, the upper lip and the nasolabial area.



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SKIN CARE COMPOSITIONS AND METHODS

Field of the Invention

This invention relates to skin care compositions and methods for the improvement of the appearance of aging skin, in particular, to the improvement of wrinkling skin in target areas including but not limited to the areas outside and under the eyes, in the nasolabial area, the upper lip, the forehead, the neck and the hands.

Background of the Invention

People in general are very concerned with maintaining youthful and attractive appearances. As populations age, it is anticipated there will be increasing markets for skin care products which can improve the appearance of aging skin and/or maintain attractive skin qualities. Treatments designed to prolong or promote youthful appearance include topical applications of cosmetic preparations, lotions and moisturizer, electrical stimulation, collagen injections and cosmetic surgery.

With aging, prolonged or repeated exposure to ultraviolet radiation and/or oxidative stress, the skin of the face often shows signs of damage resulting from such exposure. Aging or other damage to skin may be recognized by effects including wrinkling, yellowing, laxing, lines, spots, mottling and a leathery or dry appearance. At the histological level, skin damage, e.g., from photoaging, may be reflected in tangled, thickened, abnormal elastic fibers, decreased collagen and increased glycosaminoglycan content (Tanaka et al. (1993) *Arch. Dermatol. Res.* 285:352-355). The aging process results in thinning and deterioration of the skin. There is a reduction in cells and in blood supply, and a flattening in the junction between the dermis and epidermis.

Ascorbic acid (Vitamin C), Vitamin A, tocopherol (Vitamin E) and β -carotene, which can at least in part be functionally characterized as antioxidants, are essential to the maintenance of a healthy and attractive skin appearance in humans. Vitamin K is also beneficial to maintaining attractive skin. Generally, these nutrients are obtained in the diet and/or in nutritional supplements. Other cosmetically beneficial components can be applied topically for improving skin appearance and quality; such components include moisturizers, including but not limited to polysaccharides and marine extracts.

The aforementioned antioxidants help to prevent damage to skin and/or body organs resulting from poor nutrition, physiological processes and exposure to environmental pollutants, certain drugs, alcohol, and ultraviolet (UV) radiation. Normal physiological processes, including aging, and exposure to deleterious agents can lead to the generation of free oxygen radicals, a

component of so-called oxidative stress. Oxidative stress leads to damage to cellular membranes, the genetic material and other cellular targets including connective tissue and collagen. Other sources of oxidative stress include heat, trauma, infection, hyperoxia, toxins and excessive exercise. Antioxidants can donate electrons without generating potentially harmful chain reactions and oxidation of cellular components, and thus provide protection from oxidative damage. A further problem, especially with aging skin is a decrease in blood circulation.

Ascorbic acid (Vitamin C) is known to stimulate and/or regulate collagen synthesis in human tissue. When collagen synthesis is stimulated in skin, a healthier and younger skin appearance results. Ascorbic acid can also help to prevent or minimize UV-induced lipid oxidation, thus providing further benefits in maintaining or promoting attractive skin appearance. Further, ascorbic acid acts to inhibit melanin synthesis, which leads to skin discoloration during the aging process, and to inhibit histamine release from cellular membranes, which is associated with allergenic reactions, particularly among individuals with so-called "sensitive skin."

Ascorbic acid-containing compositions for topical application to the skin have been described (see, e.g., U.S. Patent No. 4,983,382, issued Jan. 8, 1991; Avon Products, Inc.). U.S. Patent No. 4,999,348, issued March 12, 1994, Estee Lauder, Inc., refers to cholesteric liquid crystal compositions for controlled release and enhanced penetration of biologically active materials such as Vitamin A to the skin. Vitamin A is said to make wrinkling in the skin less noticeable. U.S. Patent No. 5,238,965, issued August 24, 1993, Procter & Gamble Company, refers to regulating wrinkling using topical applications of lipophosphatidic acid compositions. WO 94/00109 and WO 94/00098 (Lancaster Group AG), both incorporated by reference, refer to dermatological agents for increasing oxygen transport in the skin; these agents comprise phospholipids and oxygen-loaded fluorocarbons. U.S. Patent No. 5,296,500 (issued March 22, 1994, Procter & Gamble Co.) claims methods for regulating wrinkles or atrophy of the skin using compositions comprising N-acetyl cysteine, including compositions where one or more additional components (sunscreen, antioxidants, anti-inflammatory agents) are added. The present invention has the advantage over these conventional preparations in that absorption of Vitamin C or other cosmetically active ingredient into the skin can continue over an extended period of time without the extra effort or inconvenience of needing to actively apply another coat of a lotion, cream or the like.

Tocopherol (Vitamin E, with α -tocopherol being the most potent) has effects in the skin including antioxidant activity, improved membrane stability, protection against UV radiation and nitrosamine formation, moisturizing action on dry skin and anti-inflammatory action. It is the antioxidant effect which is believed most important in protection from oxidative damage. Tocopherol has also been shown to play a role in maintaining the structural integrity of cell membranes and connective tissue. Firmness, texture and/or tone are maintained by the integrity of the elastic fiber in the dermis and collagen in connective tissue. Vitamin E is also believed to

improve the hydration of the skin, and insufficiently hydrated skin is characterized by lines at relatively closer distance than in normal skin, irregular texture and a "scruffy" appearance.

It has been reported that only about 20-40% of oral vitamin E is absorbed, and it is not known what fraction of the absorbed vitamin E is available to the skin. Topically applied vitamin E, either in the alcohol or the acetate form, can be absorbed through the skin. When combined with ascorbyl palmitate which acts as an oxygen scavenger, tocopherol is particularly effective as an antioxidant to extend the shelf-life of natural products formulations such as perfumes, vitamins and herbal extracts.

β -carotene within physiologically advantageous levels is also essential for skin development. An excess of β -carotene inhibits the keratinization of epithelial tissue, and a deficiency results in acne-like blackheads. β -carotene also acts to improve the skin's water barrier properties, and therefore β -carotene can be useful in treating seasonal and/or environmental problems (heat, dryness, air pollution). Provision of β -carotene to the skin will increase the amount of Vitamin A within the skin, and thereby impart beneficial effects on appearance of skin.

Other cosmetically active compositions, when topically applied to the skin, include marine extracts and moisturizers, for example, hyaluronic acid. Marine extracts, for example, those prepared from seaweed, are rich in minerals, amino acids, vitamins, and polysaccharides which are believed to function as moisturizing agents. Additional embodiments of a skin care patch can increase the oxygen supply to the skin, for example, using oxygen-loaded fluorocarbon compounds (as disclosed in WO 94/00109, WO 94/00098, for example) within the patch. Further embodiments include patches comprising cosmetically effective amounts of an active ingredient such as lysophosphatidic acid, an α -hydroxyacid and N-acetyl cysteine.

Transdermal delivery of pharmaceutical compositions is well known. Such well-known pharmaceutical compositions include scopolamine for treatment of motion sickness, estrogen replacement therapy and nicotine for assistance in breaking tobacco habits. The present invention is believed to be the first application of transdermal delivery systems for skin care and the improvement of the appearance of aging, photodamaged or oxidatively stressed skin, especially for the improvement of the appearance of wrinkled skin.

Brief Description of the Drawings

Fig. 1 is a sketch of a typical aging human face with wrinkles under and in the outside corners of the eyes, the forehead, upper lip, the area from the outside bottom edges of the nose to the outside corners of the mouth (the nasolabial fold area) and the neck.

Fig. 2 illustrates a human face with the transdermal delivery device for application of cosmetically active compositions in place on the forehead.

Fig. 3 illustrates a human face with a pair of the transdermal delivery devices for application of cosmetically active compositions in place in the nasolabial fold area.

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