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Review Article

COSMECEUTICALS FOR THE SKIN: AN OVERVIEW

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ABSTRACT

Cosmeceuticals is the merging of cosmetics with pharmaceutical industry. These days number of cosmeceutical products have been introduced into the market with enhanced efficacy. Moisturizers, sunscreen, pigment lightener and other formulations have been renovated to improvised forms by addition of drug like ingredients for better results. Cosmeceuticals contribute majorly to the cosmetic industry. Although the effects may be small, these products however improve the skin feel and appearance with continued use over a period of time; thus there lies great opportunity to explore this avenue. The present text aims to highlight the blooming skin cosmeceuticals industry that offers limitless possibilities for identifying new functional materials as well as explore the existing classes of compounds.

Key words: Cosmeceuticals, moisturizing agents, sunscreen agents, hydroxy acids, vitamins

INTRODUCTION

Cosmeceuticals are cosmetic products with biologically active ingredients purporting to have medical or drug-like benefits. A cosmeceutical is an ingredient with medicinal properties that manifests beneficial topical actions and provides protection against degenerative skin conditions. The word "Cosmeceuticals" was popularized by Albert M. Kligman in the late 1970s. It encompasses cosmetic actives with therapeutic, disease fighting, or healing properties, serving as a bridge between personal care products and pharmaceuticals. Like cosmetics, cosmeceuticals are topically applied, but they contain ingredients that influence the biological function of the skin.[1] Cosmeceuticals improve appearance by delivering nutrients necessary for healthy skin. Cosmeceuticals typically claim to improve skin tone, texture, and radiance, while reducing wrinkling. Cosmeceuticals are the fastest-growing segment of the natural personal care industry[2].

Consumers are always interested in maintaining a youthful appearance, and as the global population's median age increases, this market is increasingly expanding. According to the United States Food and Drug Administration (FDA), the Food, Drugs, and Cosmetics Act; *A product can be a drug, a cosmetic, or a combination of both, but the term "cosmeceutical" has no meaning under the law".* So the term cosmeceutical is not recognized by the Federal Food, Drug, and Cosmetic Act. Although cosmetics and cosmeceuticals are tested for safety, testing to determine whether beneficial ingredients actually live up to a manufacturer's claims is not mandatory. In general, vitamins, herbs, various oils, and botanical extracts may be used in cosmeceuticals, but the manufacturer may not claim that these products penetrate beyond the skin's surface layers or that they have drug like or therapeutic effects.

For cosmetic labels, no division between active ingredients and other ingredients is required; they are all listed together. The most important botanicals pertaining to dermatologic uses such as cosmeceuticals include teas, soy, pomegranate, date, grape seed, pycnogenol, horse chestnut, German chamomile, curcumin, comfrey, allantoin, and aloe; only green and black tea, soy, pomegranate, and date have been studied to the extent that clinical trials for the treatment of parameters of extrinsic aging have been published.[3] Few botanical-based cosmeceuticals have uses that are supported by evidence-based science. Chemoprevention by oral or topical use of dietary or pharmacologic agents to inhibit or reverse the development of cancer is a possibility[4]. Potential cosmeceutical agents in this category include green tea, grape seed extract, vitamin E, and beta-carotene. Cosmeceuticals being cosmetic products having medicinal or drug-like benefits are able to affect the biological functioning of skin owing to type of functional ingredients they contain. There are skin-care products that go beyond coloring and adorning the skin. These products improve the functioning/texture of the skin by encouraging collagen growth by combating harmful effects of free radicals, thus maintaining keratin structure in good condition and making the skin healthier. Most of the eminent multinational companies engaged in cosmetics productions have introduced a wide range of products having therapeutic effects by addition of a single or more active drug like component to enhance the efficacy of products which later on was found to be beneficiary for the required purpose. These products have also mended some flaws associated with existing products leading consumers to discontinue the use of that product due to allergic reactions or excessive skin dryins. Many companies add humectants like glycerin as a soothing agent which increases the skin moisture level and keeps it hydrated. Commonly used substances included in cosmeceutical formulations are described as follows.

Moisturizing Agents

Stratum corneum is the primary barrier of the skin whose one of main purpose is to keep inside in & outside out. This barrier is rich in cholesterol, free fatty acids, and ceramides. Many oily preparations have been used to maintain the fluidity of the skin (Mineral oil, Lanolin, cyclomethicone, etc.). Water from the stratum corneum gets evaporated very quickly leading to dehydration. This dehydration of skin can be averted by using moisturizers which provide flexibility to the skin. Humectants are cardinal ingredients of the moisturizing formulations.

Humectants also help in preventing drying out of the formulations. When moisturizers are applied to the skin, a thin film of humectant is formed which retains moisture and imparts better appearance to the skin. Bio-mimetic lipid containing formulations facilitate in normalizing the damaged skin. Water can cause the excretion of cytokines when applied to the skin for a prolonged period of time. This may further lead to edema, vasodilatation, and inflammation gets induced. Moisturizers by hydrating the skin, make the stratum corneum softer & can even alter physiology of skin. Ceramide-containing moisturizers are very popular as these contain the same balance of lipids as our skin. There are nine different types of ceramides in the stratum corneum named as ceramide 1- 9. They constitute 40-50% of the lipids in this outermost layer. It has been proven that these substances help to treat eczema, and can even be used for dry skin. Fluocinolide containing ceramides formulation has been found to reduce eczema.[5] Besides these, black cohosh, soy extract, and vitamins A and E also help in augmenting the skin's natural moisture balance. Complex mixture of hyaluronic acid and a revival complex containing green tea leaf extract, and glutathione are also promising moisturising agents[40].

Sunscreen Agents

Use of sunscreen agents and limiting the exposure to sun prevents early wrinkling and skin cancer. Sunscreen agents are used to prevent sunburns. There are two kinds of sunscreen agents:

chemical and physical. Chemical sunscreen agents protect the skin from the sun by absorbing the ultraviolet (UV) and visible sun rays, while physical sunscreen agents reflect, scatter, absorb, or block the rays. Sunscreen agents often may comprise more than one ingredient.

For example, products may contain an ingredient that provides protection against the ultraviolet A (UVA) sun rays and another ingredient that protects from the ultraviolet B (UVB) sun rays, which are more likely to cause sunburns than the UVA sun rays. Ideally, coverage should include protection against both UVA and UVB sun rays. The sun protection factor (SPF) that is present on the label of these products reflects the minimum amount of UVB sunlight that is needed with that product to produce redness on sunscreen-protected skin as compared with unprotected skin. Sunscreen products with high SPFs provide more protection against the sun.

The following sunscreen agents have been recommended by the U.S. Department of Health :

- Cycloform (isobutyl p-amino benzoate)
- Propylene glycol p-amino benzoate
- Monoglyceryl p-amino benzoate
- Digalloyl trioleate
- Benzyl salicylate and benzyl cinnamate (2% each)

Besides these, chemical sunscreens mainly based on para-amino benzoic acid, its deivatives, cinnamates, various salicylates and benzophenones, dibenzoylmethanes, anthraline derivatives, octocrylene and homosalate are frequently employed as sun blocking agents. Direct physical blockers include metal containing compounds such as iron, zinc, titanium, and bismuth.

Zinc oxide and titanium dioxide are highly reflective white powders, but submicron zinc oxide or titaniumdioxide powder particles transmit visible light while retaining their UV blocking properties, thus rendering the sun block invisible on the skin. Other commercially available sunscreens are Benzophenone-8, Neo Heliopan MA and BB, Parsol MCX and HS, Escalol 557, 587,and 597[40].

Hydroxy Acids

Hydroxy acids are organic carboxylic acids classified into alpha-hydroxy acids (AHA), beta-hydroxy acids (BHA), polyhydroxy acids, and bionic acids on the basis of their molecular structure. Hydroxy acids are found in most of the marketed cosmetic preparation but are used in very low concentration. AHAs range from simple aliphatic compounds to complex molecules. Derived product can be either from natural or non-natural origin, product derived from natural origin are known as fruit acid. Hydroxy acids are found to be present in antiaging formulations, moisturizers, and peels, and in treatment products to improve hyperpigmentation and acne. The skin appears to be smoother and more uniform.

The likely cause of these changes is the property of AHAs to enhance epidermal shedding. Some claim that AHAs increase the synthesis of glycosaminoglycans (GAGs), improve the quality of elastic fibers, and increase the density of collagen. BHAs are aromatic compounds. Salicylic acid is the reference BHA; it has dermatolytic properties and helps in various xerotic and ichthyotic disorders. Other BHAs include 2-hydroxy-5-octanoyl benzoic acid, also known as beta-lipohydroxyacid (B-LHA), and tropic acid.

Mechanism of action of hydroxyl acid is unknown however one finding of its biological activities may be attributed to the inherent acid strength of the compounds. Ability of AHAs to increase sensitivity to UV radiation has been proved and thus sunscreen application may be advisable when these products are used. Some AHAs comprise the following: lactobionic acid, glycolic acid, lactic acid, citric acid, mandelic acid, malic acid, and tartaric acid.[6]

Vitamins

Exposure to the UV radiations accelerates the aging effect of the skin. The progressive telomere shortening and finally its disruption by low-grade oxidative damage are related to the aging. Damage is initiated by the generation of reactive oxygen species (free radicals). It is a progressive process whose consequences are damage to DNA.

The topical treatment of acne vulgaris with vitamin A, is very well supported by evidence. Vitamin B3, commonly known as nicotinamide or niacinamide, is available in cosmetic and cosmeceutical products and can be used as a complementary agent for some types of acne, as well as aging skin.

Activation of toll-like receptors may also be involved in the scarring process by activating the metalloproteinases.[7-9] The retinoids are vitamin A derivatives constituting the most effective comedolytic agents. They function by normalizing desquamation of the follicular epithelium, preventing the formation of new microcomedo, and minimizing the formation of comedones and inflammatory lesions.[7-9] Nicotinamide is useful as a complementary drug because of its mild anti-inflammatory activity and its possible action in the reduction of sebum production and improvement of the skin barrier.[10-12]

Vitamin A

The human epidermis contains significant amounts of vitamin A (all-trans-retinol). It has been observed that both UVB and UVA can damage the metabolism and transport of vitamin A. This may lead to vitamin A deficiency in the skin.[13] Small amounts of retinol in the body gets converted to all-trans retinoic acid also called tretinoin (active form) & rest of the retinol is converted into retinyl ester (storage form).

Topical retinoids have successfully been used to treat acne. The efficacy of topical tretinoin in the treatment of photoaged and intrinsically aged skin is sufficiently established. The effects are believed to be mediated through its binding to the nuclear retinoid acid receptors. It induces type I and type III procollagen gene expression in human skin, resulting in increased deposition of collagen fibrils in the dermis. The effects result in an improvement in the clinical and histologic skin appearance.[14, 15] Tretinoin cream in the appropriated concentrations of 0.025%, 0.05%, and 0.1%, as well as 0.1% isotretinoin and 0.1% tazarotene, frequently produce moderate to severe skin irritation. Retinaldehyde (0.05%) is another useful topical agent for the treatment of photoaged skin. It has a lower frequency of irritation but less efficacy than tretinoin.[16] Photosenstivity is another problem to be dealt in case of tretinoin.

The useful concentration of topical retinol ranges from 0.3% to 1%. Most of the over-the-counter products available usually contain lower levels of retinol (about 0.08% or less), compared with the concentration used in the few clinical studies available.[17]

Vitamin A (retinol) is the prototype of all other retinoids and is necessary for proper growth, bone development, and integrity of mucosal and epithelial surfaces. In vitamin A deficiency, the eyes and the skin are severely affected. The conjunctiva and the cornea develop metaplasia and keratinization, leading to night blindness.

Vitamin A exists in three isomeric forms among which beta form found to be more active than alpha & gamma isomer. Its deficiency may lead to dry rough skin. The advent of synthetic analogs of vitamin A in the 1970s brought new interest into their biological activity, especially on the skin. Since then, vitamin A and its derivatives have been useful in the treatment of many skin disorders, including ichthyosis, acne, and psoriasis. A great amount of research has concentrated on its use as an antiaging compound as well as its use for other cutaneous disorders.

As antioxidants, they protect cells from oxidative damage by 3 different mechanisms: scavenging peroxyl radicals, quenching singlet oxygen, and triplet-state sensitizers. Vitamin A and its derivatives have 2 main functions: they act as antioxidants, and they activate specific genes and proteins. Vitamin A also exerts a hormone like effect on the skin, activating specific genes through nuclear receptors.

The receptors bind to target sequences called hormone response elements on DNA and activate gene transcription. Retinoic acid receptors (RARs) bind all-trans retinoic acid, and retinoic X receptors (RXRs) bind 9-cis retinoic acid. Vitamin A and its derivatives inhibit lipid peroxidation; increase the levels of alpha-tocopherol (vitamin E); and also activate growth factors, oncogenes, keratins, and transglutaminases.

Structural changes underlying the cosmetic benefits include correction of epidermal atrophy, deposition of new collagen, generation of new vessels, and enhancement of mitogenesis. This enhanced mitogenesis promotes the shedding of melanin-laden keratinocytes, resulting in bleaching and subsequent depigmentation. The ability of topical tretinoin to improve the appearance of aged and photo-damaged skin by reducing wrinkles, decreasing laxity, bleaching hyperpigmented spots, and bringing about a smoother surface have been well studied and documented. Further remedial qualities of retinoids remain to be elucidated.

Vitamin E

The physiological function of vitamin E, if applied dermally is to contribute to the antioxidant defense of the skin, because of its tendency to absorb UV light in the solar spectrum region that is responsible for most of the harmful biologic effects of the sun[18]. Vitamin E blocks lipid peroxidation in cells & tissues & it is a good antioxidant. It helps to enhance the performance of UV filters, softens skin & moisturizes within. Vitamin E is the body's major lipid-soluble antioxidant, if oxidized, vitamin E can be regenerated back to its reduced form by L-ascorbic acid.

Vitamin E as alphatocopherol or tocopherol acetate is used in topical OTC (over-the counter) products in concentration (1% - 5%). Alphatocopherol has been found to be beneficial in reducing minimal erythema and the number of epidermal sunburn cells, which marks skin damage related to oxidative stress caused by UVB[19].

The effect of vitamin E after sun exposure seems to have no benefit[20]. Vitamin E can reduce UV-induced erythema and edema when it is applied before UV exposure. Topical application of vitamin E may increase stratum corneum hydration and enhance water-binding capacity. Alpha-tocopherol also shows synergistic effect with vitamins A (retinol) and C (ascorbic acid) in combined products, providing an appreciable photo protection and antioxidant action that suggests a potential effect in the protection against photo aging and skin cancer[21-22].

Nanoemulsions have been formulated containing palm oil esters in water with vitamin E and are promising potential nanocosmeceuticals.*[23]*

Vitamin B3 (niacinamide or nicotinamide)

Nicotinamide is a part of the coenzymes nicotinamide adenine dinucleotide (NAD), NAD phosphate (NADP), and its reduced forms are NADH and NADPH. These molecules are important in many cellular metabolic enzyme reactions.[17, 24] The reduced forms mainly act as antioxidants.

Nicotinamide is one of the newly discovered vitamin-based components of cosmeceutical products. It is found to possess anti-inflammatory and anti acne actions.[10] Its anti-inflammatory effect may improve skin appearance by reducing leucocyte peroxidase systems that may lead to localized tissue damage as well as improve the stratum corneum barrier. In a study, the anti-inflammatory effect of 4% nicotinamide gel in the treatment of acne vulgaris was comparable as the benefits of 1% clindamycin gel[25]. This effect also shows significance to reduce cutaneous erythema in various disorders.

The amelioration of facial depigmentation is mediated by the suppression of melanosome transfer from melanocytes to keratinocytes[26]. In fibroblast culture nicotinamide increases collagen production and this effect may lead for the improvement of skin elasticity and reduction of fine wrinkles[27].

Vitamin C

The increase of vitamin C in skin concentration is limited even with huge oral supplementation. Vitamin C has become a popular topically applied cosmeceutical because topical application of L-ascorbic acid is the only way to further increase skin concentration. Free radical scavengers have grabbed the attention of researchers on vitamin C. L-ascorbic acid is the active form of vitamin-C, which was first used as cosmeceutical creams.

Previous formulations (L-ascorbic acid) were very unstable due to the oxidation of the vitamin exposed to air. So to overcome this problem, esterified derivatives of L-ascorbic acid in topical formulations have been used to improve stability. The most commonly used derivatives are ascorbyl- 6-palmitate and magnesium ascorbyl phosphate[28.] Skin-lightening effect has been observed by the demonstration of Magnesium ascorbyl phosphate.

Experiment performed on hairless mice with ascorbyl-6-palmitate revealed percutaneous absorption but little effectiveness in an UVB photoaging model.[29] In contrast, other studies indicate that delivery of L-ascorbic acid into skin depends on the removal of the ionic charge on the molecule. 3.5 is the maximum pH in which above studies conducted. Maximum concentration of the L-ascorbic acid for percutaneous acid was dtermined to be 20%, above this concentration it failed to increase absorption[30]. Continuous application of a 15% solution of L-ascorbic acid increased ascorbic acid levels 20-fold and tissue levels of the vitamin were saturated after 3 days[30]. Also ascorbyl-6-palmitate has fewer advantages over L-ascorbic acid[31.] Despite these controversies, all the researchers agree that topically applied vitamin C has many benefits, such as lightening hyperpigmentation, promoting collagen synthesis, anti-inflammatory and photoprotective properties[30-32]. Vitamin C and its derivatives are believed to show reducing effects on melanin intermediates. They inhibit the oxidative chain reaction from tyrosine/dihydroxyphenylalanine (DOPA) to melanin. It is required for the hydroxylation of procollagen, proline, and lysine. Its deficiency can cause keratotic follicles, purpura and bleeding gums It is an important regulator of collagen expression stimulating its synthesis, a water-soluble antioxidant that clenches free radicals and regenerates vitamin E. Vitamin C levels on the skin are severely depleted after UV irradiation and it improves and normalizes the changes caused by light damage.

Skin Lightening Agents

Hyperpigmentation is the changing of colour intensity of the skin to darker hue, which is due to an increased amount of melanin in the epidermis, the dermis, or both. This change can be due to 2 pathophysiologic processes: melanocytosis (increased number of melanocytes) and melanosis (increased amount of melanin). Skin lightening agents work best when melanosis or melanocytosis is confined to the epidermis. Patients with Fitzpatrick skin types I-III have advantage over type- IV such as type I-III benefit from local pigment lightening for the treatment of hormonally induced melasma and postinflammatory hyperpigmentation caused by acne and trauma, whereas those with Fitzpatrick skin types IV and darker may also seek therapy for pigmentary changes that occur around the eyes, in the intertriginous areas, following dermatitis, or with acne and trauma[33.] Standard dermatologic agent for skin lightening is hydroquinone but its safety is questionable, leading to the use of alternative agents such as retinoids, mequinol, azelaic acid, arbutin, kojic acid, aleosin, licorice extract, ascorbic acid, soy proteins, and *N* -acetyl glucosamine.

Chemical Peeling Agents

Alpha-hydroxy acids have been shown to lighten melasma, solar lentigines, and post-inflammatory hyper pigmentation. Glycolic acid is derived from sugar cane and is used as an ingredient in skin-lightening products in low concentrations. It may also be used as a peeling agent in concentrations of 30-70% to increase the efficacy of other lightening agents such as hydroquinone by removal of the dead skin, thus enhancing the penetration of hydroquinone. Repeated peels every 2-3 weeks are necessary to attain significant lightening. Other chemical peels include 50% trichloroacetic acid (TCA) peels and 20-30% salicylic acid peels used for various pigmentary disorders, including melasma, on darker skin types.

The following table summarises some of the agents that are often used in manufacturing of cosmeceuticals along with their sources and actions[34-36]

Toxicity

It is accepted that cosmeceuticals must be as safe as a cosmetic and should not act as a drug. They have performance characteristics that suggest pharmaceutical action, but they are registered (where necessary) and sold as a cosmetics.[37-38,] The skin care industry is

marketing a huge number of new agents claiming promising results that have not yet been proven which can lead to serious side effects.

The interactions between cosmeceuticals and skin are complex, depending on the specific composites in cosmeceuticals products, condition of the skin or general health status of a subject, and also the environment where the action occurs. Hundreds of substances have been screened, synthesized, and tested and many have been included in commercially available products. In addition, the desired functions of a cosmeceuticals might require a coordinating action of multiple ingredients. Moreover, there are problematic skin conditions that might change the interactive pattern and outcome between cosmeceuticals and skin. Scientific clinical evaluation is a must for research, development, and application of cosmeceuticals.

Most consumers mistakenly believe that cosmeceuticals are regulated and tested as drugs. They also believe that the ingredients and final products have been tested for safety and that the claims made in advertisements are valid. Although cosmeceuticals and pharmaceutical ingredients have never been closer together, their regulatory environments are vastly different due to the distinct Congressional mandates given the Food and Drug Administration[39].

CONCLUSION

The usage of cosmeceuticals has drastically hiked in recent years, which in turn has increased the spectrum of the physician to broaden their range of products to enhance the comeliness of the patients associated with dermal problems. However, at times, where generations are keenly worried for their beauty, lots of manufacturing companies are competing and working hard to provide convincing results to meet requirements of the patients. Claims of effectiveness lack convincing evidence, thus the industry is challenged to provide evidence on the effectiveness of these compounds. Cosmeceuticals like vitamins, sunscreens, hydroxy acids & many more have proved their efficacy in treating skin diseases thus enhancing the skin texture. Clinical trials of cosmeceuticals are important to know the interaction between skin and cosmeceuticals which could even be influenced by environmental fact.

Ingredient	Purported action	Sources	Marketed preparations
Allatonin	Skin Soothening	Comfrey(Fm Boraginaceae)	Soft cleansing emulsion
Aloe vera	Softens skin	Aloe vera (Fm Asphodelaceae)	Lotus herbal moisturizers
Alpha-hydroxy acids(AHA)	Exfoliates and improves circulation	Fruit acids (glycolic acid, lactic acid, citric acid, tartaric acid, pyruvic acid, maleic acid,e.t.c.	Garnier anti- wrinkle preparation
Arnica	Astringent and soothing	Arnica montane (Fm. Asteraceae)	Arnica herbal cream
Arjunolic extract	Antioxidant and antiinflammatory	Terminalia arjuna(Fm Combretaceae)	Himalaya Arjuna
Beta-Bisabolol	Antiinflammatory, antibacterial, and calms irritated skin	Chamomile flower (Fm Asteraceae)	Adrien Arpel C, Vitamin C Facial Treatment Capsules
Beta hydroxyl acids(BHA)	Anti bacterial	Salicylic acid (Salix alba)	Oxymed shampoo
Beta-Carotene	Minimizes lipid peroxidation and cellular antioxidant	Carrots and tomatoes(Fm. Umbelliferae ,Solanacea)	Environ body cream
Boswellia	Antiinflammatory and antiaging	Boswellia serrata (Fm. Burseraceae)	Aroma silk boswelia anti-wrinkle cream
Calendula	Soothes, softens skin, promotes cell formation.	Calendula officinalis (Fm. Asteraceae)	Weleda calendula paste
Centella	Skin conditioning agent, increases collagen production, improves texture and integrity of skin, and reduces appearance of stretch marks	Centella asciatica (Fm. Mackinlayaceae)	Keratin complex
Coleus forskoflii oil	Antimicrobial, aromatherapy/perfumer	Coleus sps.	Ayush neem plus
Coriander seed oil	Antiinflammatory and antiirritant, skin- lightening properties	Coriandrum sativa(Fm.Umbelliferae)	Tcc collagen complex
Coenzyme Q10(Ubiquinone)	Cellular antioxidant	Naturally occurring in skin	Lavere sensation cream
Cucumber Cools	Refreshes, and tightens pores	Cucumis sativus (FmCucurbitaceae)	Eminence eye makeup remover
Dry extract from yarrow	Treatment of oily hair	Achillea millefolium (fm. Asteraceae)	Juniper yarrow moisturizer
Essential fatty acids	Smoothens, moisturizes and protects	Linolenic and arachidonic acid	Parachute hair oil
Furfuryladenine	Improves hydration and texture of skin	Plant growth hormone	Kinerase lips treatment
Lupeol	Antioxidant and skin conditioning agent	Cratacva nurvula (Fm Fm.Capparidaceae)	Seatonic stretch mark removing cream
Ginkgo	Antioxidant that smoothes, rejuvenates and promotes youthful appearance	Ginkgo biloba (Fm.Ginkgoaceae)	Embryo revitalizer cream
Green tea extract	Antioxidant	Green teas (Camellia sinensis)	Alchemy conditioner
Horse chestnut extract	Supports blood circulation, wound healing effect and antiinflammatory	Aesculus hippocastanum (Fm. Hippocastanaceae)	Sisley flower gel
Ivy	Stimulates circulation and helps other ingredients penetrate skin	Hedera spp. (ivy family)	Pattern body wash
Kinetin	Free-radical scavenger and antioxidant	Plants and yeast	Kinerase pro therapy
Licorice extract	Skin whitening properties,	Glycyrrhiza glabra	Liqourice balm

	antioxidant antimicrobial, and antiinflammatory	(Fm. Fabaceae)	
Neem oil limonoids	Antimicrobial	Azadirachta indica(Fm.Meliaceae)	Himalaya neem face wash
Oleanolic extract	Antioxidant, antifungal, improves texture and integrity of skin	Olive leaf	Trioxil anti acne cream
Panthenol	Builds moisture and soothes irritation	Provitamin B5(broccoli, calf's liver, turnip greens)	Penaten baby cream
Pycnogenol	Antiaging effect	Grape seed extract	Isotonix
Retinoic acid	Smoothes skin, promotes cell renewal and improves circulation to skin	Vitamin A(green leafy vegetables,)	Renova cream
Sodium hyaluronate	Lubricant between skin tissues and maintains natural moisture	Natural protein	Pevonia botanica
Rosemary extract	Antioxidant, antimicrobial, and anti-inflammatory	Rosemarinus officinalis	Loreal body conditioner
Tetrahydrocurcuminoides	Antioxidant and antiaging	Curcuma longa (Fm. Zingiberaceae)	Life extension super curcumin
Turmeric oil	Antibacterial and antiinflammatory	Curcuma longa (Fm. Zingiberaceae)	Vicco turmeric cream
Ursolic acid	Antiinflammatory, collagen build-up	Rosemarinus officinalis(Fm. Lamiaceae)	Holy basil extract
Vitamin A	Antioxidant	Vitamin A,C,E (lemon,citrus fruits,oils from sunflower and safflower)	Everyuth peel
Witch hazel	Tones	Hamamelis virginiana (Fm. Hamamelidaceae)	Thayers skin toner

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