THE SCIENCE WHITE PAPER SERIES OF IMAGE SKINCARE:

The Science behind Botanical Agents

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ABSTRACT

Image Skincare offers products with many active, scientifically proven and researched key ingredients to achieve a certain result on the skin. In order to achieve the maximum benefit, not only one key ingredient, but an array of synergistically working ingredients, to target specific skin concerns, is found in every product. This concept is found throughout each and every line and not the name of the product identifies which ingredient is used, but the ingredient listing. All key ingredients are named on the international nomenclature of cosmetic ingredients (INCI) and are furthermore described on product key ingredient manuals. The uniqueness about Image Skincare is the blend of these ingredients into an advanced formulation with a perfectly balanced pH, which dictated the effectiveness of several ingredients. All products follow the concept of the exclusive CPN System™, a unique blending of Correction, Prevention and Nutrition, only offered by Image Skincare. This three in one concept greatly enhances the effect of each product on the skin and achieves results quicker and more profound.

Echinacea

Echinacea is a coneflower commonly used to cure the common day cold. This plant originated in North America and was one of the most important medicinal plants used by Native American groups of the Great Plains. It was used for

everything from colds to cancers. It is now commonly used in West Germany as a general nonspecific stimulant to the immune system. It is used to support and stabilize cellular immunity for the prevention and treatment of infections. It can be used in many ways to treat difficult to heal wounds and sores, inflammatory skin diseases such as eczema, minor burns, sunburn, and herpes. Liquid extracts are used for colds, flu, infections, psoriasis, to treat viral-induced canker sores, and to support long-term treatments with antibiotics.

Over 500 clinical experiments have been done to show the effects of Echinacea as an oral or topical treatment. One specific study revealed that of 4500 patients with inflammatory skin conditions, including psoriasis, 85% were cured with topical applications of echinacea salve (Wacker & Hilbig, 1978).

In Echinacea more than 20 constituents have been identified. These constituents have been found to have potential to stimulate the mammalian immune system including: polysaccharides, alkamides, caffeoyl esters, and coumaric acid. A caffeic acid glycoside, echinacoside, makes up approximately 0.1 percent of the leaves and stems, which also contain cichoric acid. It is likely that the medicinal effect that comes from Echinacea is a result of several of its compounds working in a synergistic manner.

Calendula officinalis

Calendula officinalis, a type of marigold, is from the family of flowers *Asteraceae* that originated in the Mediterranean. The flower has been used to treat minor wounds, skin infections, burns, bee stings, sunburns, warts, and cancer. These flowers are made up of flavonol glycosides, triterpene oligoglycosides, oleanane-type triterpene glycosides, saponins, and a sesquiterpene glucoside. Because of its constituents it can be used in skin products for its soothing, anti-itching, antiseptic and anti-inflammatory properties. Its wound-healing properties may also be attributed to its high content of natural iodine, carotene, and manganese, which promote skin cell regeneration. Also because of the flavonal glycosides they possess antioxidant characteristics and guard against changes caused by the existence of free radicals in the body.

According recent research, a study done on women receiving radiation therapy to the breast for breast cancer, showed a reduction of severe dermatitis (skin irritation, redness, pain) with the use of a calendula ointment. Along with this, other research has shown that calendula reduces inflammation when applied to the skin and can be used to treat minor skin wounds.

Another study tested whether a propylene glycol extract of Calendula officinalis interferes with reactive oxygen species (ROS) and reactive nitrogen species (RNS) during the release of polymorphonuclear leukocytes (PMNs). Reactive oxygen species and reactive nitrogen species are aggressive free radicals which have the potential of being harmful against skin cells. PMNs are a type of cell that when activated, generate large amounts of ROS and RNS leading to an imbalance of redox homeostasis and oxidative stress. The test also wanted to establish the lowest concentration at which the propylene glycol extract of the Calendula officinalis still exerts antioxidant activity by means of luminal-amplified chemiluminescence. Electron paramagnetic resonance (EPR) spectropy was used to confirm the activity of the calendula extract. The study showed the calendula officinalis extract exerted ist anti-ROS and anti-RNS activity in a concentration-dependent manner, with significant effects observable ant even very low concentrations: 0.20 µg/ml without L-arginine. 0.1 µg/ml when L-arginine was added to the test with phorbol 12-myrestate 13-acetate and 0.05 µg/ml when it was added rto the test with N-formyl-methionyl-leucyl-phenylaline. The EPR study confirmed these findings. In conclusion the study found Calendula officinalis significantly improved the antioxidant network and restored the redox balance in human cells.

Green Tea

Ultraviolet solar radiation may induce a variety of adverse effects in humans, including melanoma, photoaging of the skin, sunburn, and immunosuppression. Protection against UV-induced skin damage includes avoidance of sun exposure, application of sunscreens, low-fat diets, and pharmacologic intervention with retinoids. More recently,

green tea extracts have been reported to be beneficial in treating UV-induced photodamage.

In a study by Elmets et al, 1% to 10% green tea polyphenolic (GTP) fractionsin ethanol and water vehicle were applied onto the backs of 6 volunteers. Thirty minutes after GTP application, patients were exposed to twice the minimal erythema dose of UV radiation from a solar simulator. The minimal erythema dose was determined for each patient by exposing skin to graded doses of UV radiation from the solar simulator. Green tea extracts resulted in a dose-dependent reduction of UV-induced erythema as measured by chromatometry and visual evaluation. The (-)-epigallocatechin-3-gallate and (-)-epicatechin-3-gallate polphenolic fractions were most effective, while the (-)-epigallocatechin (EGC) and (-)-epicatechin fractions had little effect. Histologic examination showed a decrease in sunburn cells in GTP-treated skin. Epidermal Langerhans cells, the antigen-presenting cells involved in the skin immune response, were significantly protected against UV damage. Finally, GTP fractions reduced UV-induced mutations in DNA, as detected by means of a phosphorus 32 postlabeling technique. Spectrophotometric analysis indicated that GTP fractions did not absorb UV-B light, implying a mechanism of action different from that of sunscreens. This study demonstrates the potential benefit of GTP extracts in preventing UV-induced immunosuppression and erythema.

The use of GTP extracts was also found to be beneficial in treating UV-induced immunosuppression in mice. The GTP extracts, fruits and vegetables, and quercetin and chrysin significantly prevented the UV-induced suppression of contact hypersensitivity to picryl chloride when compared with irradiated, untreated control ($P<.05$). Increased ear thickness measurements were used to evaluate the response. The GTP was administered in concentrations of 0.1% and 0.01%. Green tea extracts have been beneficial in preventing early signs of photochemical damage to mouse and human skin treated with psoralen–UV-A therapy. Psoralen–UV-A, a treatment for psoriasis, increases the patient's risk of developing melanoma and squamous cell carcinoma. Pretreatment and posttreatment with the green tea extracts in mouse and human skin significantly decreased markers of this photochemical damage, namely hyperplasia and hyperkeratosis, c-fos and p53, and erythema, ($P<.05$), when

compared with vehicle controls (water given before and after treatment). The effects of green tea on skin are further discussed by Katiyar et al.

Oral and topical standardized black tea extracts also decreased photochemical damage to the skin. In one study, standardized black tea extracts significantly reduced erythema and skinfold thickness associated with UV-B–induced carcinogenesis in cultured keratinocytes and mouse and human skin ($P<.05$). In topically treated mice, a 64% reduction in severity of erythema and a 50% decrease in skinfold thickness were observed when compared with vehicle control. A decrease in the expression of c-fos, c-jun, and p53 in mouse skin and keratinocytes pretreated with standardized black tea extracts was also noted. This study indicates that when green tea is oxidized to black tea, the extracts remain beneficial in preventing the early signs of UV-B–induced phototoxic effects, namely, sunburn and skin thickness

Anti-oxidant function

Tea is an important source of flavonoids in the diet and the flavonoids found in tea are known to be strong antioxidants. In vitro assessment of antioxidant power with the TEAC assay gives results closely similar with green and black tea. The majority of the human intervention studies in which biological antioxidant properties of tea polyphenols have been studied demonstrates an increase in plasma antioxidant potential after the consumption of green tea as well as black tea. Small but significant increases (2–4%) were found in studies by Leenen (FRAP), Benzie (FRAP) and Van het Hof (TEAC) after green tea consumption. Leenen found a small but significant increase (2%) with the FRAP assay after ingestion of black tea. A substantial increase in the antioxidant potential of plasma after consumption of green tea (50%) and black (40%) tea was found by Serafini with the TRAP assay. Langley-Evans reported an increase in plasma antioxidant capacity of 76% after black tea consumption, measured with the FRAP assay. An increase of 12% was found by Sung after ingestion of green tea measured with the TEAC assay. A small nonsignificant improvement of antioxidant status was found by Hodgson after green and black tea ingestion using the TRAP assay.

Maxwell and McAnlis did not find any change in antioxidant potential after consumption of black tea. The study by Maxwell, however, was a low power study (10 subjects) without control treatment. In the study by McAnlis, coffee intake was used as a control. The high level of chlorogenic acids in coffee may explain the lack of results in this study.

The polyphenolic compounds from green tea were tested against chemical carcinogenesis and photocarcinogenesis in murine skin. These green tea polyphenols were found to afford protection against chemical carcinogenesis as well as photocarcinogenesis in mouse skin. A few experimental studies were conducted in human skin in our laboratory. Analysis of published studies demonstrates that green tea polyphenols have anti-inflammatory and anticarcinogenic properties. These effects appear to correlate with antioxidant properties of green tea polyphenols.

Conclusions

The outcome of the several experimental studies suggests that green tea possess anti-inflammatory and anticarcinogenic potential, which can be exploited against a variety of skin disorders. Although more clinical studies are needed, supplementation of skin care products with green tea may have a profound impact on various skin disorders in the years to come.

Oat Kernel Extract

Colloidal oatmeal is derived from whole oat kernels ground into a very fine powder. Colloidal oatmeal has a number of active components, including polysaccharides, proteins, lipids, saponins, enzymes, flavonoids, vitamins (eg, vitamin E), and a group of polyphenols called avenanthramides. In addition to anti-inflammatory properties, colloidal oatmeal also has anti-oxidant, anti-irritant, and immunomodulatory effects. It is one of the few natural ingredients that havebeen approved by the US Food and Drug Administration (FDA) for use as a skin protectant for conditions such as poison ivy, diaper rash, and dry skin, and for cleansing and

moisturizing.

Some of the most active phytochemicals in colloidal oats are the avenanthramides, which have been shown to exhibit strong anti-inflammatory effects. On the molecular level, this includes the inhibition ofinhibitor of kappa B (IkB) degradation, decreased p65 phosphorylation and nuclear factor kappa B (NF-kB) gene activity, and inhibition ofthe release of proinflammatory cytokines. These anti-inflammatory effects are manifested as a decrease in skin immune response (ie, contact hypersensitivity) and a reduction in the skin neurogenic inflammatory response.

In a preclinical model, avenanthramides inhibited immunemediated skin inflammation in a dose-dependent fashion. At the highest concentration of avenanthramide (3%), inhibition of skin inflammation approached that produced by topical hydrocortisone 1%. In humans, a colloidal oatmeal lotion was shown to be effective for controlling the rash associated with treatment with epidermal growth factor receptor (EGFR) antagonists and multiple tyrosine-kinase inhibitors, agents that are used to treat various solid tumors. Acneiform skin eruptions occur in approximately 60% to 70% of patients who receive these agents, and the rashes are often unresponsive to topical steroids andoral/topical antibiotics. In a study involving 10 patients with EGFR-in-duced and tyrosine kinase inhibitor-induced cutaneous toxicity, complete response was observed in 60%, near-complete in 10%, and partial response in 30% of patients when treated with a colloidal oatmeal lotion. An important benefit of colloidal oatmeal for these reactions is that it avoids the toxicity associated with other therapies such as benzoyl peroxide (erythema), tetracyclines (gastrointestinal symptoms, photosensitivity), and topical creams (xerosis).

Colloidal Oatmeal

Clinical use of colloidal suspensions--particularly oats--to treatatopic dermatitis and other inflammatory skin conditions goes back at least a half century. Modern colloidal oatmeal compounds contain a mix of natural ingredients developed from extensive laboratory investigation of each component. The principal ingredients are:

* Protein (10%-18%)--Acts as an emulsifier, promotes hydration, and promotes antioxidant activity

* Polysaccharides (60%-64%)--[beta]-glucan appears to have immunodulatory activity, which could represent a modulating effect on inflammation

* Lipids (3%-9%)--Contribute to viscosity to reduce the rate of TEWL

* Antioxidant enzymes, saponins, vitamins, flavonoids, and prostaglandin synthesis inhibitors (9%-17%)--All have anti-inflammatory properties.

Colloidal oatmeal has proved to be well suited for treating inflammatory skin conditions. The natural ingredient cleanses and moisturizes, helps protect the skin barrier, and has anti-inflammatory activity Colloidal oatmeal preparations are safe and cosmetically stable, and do not irritate the skin. Additionally, colloidal oatmeal has been shown to promote skin repair after exposure to chemicals (such as [alpha]-hydroxy acids, surfactants, and bleaches) and other environmental insults.

Artemisia Vulgaris (Mugwort)

Artemisia vulgaris L. (mugwort), belonging to the family of Asteraceae, is a perennial weed growing wild and abundantly in temperate and cold-temperature zones of the word (Cui, 1989). In Traditional Chinese Medicine, mugwort has been used as an analgesic agent and in conjunction with acupuncture therapy (Yoshikawa et al., 1996), to treat the neonatal jaundice (Fok, 2001), gastric ulcers (Repetto et al., 2002), hepatitis (Tan et al., 1999) and convulsive crisis (Hickey et al, 2004).

Mugwort leaves and stem are used medicinally as a bitter digestive tonic, uterine stimulant and antirheumatic (Hickey et al., 2004). Some reports have revealed that mugwort is a potent immunomodulatory (Schmid-Grendelmeier et al., 2003), antihypertensive (Tigno et al., 2000), antinflammatory (Tigno and Gumila, 2000), antioxidant (Luo et al., 2007) and hepatoprotective agent (Gilani et al., 2005).

Antitumoral activity has been reported to artemisic acid and artemisinin B extracted from mugwort (Sun et al., 1992). Insect repellent and fumigant activity has been found in essential oils from mugwort (Wang et al., 2006). The insecticidal activity of essential oils from mugwort has been evaluated on *Aedes aegipti* (Chantraine et al., 1998). In addition, anti-viral activity has also been described to extracts of this plant (Tan et al., 1998).

Phytochemical studies have identified more than 20 flavonoids in mugwort extracts (Lee, 1998). Some flavonoids as well as acetylenes, coumarins, sesquiterpene lactones, and volatile oil components have previously been reported from mugwort (Marco et al., 1990). The most abundant compounds were eriodicyol and luteolin (Lee, 1998).

Althaea Officinalis

The antioxidant properties of marshmallow (Althaea officinalis L., Fam.Malvaceae) ethanolic extract was evaluated using different antioxidanttests, including reducing power, free radical scavenging, superoxide anion radical scavenging, and metal chelating activities. The extract of marshmallow (A. officinalis L.) exhibited strong total antioxidant activity. The concentration of 50, 100, and 250mg/mL of ethanol extract of marshmallow (A. officinalis L.) showed 85.5%, 91.2%, and 96.4% inhibition on peroxidation of linoleic acid emulsion, respectively. On the other hand, 100 mg/mL of standard antioxidant such as butylate hydroxyanisole (BHA), butylated hydroxytoluene (BHT), and a-tocopherol exhibited 94.5%, 99.1%, and 80% inhibition on peroxidation of linoleic acid emulsion, respectively. The extract of marshmallow (A. officinalis L.) had effective reducing power, free radical scavenging, superoxide anion radical scavenging, and metal chelating activities at same concentration (50, 100, and 250mg/mL). Those various antioxidant activities were compared with standard antioxidants such as BHA, BHT, and a-tocopherol

Image Skincare offers a wide range of effective home care products with botanical ingredients. For a complete list of botanicals used in our skin care formulations please visit us on our website: www.imageskincare.com or call us at 1-800-796-SKIN. You will also find clinical results on this website.

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