

CBD anti-inflammatory delivery system natural soothing entourage effect hemp oi

BACKGROUND

'Inflammaging', aging accelerated by inflammation, is the turning point driving the skin care industry. Cannabinoids and cannabidiol (CBD) are the new darlings of the antiinflammatory market and scientific discoveries in that area are driving the industry forward. **AC Hemp Oil Liposome PF** capitalizes on the anti-inflammatory benefits associated with hemp oil while using modern encapsulation technology to enhance activity and stability.

Inflammaging is the concept linking underlying inflammatory changes to the causes of most age-associated diseases. Inflammation is a driving force behind the skin aging process, leading to a breakdown of the extracellular matrix and consequential skin wrinkling.¹ Inflammation is the body's response to cellular aggression or injury. It represents a defense mechanism designed to heal cells from injury and protect the body. Inflammation also facilitates early tissue healing and repair, and allows the body to restore itself to a normal form and function. All skin is subject to inflammation, even at low intensities. It is this underlying inflammation that ultimately exhausts the body's defense system, dismantling key youth-sustaining skin structures, and resulting in collagen and elastin degradation, as well as a breakdown of the skin's barrier function.² Inflammaging can be alleviated and prevented by the use of topical products formulated with anti-inflammatory actives.

Humans have made use of the hemp plant — and its nutritional benefits — since the beginning of written history. It is believed that weaving of hemp fibers began thousands of years ago and have been used industrially to manufacture rope, canvas, paper, and clothing. After the discovery of textiles and synthetics, hemp fiber weaving or manufacturing began to disappear. Today hemp products are making a comeback particularly with hemp oil.

Hemp oil is produced by gentle cold press extraction from the specialized varietals of the hemp plant of the Cannabis genus. The plants used for the extractions are specifically cultivated to have the insignificant amounts of the psychoactive substances associated with the genus, most notably the tetrahydrocannabinol (THC). **AC Hemp Oil Liposome PF** is manufactured using hemp oil rich in CBD. CBD is a common cannabinoid found in



Code Number: 61005PF

INCI Name: Water & Phospholipids & Cannabis Sativa Flower/Leaf/ Stem Extract
INCI Status: Conforms
REACH Status: Compliant
CAS Number: 7732-18-5 & 123465-35-0 & 89958-21-4
EINECS Number: 231-791-2 & N/A & 289-644-3

Origin: Botanical **Processing**: **GMO** Free No Ethoxylation No Irradiation No Sulphonation Additives: Preservatives: None Antioxidants: None Other additives: None Solvents Used: Water Appearance: Beige to Yellow, Liquid Liposomal Dispersion Soluble/ Miscible: Water Dispersible Microbial Count: < 100CFU/g, No Pathogens

Suggested Use Levels: 1.0 – 10.0% Suggested Applications:

Anti-Inflammation, Liposome Technology

Benefits of AC Hemp Oil Liposome PF:

- Anti-Inflammation
- Encapsulation Technology
- Antioxidant



cannabis plant. While the hemp oil we use contains high CBD, it is not the same thing as CBD oil, which is a purified hemp oil product. When strains are high in CBD, they are subsequently very low in THC, typically containing < 0.3% THC. The produced hemp oil does not have psychoactive properties.

SCIENCE

AC Hemp Oil Liposome PF contains hemp oil extracted from the hemp plant. Hemp contains a symphony of over 400 compounds including CBD, secondary phyto-cannabinoids, terpenoids, terpenes, and flavonoids. These compounds work synergistically to heighten the positive, therapeutic effects of cannabidiol. The "Entourage Effect" is a term coined by scientists in 1998 to describe their study findings that taking all of the natural chemicals found in cannabis are more beneficial than just taking a single molecule compound.

The "Entourage Effect" describes the enhancement of efficacy, with related improvement in overall therapeutic effectiveness, derived from combining phytocannabinoids and other plant-derived molecules. Hemp has quite an entourage of phyto-cannabinoids, which are unique chemical compounds. The most prominent is cannabidiol, the non-psychoactive cannabinoid that has shown to have the largest potential for wellness benefits in hemp. Cannabidiol is accompanied by other cannabinoids such as tetrahydrocannabinol, tetrahydrocannabivarin, cannabigerol, cannabichromene, and cannabinol. A CBD product made with isolated CBD will not contain these other beneficial factors.

Cannabinoids are considered potent anti-inflammatory agents and exert their effects through induction of apoptosis, inhibition of cell proliferation, suppression of cytokine production and induction of T-regulatory cells.³ **AC Hemp Oil Liposome PF** encapsulates hemp oil into liposomes for enhanced delivery and effective anti-inflammation benefits.

LIPOSOMES

Liposomes can be used in the delivery of various cosmetic materials, vitamins, and minerals throughout the body, typically to the skin, for an array of advantages. The liposomes may attach and fuse to the cellular membranes, releasing their contents into the target cells. Liposomes are microscopic vesicles that consist of an aqueous center with a phospholipid membrane. Phospholipids contain a glycerol bonded to two fatty acids and a phosphate group with a polar head. The fatty acid portion of this biomolecule is hydrophobic and is located toward the outside of the lipid bilayer whereas the phosphate group is hydrophilic and faces the aqueous interior. These phospholipid walls are identical to those that comprise other human cell membranes. Liposomes act as vehicles to transport nutrients to the cells through layers of skin and enhance delivery of active ingredients.



Figure 1. Comparison of liposomal encapsulation vs. free material.

When non-encapsulated materials are placed on the skin a range of factors determine the fate of the material. Stability, solubility, lipophilicity, and size are all obstacles the active must overcome to penetrate the epidermal barrier. Liposomes, which resemble the basic structures of cellular membranes, create a more beneficial interaction with skin cells. The structure and amphiphilic nature allows the liposomes to penetrate the epidermal barrier and travel deeper than free materials to deliver the anticipated results.



Liposomes are readily compatible with epidermal surface lipids, the skin's primary moisture barrier, as these epidermal lipids exist as lamellar bilayers. Lamellar bilayers require less moisture to maintain their structure. When a liposome fuses with the epidermal lipids, the epidermal lipid structure becomes overloaded with water and out of equilibrium. To restore equilibrium, the water and phospholipid, as well as the active loaded, are rapidly churned through the top cell layers of the stratum corneum. Enhanced delivery of the active occurs as it is rapidly carried down through the stratum corneum. Liposomes' proven delivery system yields a multitude of benefits; enhancing the penetration of actives yielding increased efficacy, offering time release mechanisms, protecting and delivering otherwise unstable ingredients, and the ability to target specific cells.

BENEFITS

AC Hemp Oil Liposome PF can be used to reduce inflammation and capitalize on the benefits of hemp oil in a variety of hair and skin care formulations. The inhibition of Interleukin-6 activity by AC Hemp Oil Liposome PF may help to alleviate the chronic inflammatory process, which is linked to the process of skin aging and the formation of fine lines and wrinkles.

EFFICACY

AC Hemp Oil Liposome PF exhibited anti-inflammatory effects in an in-vitro Interleukin-6 ELISA model. Cytokines are the signaling proteins synthesized and secreted by immune cells upon stimulation. They are the modulating factors that balance initiation and resolution of inflammation. During chronic inflammation, Interleukin-6 (IL-6) suppression can decrease tissue injury. IL-6 is a pro-inflammatory cytokine known to play an active role in inflammation, immunology, and aging. IL-6 signals through the nuclear factor-kappa B (NF-κB) pathway that results in the transcription of inflammatory mediators, including matrix metalloproteinase-1(MMP-1). MMP's are responsible for breaking down the extracellular matrix and collagen in the skin leading to wrinkles, fine lines, and loss of skin elasticity. Reducing the level of IL-6 and other inflammatory mediators is believed to slow down degradation of the skin matrix and stimulate its replenishment.

An IL-6 ELISIA assay was conducted to assess the changes in IL-6 levels in cultured human dermal fibroblasts treated, invitro, with AC Hemp Oil Liposome PF. As shown in Figure 2, AC Hemp Oil Liposome PF exhibited anti-inflammatory effects on LPS-treated fibroblasts. This decrease in IL-6 production indicates a reduced inflammatory environment.



in-vitro Anti-Inflammation Assay

Figure 2. AC Hemp Oil Liposome PF-treated fibroblasts IL-6 concentrations.



Oxygen Radical Absorbance Capacity (ORAC) assay was conducted to assess the antioxidant capacity of **AC Hemp Oil Liposome PF**. As shown in Figure 3, **AC Hemp Oil Liposome PF** exhibited antioxidant activity comparable to 200µM Trolox[®]. The antioxidant capacity of **AC Hemp Oil Liposome PF** increased as the concentration increased. As a result we can assure that its ability to minimize oxidative stress is dose dependent and that **AC Hemp Oil Liposome PF** is capable of providing antioxidant properties.



Figure 3. Antioxidant capacities of AC Hemp Oil Liposome PF.

As shown in Figure 3, **AC Hemp Oil Liposome PF** decreased IL-6 concentration by 83.77% at a 0.5% use level and by 99.22% at a 1.0% use level. Non-encapsulated CBD oil was tested for added perspective. Results of this IL-6 ELISA assay demonstrate that 1.0% **AC Hemp Oil Liposome PF** reduces IL-6 concentration 45.51% more than 1.0% CBD oil. This data suggests that **AC Hemp Oil Liposome PF** enhances soothing and anti-aging properties at normal use concentrations.



Figure 3. Percent change in IL-6 Concentration for test materials.

A half head study was conducted in order to determine the comparison of using a shampoo incorporating **AC Hemp Oil Liposome PF** vs. a control shampoo, in addition to the comparison of using a conditioner incorporating **AC Hemp Oil Liposome PF** vs. a control conditioner. The images of the half head study were used in conjunction with a sensory assessment subjectively rating the parameters - cleansing, smoothing, dry and wet combability, anti-frizz, overall feel, shine and hydration. This assessment was conducted both before and after treatment.

Based on the results obtained, **AC Hemp Oil Liposome PF** is capable of enhancing wet and dry combability, antifrizz, overall feel, shine and hydration of the hair. The professional stylist who performed the tests by applying the product, styling the hair, and documenting the images, said **AC Hemp Oil Liposome PF** is great for improved hydration and shine of the hair. This product may also be incorporated into treatments to enhance shine and hydration for healthier hair.



Graph 1. Rating of hair characteristics following sensory assessment.



Figure 1. Full head Baseline, Untreated Hair.



Figure 2. Half Head Treated.

References:

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