

# AC Hemp Oil Liposome PF



CBD, soothing  
 anti-inflammatory  
 delivery system  
 natural, entourage effect  
 hemp oil

## 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 anti-inflammatory 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.<sup>1</sup> 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.<sup>2</sup> 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 varieties 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**

**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
- Trendy & Marketable

# AC Hemp Oil Liposome PF

**PF** is manufactured using hemp oil rich in CBD. CBD is a common cannabinoid found in the 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

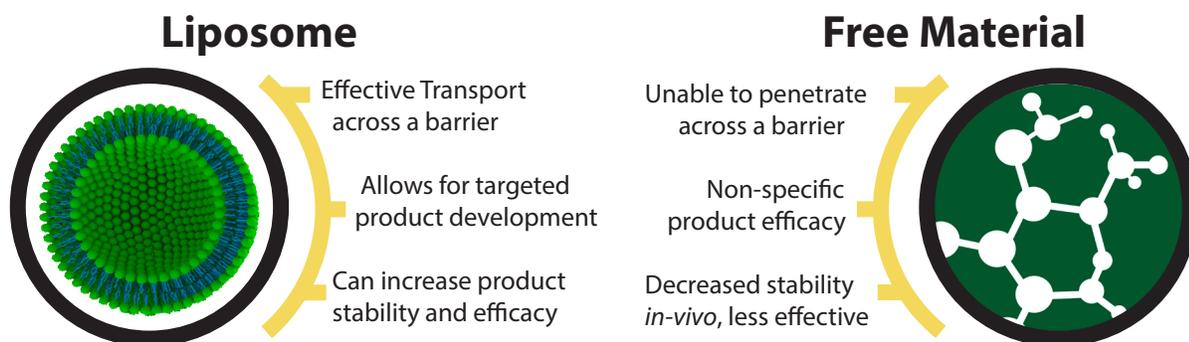
**AC Hemp Oil Liposome PF** contains hemp oil extracted from the hemp plant. Hemp contains a symphony of over 400 compounds including CBD, secondary phyto-cannabinoids, terpenoids, terpenes, and flavonoids. These compounds work synergistically to heighten the positive, therapeutic effects of cannabidiol. 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.<sup>3</sup> **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.

# AC Hemp Oil Liposome PF

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

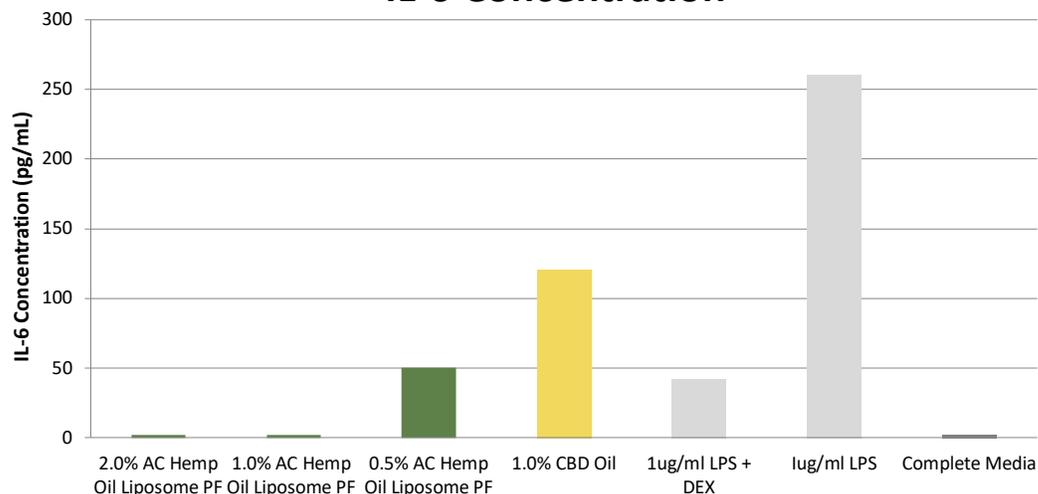
**AC Hemp Oil Liposome PF** can be used to reduce inflammation and capitalize on the benefits of hemp oil in a variety of hair and skin care formulations. The inhibition of Interleukin-6 activity by **AC Hemp Oil Liposome PF** may help to alleviate the chronic inflammatory process, which is linked to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

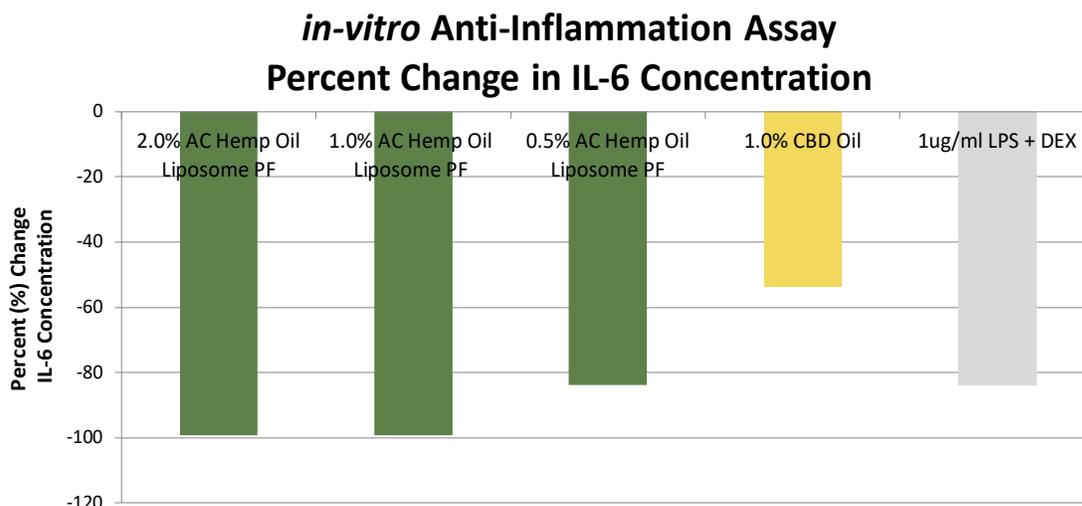
### *in-vitro* Anti-Inflammation Assay IL-6 Concentration



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

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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.

References:

1. G Makoto, Inflammaging (inflammation + aging): A driving force for human aging based on an evolutionarily antagonistic pleiotropy theory?, Biosci Trends 2 6 218–30
2. C Franceschi, et al., Inflamm-aging. An evolutionary perspective on immunosenescence, Ann NY Acad Sci 908 244–54
3. Nagarkatti, Prakash et al. "Cannabinoids as novel anti-inflammatory drugs" Future medicinal chemistry vol. 1,7 (2009): 1333-49.
4. Fine, P. G., & Rosenfeld, M. J. (2013). The endocannabinoid system, cannabinoids, and pain. Rambam Maimonides medical journal, 4(4), e0022. doi:10.5041/RMMJ.10129
5. Gallily, R., Yekhtin, Z. and Hanuš, L.O. (2015) Overcoming the Bell-Shaped Dose-Response of Cannabidiol by Using Cannabis Extract Enriched in Cannabidiol. Pharmacology & Pharmacy, 6, 75-85.