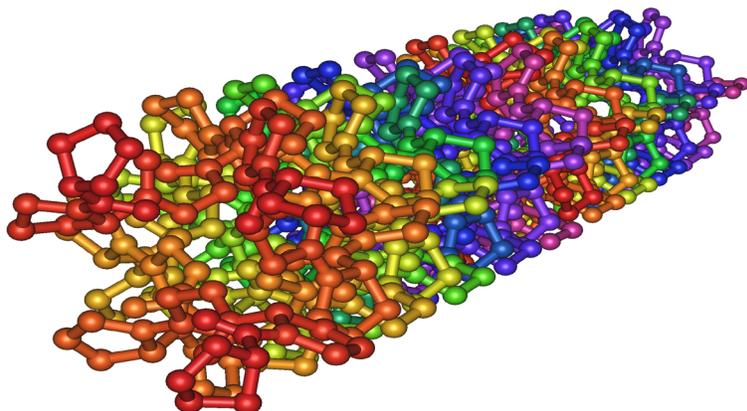


AC Phytocoll PF



High Weight Proteins
 Direct Replacement for Animal Collagen
 Functional
 Natural Alternative
 Luxurious
 Yeast
 Moisture Binding

BACKGROUND

In the early 2000's when consumer recognition of animal rights and animal derivatives became elevated, high molecular weight proteins such as soluble collagen (in an animal derivative form) (~ 300 kD) were used as the building blocks of almost all quality cosmetics and personal care products. However ever-expanding support for animal rights and consumer awareness has all but eliminated incorporation of animal proteins into new cosmetic formulations.¹ The unfortunate elephant in the room was that these animal proteins were popular based on their efficacy, no one can deny they worked.

This led to the need for a naturally derived soluble collagen to fill a market need. By extracting proteoglycan structural elements from yeast, Active Concepts has formulated an alternative to traditional collagen. **AC Phytocoll PF** was created to satisfy the desire for a conflict free, effective alternative to soluble collagen for use in high-end cosmetics.

SCIENCE

Soluble collagen serves as an excellent film former, this can be attributed to the relatively uniform amino acid content of mammalian collagen which allows for the formation of complex H-bonded water bridges that are able to tie moisture to the peptide backbone in a type of molecular "net". Atypical of film formers, collagen does not present the standard greasy shielded sensation but rather a luxurious-feeling film.²

Binding moisture to the skin effectively has traditionally been the reason for collagen's popularity. Though the problem remains, how is it possible to duplicate the aesthetics and efficacy of mammalian collagen without encountering the issues associated with animal and animal derived products? One solution, the use of marine derived collagens such as our AC Marine Collagen, which has a storied history and a variety of uses including its use in the clarification of beer. Chemically and functionally similar to mammalian collagen, AC Marine Collagen is a good alternative for markets where animal products and sustainability are primary concerns.

Code Number: 16564

INCI Name: Yeast Extract

INCI Status: Conforms

REACH Status: Complies

CAS Number: 8013-01-2

EINECS Number: 232-387-9

Origin: Yeast

Processing:

GMO Free

No Ethoxylation

No Irradiation

No Sulphonation

Additives:

Preservatives: None

Antioxidants: None

Other additives: None

Solvents Used: Water

Appearance: Clear to Hazy Viscous
Liquid

Soluble/ Miscible: Water Soluble

Ecological Information:

85.00% Biodegradability

Microbial Count: < 100 opg,
No Pathogens

Suggested Use Levels: 1.0 - 10.0%

Suggested Applications:

Moisturization, Conditioning for
Hair or Skin Care

Benefits of AC Phytocoll PF

- Direct Animal Collagen Replacement
- Enhanced levels of Moisture
- Natural Alternative

AC Phytocoll PF

Yeast can be defined as any fungus of the family Saccharomycetaceae that produces alcohol and carbon dioxide as byproducts of the fermentation process. Two species are principally used for commercial application, *Saccharomyces cerevisiae*, a top-fermenting yeast, and *Saccharomyces uvarum*, bottom fermenting, or lager yeast. Interestingly, on a cellular level yeast contain many of the same metabolic processes that can be seen in humans. Some strains of yeast have been used as vectors to produce human collagen in culture.

Much like the mammalian extracellular matrix, yeast contains a variety of high molecular weight proteins, which contain hydroxyproline-rich regions.² In contrast to mammalian tissue these yeast-derived proteins exist conjugated with sugars, in the form of glycoproteins. The typical ratio of carbohydrates to protein is 3:1. Due to the presence of sugar groupings that exhibit an excess of hydroxyl groups, there is significantly more water bound to than with mammalian collagen.³

BENEFITS

By lysing yeast cells, and isolating the hydroxyproline-rich glycoproteins through the use of molecular sieves, we have produced **AC Phytocoll PF** as an alternative form of collagen. **AC Phytocoll PF** duplicates the aesthetics of mammalian collagen while delivering enhanced levels of moisture to the skin or hair without the associated issues of using an animal based product. This enhanced level of moisture binding ability can be attributed to the presence of the sugars, which are typically absent of mammalian collagens. **AC Phytocoll PF** may be formulated as a direct 1:1 replacement for animal derived collagen products.

EFFICACY DATA

An *in-vivo* moisturization assay was conducted over a period of four weeks to evaluate the moisturizing ability of **AC Phytocoll PF**. Initial readings were taken, followed by measurements after 24 hours, one week, two weeks, three weeks, and four weeks respectively, using an impedance meter. This piece of equipment employs an impedance-based electronic sensing system to evaluate conductance. Results in Figure 1 demonstrates that when comparing the emulsion containing 2.0% **AC Phytocoll PF** to the untreated skin site, moisture levels were improved by 35.6% after 24 hours and by 61.6% after 4 weeks. Comparisons of the base lotion to the experimental lotion containing 2.0% **AC Phytocoll PF** demonstrate the experimental material moisturized the skin 4.1% better after 24 hours. After four weeks the base lotion containing 2.0% **AC Phytocoll PF** moisturized skin 11.5% better than the base lotion alone. Results indicate that **AC Phytocoll PF** is capable of increasing moisturization when compared to both the untreated control as well as the base lotion.

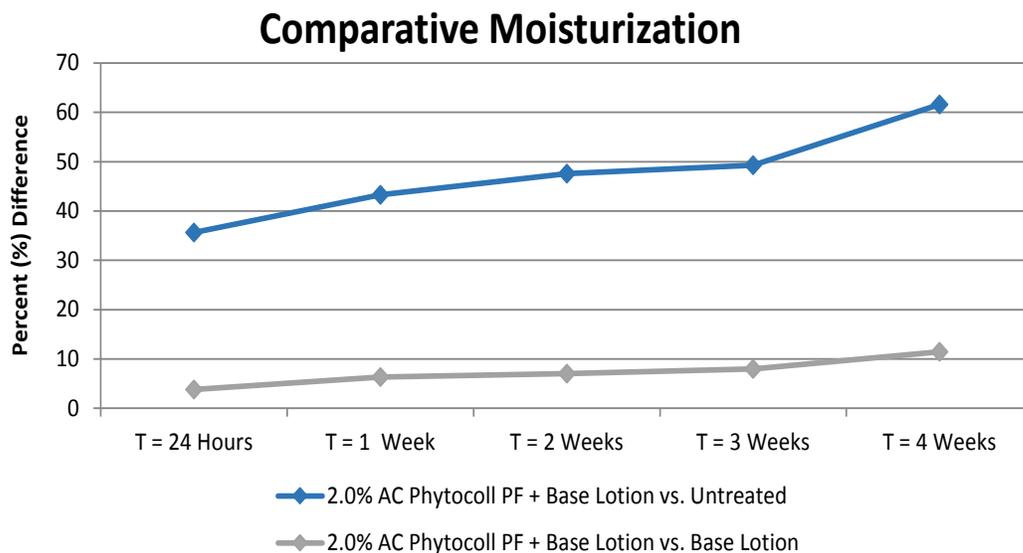


Figure 1. Improvements in Moisturization.

AC Phytocoll PF

As shown in Figure 2, **AC Phytocoll PF** exhibited antioxidant activity comparable to 200µM Trolox®. The antioxidant capacity of **AC Phytocoll PF** increased as the concentration increased, as a result we can assure that its ability to minimize oxidative stress is dose dependent.

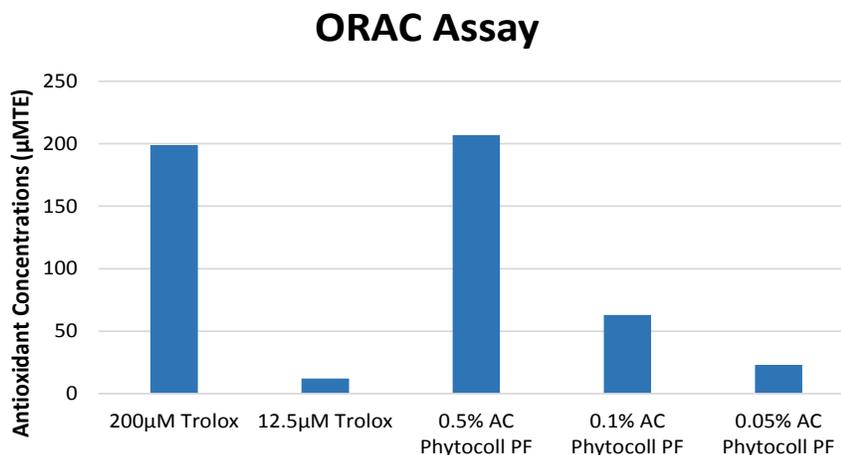


Figure 2. Antioxidant Capacities.

As shown in Figure 3, **AC Phytocoll PF** exhibited positive results by increasing cell metabolism. The increase in fluorescent signal indicates an increase in cellular metabolism and viability post **AC Phytocoll PF** treatment. For these reasons, we can assume **AC Phytocoll PF** is suitable for cosmetic applications designed to increase cell viability and metabolism.

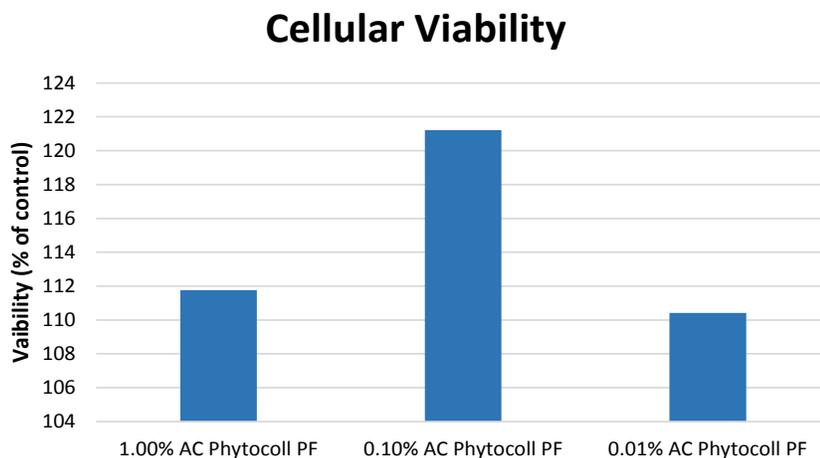


Figure 3. Cellular Viability Assay.

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- 3) Hou, H. et al. 2012. Journal of Food Chemistry. Moisture absorption and retention properties, and activity in alleviating skin photodamage of collagen polypeptide from marine fish skin. 135(3): 1432-1439



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