ACB Cationic Glycoprotein PF

exotic + extreme environment
accelerates the speed of DHA
reactions prior to self tanning
moisturizes + hydrates
perfect for hair + skin care
great for swimmer's hair

BACKGROUND

Glycoproteins are composed of both a protein and a carbohydrate (typically a sugar) that are linked via a covalent bond. Glycoproteins are very important structures in mammalian cellular functions, as they enhance solubility, help with membrane orientation, and may help carry blood group determinants. Not only are they important in mammalian cellular functions, but they are also essential in plants as well. Glycoproteins, in combination with phospholipids, allow the body to readily absorb the moisture that is available from the Yerba Santa plant. Sugars tend to be very hydrophilic due to their many –OH groups, but phospholipids, cationic by nature, contain a lipid bilayer where the hydrophobic lipid tail is shielded from the aqueous phase. Phospholipids are useful in assisting molecular transportation through fat-soluble membranes when hydrophilic molecules cannot easily penetrate by themselves.[1]

SCIENCE

ACB Cationic Glycoprotein PF has an expanded molecular weight and was run over an ion exchange resin to isolate the proper cationic molecules. An ion exchange is a reversible process where one ion is exchanged from a solution for a similarly charged atom on the attached immobile solid particle. Ion exchange resins can be categorized as cationic, which provide positive mobile ions, or anionic, which provide negative mobile ions. An ion exchange is a very beneficial process because it is extremely efficient in isolating the desired ionic elements; waste products are easily filtered out; it has exceptionally high water recovery; and the resulting molecule is more stable than the original. Cations enhance the tendency of other molecules to bind to the skin because the skin is naturally anionic and opposite charges attract one another.

BENEFITS

ACB Cationic Glycoprotein PF is derived from the *Eriodictyon californicum*, or the Yerba Santa plant. Yerba Santa is an aromatic evergreen shrub with dark, leathery leaves.[2] It is able to capture and hold vast amounts of moisture within its resinous leaves, which allows it to withstand its native arid environment. The technical staff at **Active Concepts** discovered that fermenting the Yerba Santa leaves with *Lactobacillus*, or lactic acid bacteria, allows for more efficient isolation of important glycoproteins, as there is no need for heat or solvents. Lactic acid fermentation is commonly used to produce many foods, such as yogurt and cheese, and is the process by which a living cell is able to break down complex sugars into smaller molecules, such as proteins and glycoproteins, without the use of oxygen.

Code Number: 20391PF

INCI Name: Lactobacillus/Eriodictyon Californicum Ferment Extract & Phospholipids
INCI Status: Conforms
REACH Status: Complies
CAS Number: 68990-14-7 & 8002-43-5
EINCS Number: 273-580-8 & 232-307-2

Origin: Botanical
Processing:
GMO Free
No Ethoxylation
No Irradiation
No Sulphonation
Additives:
Preservatives: None
Antioxidants: None
Other additives: None
Solvents Used: N/A
Appearance: Liquid Liposomal Dlspersion
Soluble/ Miscible: Water Soluble
Ecological Information:
100% Biodegradability
Microbial Count:
< 100opg, No Pathogens

Suggested Use Levels: 1.0 – 5.0%
Suggested Applications: Moisturizing, Facilitates Self-Tanning Prior to DHA Application, Hydration, Anti-Chlorine Damage

Benefits of **ACB Cationic Glycoprotein PF**:

- Efficient isolation of glycoproteins
- Isolation of proper cationic molecules
- Moisturizing
- Facilitates Tanning
- Anti-Chlorine Damage for Hair Care

ACB Cationic Glycoprotein PF

EFFICACY

DHA does not damage the skin as it only reacts with the outermost layer and allows for no system absorption; thus it carries fewer risks than other available sunless tanning methods. This tanning effect typically appears within one hour of application, and maximum tanning will progress between 8 and 24 hours. The tan lasts until the dead skin cells are exfoliated, approximately 5-7 days. For a slightly longer lasting effect, it is recommended to wash and exfoliate the skin prior to application.

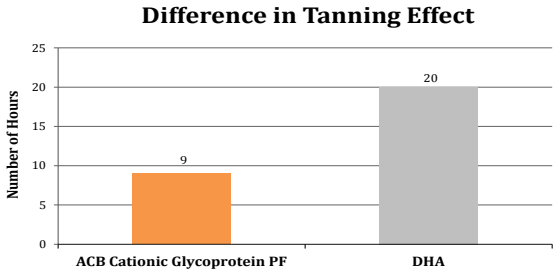

Figure 1. Difference in Tanning Effect using **ACB Cationic Glycoprotein PF** vs. DHA.

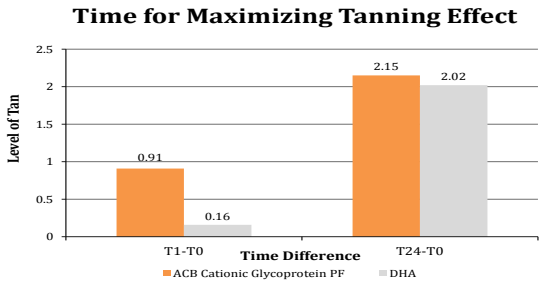

Figure 2. Time for maximum tanning effect using **ACB Cationic Glycoprotein PF** vs. DHA.

We did an in-house panel test to determine how quickly **ACB Cationic Glycoprotein PF** accelerates a DHA solution, and the results were calculated according to a rubric. We compared **ACB Cationic Glycoprotein PF** with a DHA solution vs. a DHA solution by itself as a control. We calculated a color scale in Adobe Photoshop on a scale from 0-5 for color difference after 1 hour and color difference after 24 hours. Rate of maximal tan was calculated by referencing the volunteers and was based on an hourly rate (0-24 hours).

According to the results, **ACB Cationic Glycoprotein PF** in conjunction with DHA produces a much more visible tanning effect after 1 hour than a DHA solution by itself, and **ACB Cationic Glycoprotein PF** reaches a maximum tanning effect after an average of 9 hours, whereas DHA by itself reaches maximum tanning effect at an average of 22 hours.

Free chlorine is essential in swimming pool maintenance as a disinfectant and sanitizer. However, chlorine can cause significant damage to swimmers' hair if the hair is unprotected. Overexposure of hair to chlorine may lead to dryness, split ends, and depletion of color. Chlorine testing strips are designed to give instant, visual measurements of free chlorine in a solution and were chosen as the test method for this study. Under the conditions of this assay, the test substance, ACB Cationic Glycoprotein PF, demonstrated very effective free chlorine binding action. This product is an excellent choice for hair care products designed for swimmers who come into contact with chlorine on a regular basis.

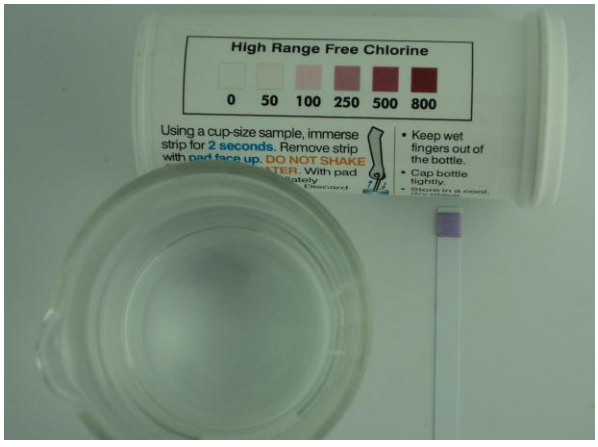

Figure 3. Free Chlorine Level of 0.4% Sodium Hypochlorite Solution (15% concentration) in DI Water.

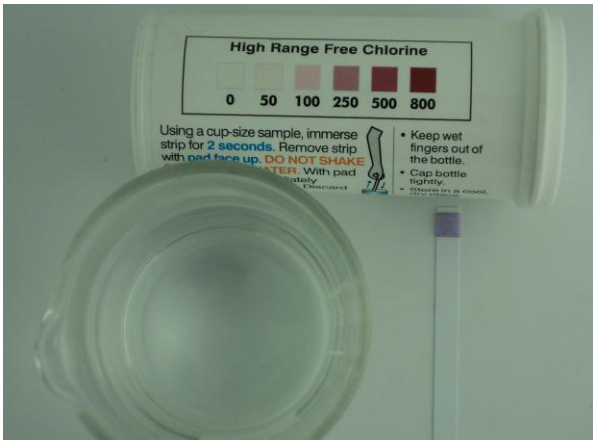

Figure 4. Free Chlorine Level of Solution in Figure 1 plus 0.4% ACB Cationic Glycoprotein PF.

ACB Cationic Glycoprotein PF

EFFICACY

The study was conducted using five participants with a variety of hair types. Each subject had their baseline photo taken prior to having their hair washed. Half of the head was shampooed and conditioned with a base shampoo/ base conditioner + 2.0% **ACB Cationic Glycoprotein PF.** The hair on the other half of the head was treated with the base shampoo and conditioner alone. After the application and rinse of the test and positive control products, each participant's hair was blown dry using a round brush on both sides of the head. Once the hair was completely dry, the participant was asked to assess the volume, shine, dry combability, thickness, smoothness, hydration, softness and manageability of both halves of her hair. The results can be viewed below.

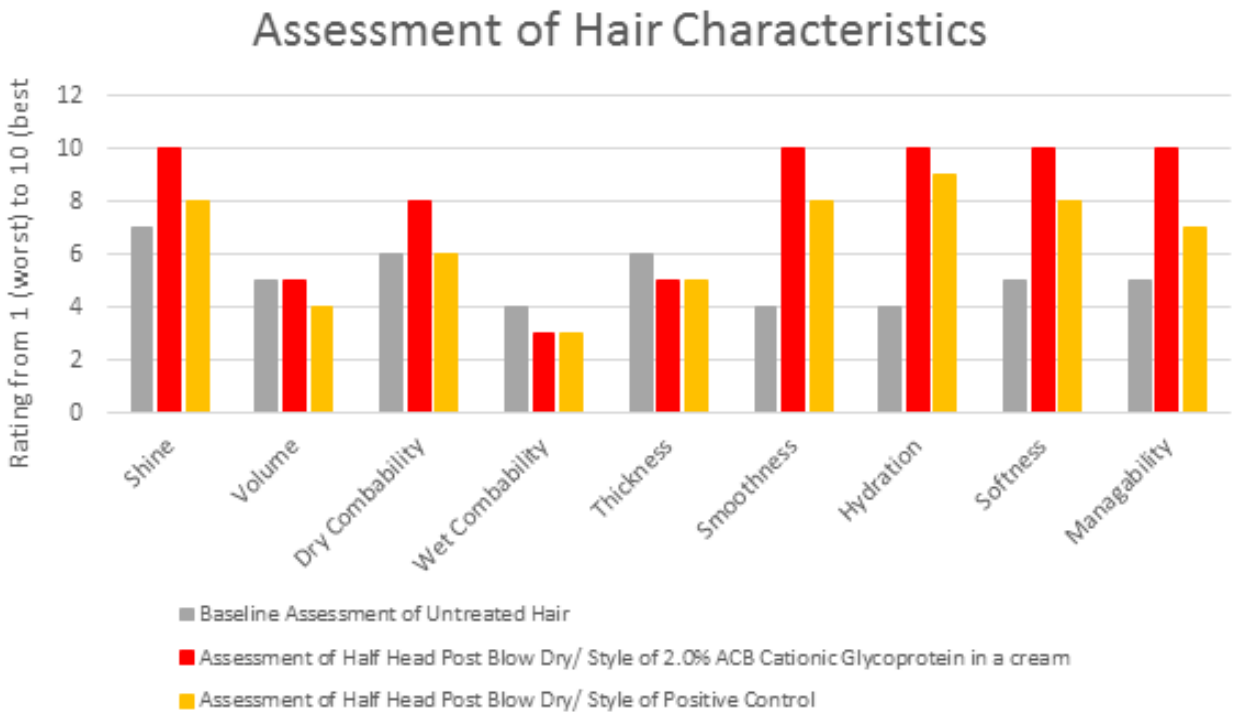

Figure 5. Assessment of Hair Characteristics Post Blow Dry

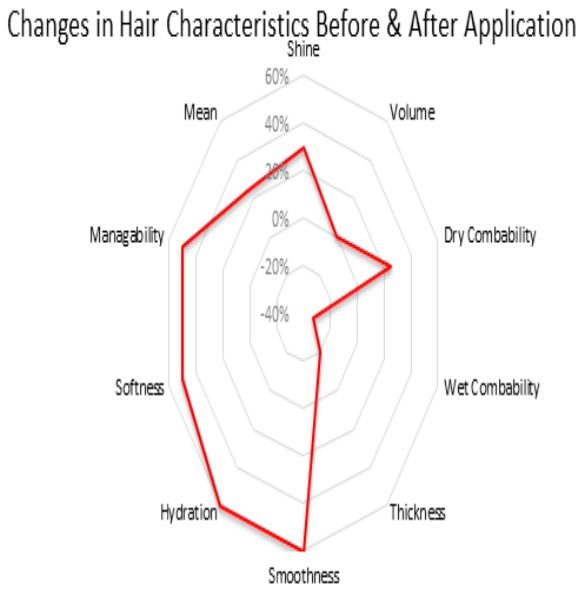

Figure 6. Changes in Hair Characteristics from Baseline to Post Style using **ACB Cationic Glycoprotein PF**

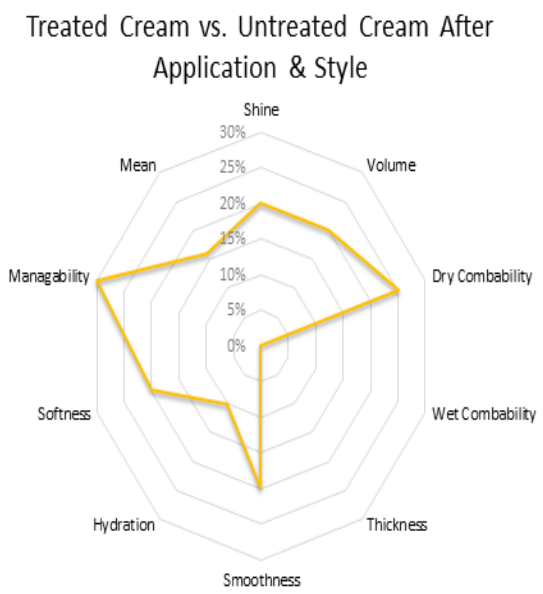

Figure 7. Treated Half vs. Control Half After Application & Style

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Figure 8. Full Head baseline, Untreated Hair

Figure 9. Half-Head Treated

Figure 10. Full Head baseline, Untreated Hair

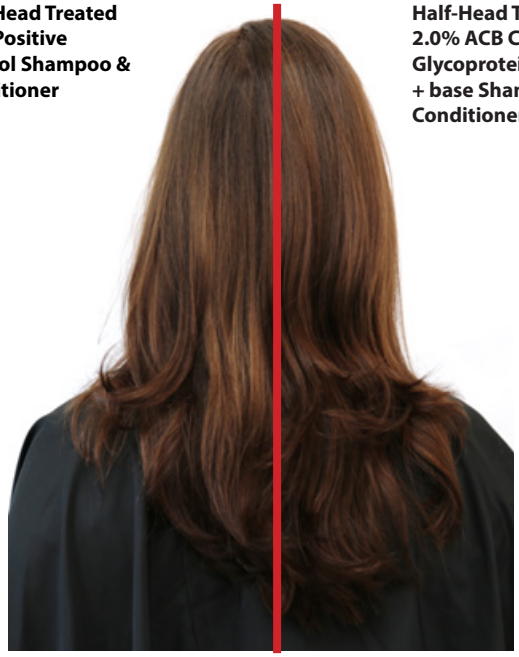

Figure 11. Half-Head Treated

The results of the assessment indicate that when incorporated into a shampoo and conditioner, **ACB Cationic Glycoprotein PF** is capable of significantly improving hair characteristics. Overall, the treated half-head was measured as 25% "better" when compared to the baseline readings. When used in cleansing and conditioning products, **ACB Cationic Glycoprotein PF** improved shine, volume, dry combability, smoothness, thickness, hydration, softness and manageability by 30%, 25%, 60%, 60%, 50% and 50% respectively, in comparison to the baseline hair assessments. The treated half of the volunteer's head above serves as a visual demonstration of hair that is shinier and smoother, and appears to have increased manageability.

ACB Cationic Glycoprotein PF also enhanced the base shampoo and conditioner when being compared to these positive controls alone. Assessments of shine, dry combability, smoothness, hydration, softness and manageability were all rated higher than the John Frieda Smoothing Crème alone. The difference in subjective ratings were 30%, 25%, 60%, 60%, 60%, 50% and 50% when all categories were analyzed in comparison to one another.

ACB Cationic Glycoprotein PF

Another study was conducted using a female participant with long, thick, unruly hair. The subject was asked to wash her hair and blow dry, as normal. A half head study was then conducted. After shampooing and conditioning, the hair was parted segmenting the hair in half, one half of the participant's wet hair was then treated with the 2.0% ACB Cationic Glycoprotein PF Cream incorporated into John Frieda's Smoothing Crème. The hair on the other half of the head was treated with John Frieda's smoothing cream alone following the wash. After the application of the test and positive control creams, the participant's hair was blown dry using a flat paddle brush on both sides of the head. Once the hair was completely dry, the visual differences were captured and displayed in figures 12 and 13.

Figure 12. Full Head baseline, Untreated Hair

Figure 13. Half-Head Zoomed Photo of Hair Treated with Test Cream vs. Untreated

ACB Cationic Glycoprotein PF imparts benefits that tactilely and visually improve the sensorial assessment of typically thick, unruly or frizzy hair. This aqueous product is ideal for use in hair care formulations, especially in shampoos, conditioners and creams, to increase shine, hydration, and softness while smoothing the cuticle for hair that appears visibly healthier and tactilely more manageable.

References:
[1]"Lipid Bilayer Permeability." Physiologyweb.com.17 Jan 2011. Web. 10 Nov 2015.
[2]Kaminski, Patricia. Katz, Richard. "Yerba Santa Eriodictyon Californicum." Flowersociety.org. Web. 10 Nov 2015.

Active Concepts LLC
Lincolnton, NC. USA
www. activeconceptsllc.com
Office: +1 704 276 7100
info@activeconceptsllc.com

Active Concepts S.r.l.
Milano ITALY
www.activeconcepts.it
Tel +39 02 90360719
info@activeconcepts.it

Active Concepts LLC, Asia
Kaohsiung, Taiwan
www.activeconceptsllc.com
Tel + 886 73599900
josephyeh@activeconceptsllc.com