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Phytofuse Renew®

Pollution Protection
Moisturization
Anti-Inflammatory

Active Concepts

VEGAN

SEPHORA CLEAN

CREDO CLEAN

COSMOS COMPLIANT

ISO 16128

THE FEATURES.

Exhaustion can settle into every part of you, and coffee and energy drinks aren't as effective on your skin and hair as they are on your mind. Phytofuse Renew® brings the solution to the cosmetic industry, capitalizing on the benefits of *Selaginella lepidophylla* to help renew the skin and hair. This botanical can revive itself after near-death conditions and has been aptly named as a "resurrection" plant. Inspired by *Selaginella lepidophylla*'s compelling capabilities, brands can capitalize on this plant's survival instincts to revive tired-looking skin and dull hair through Phytofuse Renew®!

INCI: Selaginella Lepidophylla ***Extract***

TECHNICAL DATA SHEET.

Phytofuse Renew®

THE STORY.

Work, sleep (maybe), repeat. This is the reality for many out there, and in the age of side hustles and workaholics, it's become the norm for people to run on empty. While we can use caffeine as a bandage solution, burn out is real and unfortunately not something that you can run away from. Exhaustion can settle into every part of you, and coffee and energy drinks aren't as effective on your skin and hair as they are on your mind. Phytofuse Renew® brings the solution to the cosmetic industry, capitalizing on the benefits of *Selaginella lepidophylla* to help renew the skin and hair.

Selaginella lepidophylla, also commonly referred to as the Rose of Jericho[1], is a spike moss with remarkable resilience, able to endure desiccation and resume normal physiological and metabolic activities upon rehydration.[2] *Selaginella lepidophylla* can revive itself after near-death conditions and has been aptly named as a "resurrection" plant. Over time, *Selaginella lepidophylla* has evolved to develop a unique molecular mechanism to protect itself against fatal dehydration[2], curling up to form a tight ball to protect the plant against damage due to high irradiance or temperatures while maintaining photosynthetic processes.[3] In addition to its ability to survive fatal conditions, *Selaginella lepidophylla* has been known to contain metabolites that can be highly beneficial to protect the plant from oxidative stress.[2]

Inspired by *Selaginella lepidophylla*'s compelling capabilities, the personal care industry is able to capitalize on this plant's survival instincts to revive tired-looking skin and dull hair through Phytofuse Renew®!

THE SCIENCE.

During periods of excessive drought, resurrection plants can survive by shutting down their metabolic systems to tolerate dehydration. This adaptation to severe dehydration is due to the development of unique molecular responses that enable it to withstand desiccation-induced injury. The ability of *Selaginella lepidophylla* to withstand long periods of almost total desiccation are associated with its polysaccharide-rich systems. These systems that are found in *Selaginella lepidophylla* extract have the ability to inhibit atmospheric particulates from remaining on or penetrating into the skin by forming a synthetic scaffolding.[1]

Pollution damages or weakens the skin's natural barrier, degrading structural proteins like collagen and elastin.[4] This damaged barrier can result in poor skin hydration, effecting the rigidity and firmness of skin. Actives, which help counter this degradation, can improve the efficacy of anti-pollution products. Extracts of *Selaginella lepidophylla* containing highly adaptive Moisture Retention Complex with film-forming properties can help to improve skin barrier function, offering intense moisturizing benefits and reducing transepidermal water loss from compromised skin.[4] Several compounds in *Selaginella lepidophylla* have even shown potent anti-inflammatory properties.[5] In general, inflammation occurs during the wound healing process, specifically in the proliferative phase, which also involves collagen remodeling and more.[6] These findings support the ability of Phytofuse Renew® to impart powerful benefits for skin and hair rejuvenation.

THE TECHNICAL DETAILS.

INCI. Selaginella Lepidophylla Extract
CAS. 90106-73-3
EINECS. 290-298-0
EUROPE. Compliant
USA. Compliant
CHINA. Contact Us

Origin. Botanical
Natural Antimicrobial. Lactobacillus Ferment
Preservatives. None
Solvents Used. None
Appearance. Clear to Hazy Gel, Yellow to Amber

THE FORMULATION TIPS.

pH Stability. 3 - 7
Temperature Stability. Stable up to 50°C
Use Level. 1 - 10%

Ionic State. Cationic
Alcohol Compatibility. 1% to 10% is compatible with up to 50% SDA-40
Solubility. Water Soluble
Pro Tips. It is recommended that this product is added into the aqueous phase.

THE BENEFITS OVERVIEW.

Skin

Antipollution	*Carboon Pollution Protection Assay*
	Airborne Pollution Protection
Skin Hydration	*Moisturization Study*
Moisture Retention	*Transepidermal Water Loss Study*
Wound Healing	*Scratch Assay*
Skin Density	*High Resolution Ultrasound Skin Imaging*
Anti-Inflammation	*IL-6 ELISA*

Hair

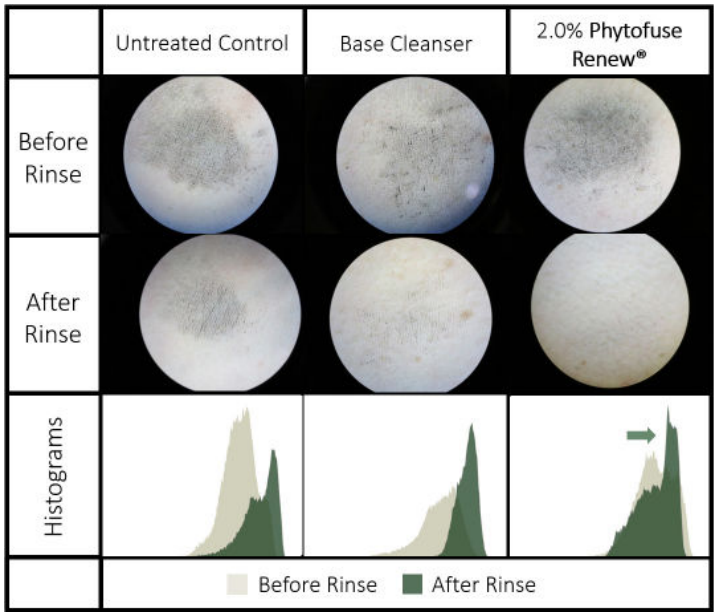
Antipollution	*Airborne Hair Pollution Protection*
Anti-Frizz & Hydration	*Salon Half-Head Study*

THE EFFICACY.

Antipollution (Skin)

A carbon pollution protection study was conducted to assess the ability of Phytofuse Renew® to provide immediate barrier protection from carbon air pollution and enhance the removal of carbon air pollution. Results indicate Phytofuse Renew® provides anti-pollution properties when added to personal care applications at recommended use levels. Collectively, Phytofuse Renew® reduces carbon accumulation on the skin and enhances carbon removal from the skin which improves the skin's protective barrier function and contributes to the appearance of healthier looking skin.

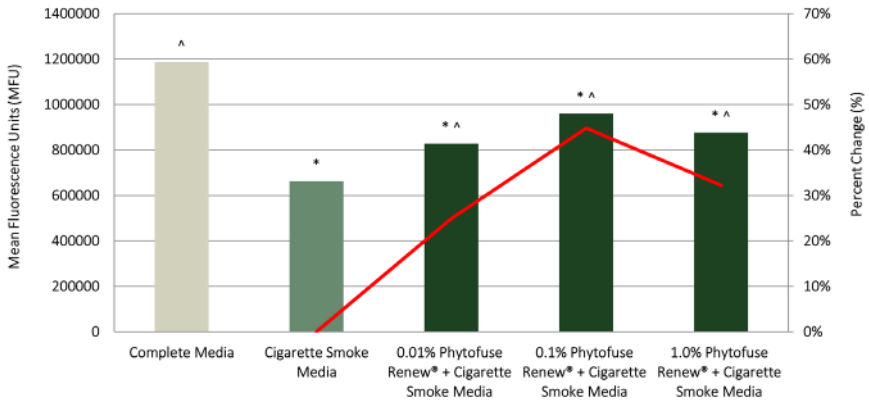
Pollution Protection



Reduces carbon on the skin by -97%

An air pollution protection assay was conducted to assess the ability of Phytofuse Renew® to protect cellular homeostasis against exposure to soluble cigarette smoke pollutants. Exposure to airborne pollutants perturbs cellular homeostasis and accelerates characteristic signs of skin aging. Taken together, these data indicate Phytofuse Renew® attenuates the negative impacts of airborne pollution on cellular viability. Collectively, Phytofuse Renew® offers protection against airborne pollutants at a cellular level.

Airborne Pollution Protection

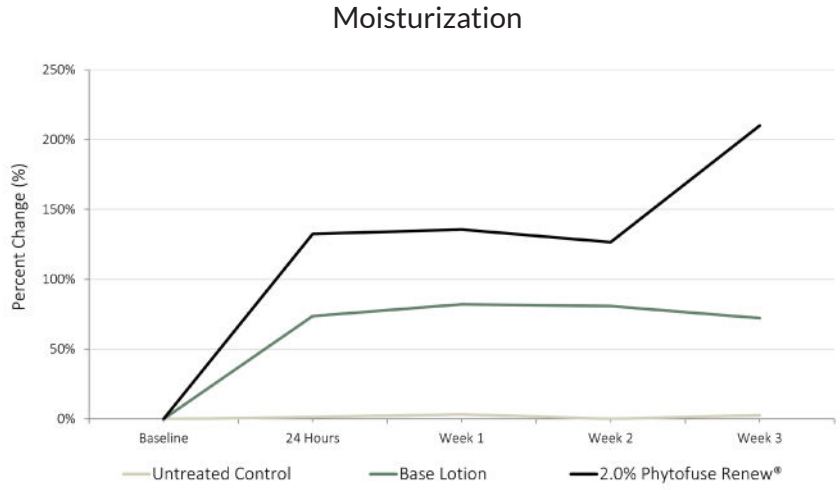


Increases viability by +45%

THE EFFICACY CONTINUED.

Skin Hydration

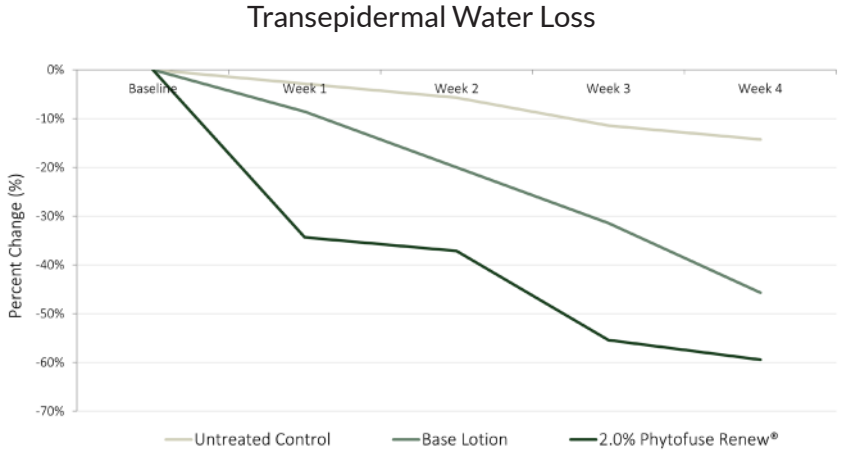
A moisturization study was conducted to evaluate the skin hydrating properties of Phytofuse Renew®. The ability of Phytofuse Renew® to enhance skin moisturization was assessed via hydration throughout three weeks of twice daily application. Results indicate Phytofuse Renew® increases skin moisturization when added to personal care applications at recommended use levels. Collectively, Phytofuse Renew® demonstrates skin hydration properties which improves the skin's protective barrier function and contributes to the appearance of healthier-looking skin.



Increases skin hydration by +210%

Moisture Retention

A transepidermal water loss study was conducted to evaluate the moisture retention properties of Phytofuse Renew®. Results indicate Phytofuse Renew® reduces TEWL when added to personal care applications at recommended use levels. Collectively, Phytofuse Renew® demonstrates moisture retention properties which improves the skin's protective barrier function and contributes to the appearance of healthier-looking skin.



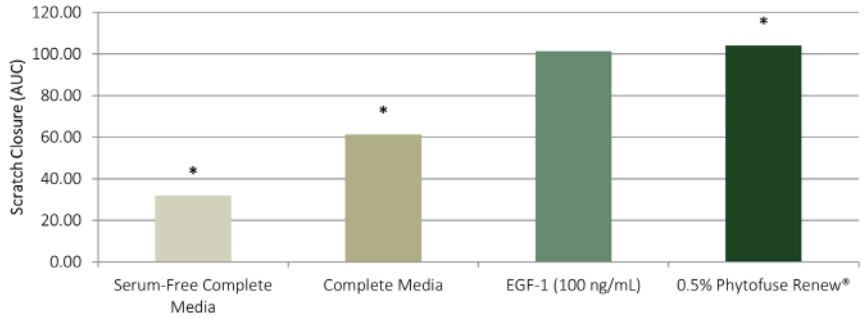
Reduces TEWL by -59%

THE EFFICACY CONTINUED.

Wound Healing

A scratch assay was conducted to assess the *in vitro* wound healing properties of Phytofuse Renew® in dermal fibroblasts. This assay is based on the observation that when an artificial gap or scratch is made on a confluent cell monolayer, the cells will migrate towards the opening and close the scratch. Collectively, the mechanisms of *in vitro* scratch closure mimic the mechanisms seen in *in vivo* wound healing. Results indicate Phytofuse Renew® has wound healing properties and triggers cellular migration, which may assist in the wound healing process.

Scratch Assay

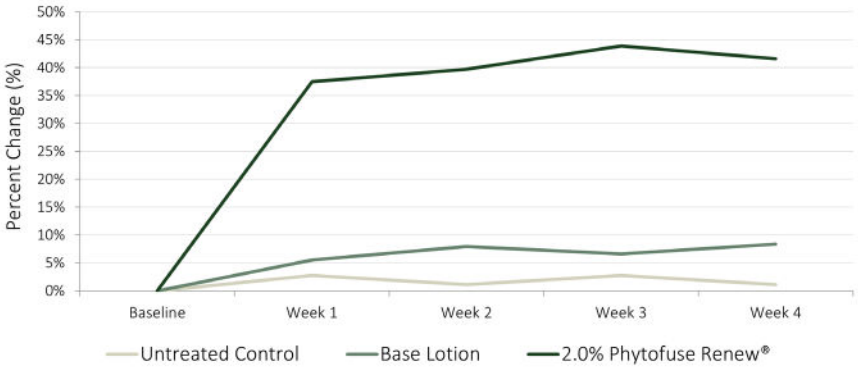


Increases cell migration by +106%

Skin Density

A high-resolution ultrasound skin imaging study was conducted to assess the ability of Phytofuse Renew® to improve collagen fiber density. The ability of Phytofuse Renew® to improve the collagen fiber density was assessed via ultrasound measurements throughout four weeks of twice daily application. These results indicate application of 2.0% Phytofuse Renew® elicits an increase in collagen density, reducing the visual impacts of normal aging. Phytofuse Renew® improves normal skin aging by augmenting collagen density, resulting in a healthier and more youthful skin appearance.

High Resolution Ultrasound Skin Imaging

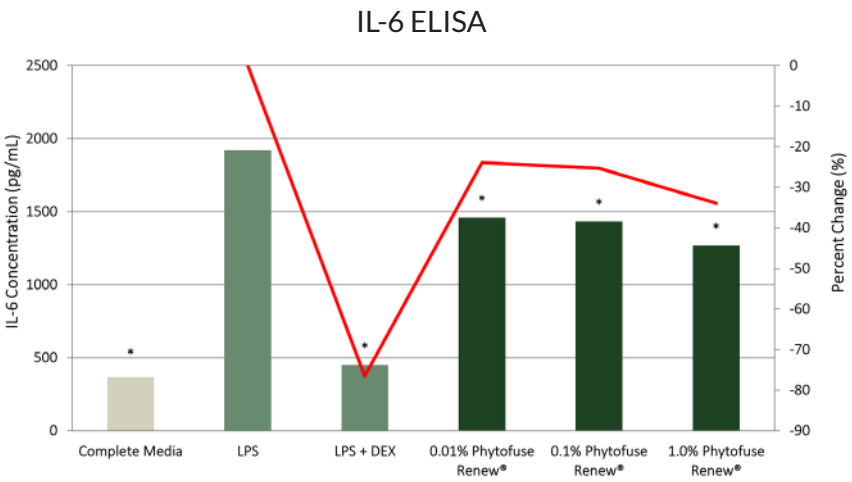


Improved skin density by 41%

THE EFFICACY CONTINUED.

Anti-Inflammation

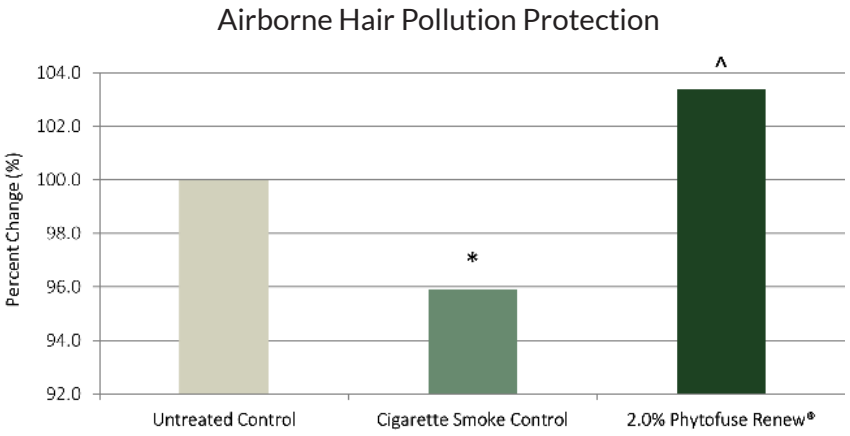
An interleukin-6 ELISA was conducted to assess the *in vitro* effect of Phytofuse Renew® to elicit changes in IL-6 levels in dermal fibroblasts. Collectively, a decrease in IL-6 production indicates a reduced inflammatory environment which could diminish the signs of aging and minimize the formation of fine lines and wrinkles. These data indicate Phytofuse Renew® exerts an anti-inflammatory effect, which may help to attenuate characteristics of cellular aging.



Reduces IL-6 levels by -34%

Antipollution (Hair)

An *ex vivo* airborne hair pollution protection assay was conducted to assess the ability of Phytofuse Renew® to protect hair from airborne pollutants. Collectively, these results demonstrate Phytofuse Renew® blunts airborne pollutant-induced hair protein degradation, thereby protecting hair fibers from damage. Taken together, these data indicate Phytofuse Renew® promotes hair health by exerting anti-pollution properties on hair when used at the recommended use-levels.



Increases tryptophan by +7.5%

THE EFFICACY CONTINUED.

Stylist Approved

A salon half-head study was conducted to evaluate the perceived hair benefits of Phytofuse Renew® in a shampoo and conditioner on wet and dry hair. These results indicate Phytofuse Renew® improves the perceived benefits with wet and dry hair when added to shampoo and conditioner at recommended use levels. Collectively, Phytofuse Renew® demonstrates visual and perceived hair characteristics which contribute to a healthier looking hair appearance.

Reduces frizz by -38%

Increases hair hydration by +41%

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1. Rick, Donald. "Nutmeg Newsletter." (2016).
2. Gechev, T.S., Hille, J., Woerdenbag, H.J., Benina, M., Mehterov, N., Toneva, V., Fernie, A.R., Mueller-Roeber, B. "Natural products from resurrection plants: Potential for medical applications." Biotechnology Advances. 6.1 (2014): 1091-1101.
3. Yobi, A., et al. "Metabolomic Profiling in Selaginella lepidophylla at Various Hydration States Provides New Insights into the Mechanistic Basis of Desiccation Tolerance." Molecular Plant. 6.2 (2013): 369-385.
4. Mistry, Niraj. "Guidelines for Formulating Anti-Pollution Products."
5. Sansores-España, D., et al. "Plants Used in Mexican Traditional Medicine for the Management of Urolithiasis: A Review of Preclinical Evidence, Bioactive Compounds, and Molecular Mechanisms." Molecules.
6. Tyagi, Nishant. "Phytopharmacological and toxicological evaluation of Selaginells bryopteris (Sanjeevani) for its anti-ulcer potential."

Active Concepts LLC
Lincolnton, NC - USA
Tel +1 704-276-7100
info@activeconceptsllc.com

Active Concepts SRL
Bareggio, (Milano) ITALY
Tel +39 02 90360719
info@activeconcepts.it

Active Concepts LLC, Asia
Kaohsiung, Taiwan
Tel + 886 73599900
info-asia@activeconceptsllc.com.tw

Website
www.activeconceptsllc.com

Social Media
@activeconceptsglobal