

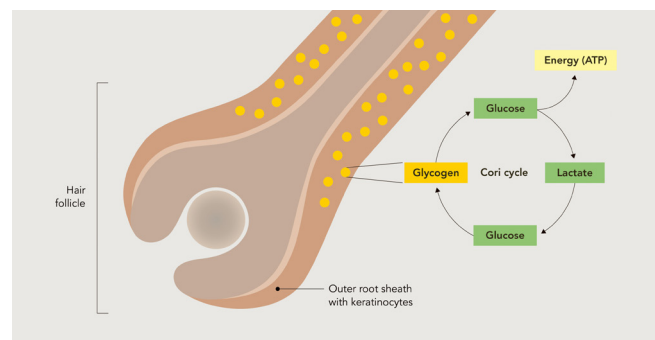


Phytoglycogen: A new energy booster for hair

Consumers are increasingly seeking solutions for hair longevity that maintain growth, density, and vitality. PhytoSpherix™ Hair, the new active ingredient from Mibelle Biochemistry, is a glycogen derived from non-GMO corn that meets the high energy demands of hair follicles, those tiny biological factories that produce hair shafts.

THE ENERGY RECYCLING SYSTEM OF HAIR FOLLICLES

The hair follicle is an extremely dynamic mini-organ whose growth requires considerable energy. This demand is especially high in the rapidly dividing matrix cells at the follicle base, where intensive keratin production places heavy strain on cellular metabolism during hair shaft formation. In this context, one metabolic pathway is particularly important: the Cori cycle. As a mechanism of energy recovery, it provides the follicle with internal energy reserves.¹ Central to this system is glycogen, a glucose-based polysaccharide that serves as a local energy store by releasing free glucose upon breakdown. Although mainly associated with the liver and skeletal muscle, glycogen is also present in the skin. In the hair follicle, matrix cells and the outer root sheath (ORS) rely on this mechanism to generate ATP. A high glucose and energy supply is especially critical during energy-intensive phases of the hair cycle, particularly anagen, when metabolic activity peaks. Stored glycogen can be rapidly mobilized when blood glucose—the follicle's primary fuel—cannot meet demand, such as during nutrient deficiency, impaired microcirculation, or temporary stress. Under these conditions,



The internal Cori cycle in the hair follicle

the Cori cycle supports ATP production and continued growth. Without this stabilizing mechanism, hair growth would be far more vulnerable to metabolic disturbances. However, the efficiency of the Cori cycle declines with age, inflammation, chronic stress, prolonged nutrient deficiencies,² or hormonal changes such as menopause.³ When this energy recycling system fails to meet follicular demand, ATP production drops, cell turnover slows, and hair growth declines, resulting in thinning and increased hair loss. Reliable replenishment of internal energy reserves is therefore essential for sustained hair growth and follicle longevity.

PHYTOSPHERIX™ HAIR CONTRIBUTES TO HAIR LONGEVITY

“Hair longevity” describes a holistic approach to supporting the hair and scalp so that they remain functional and retain their youthful biological characteristics for as long as possible: a regular growth cycle, a stable hair structure, a smooth, intact cuticle layer, high elasticity, and hair shine are just a few of these youthful characteristics. This naturally also involves paying special attention to the hair follicle, where new hair is formed and grows. By supporting the function of the hair follicles and, in particular, by promoting their energy-intensive growth phase—as PhytoSpherix™ Hair does—the foundation for longevity of the hair is established.

THE ENERGY SOURCE IN THE NON-GMO SWEET CORN

Glycogen is a compact, spherical, water-soluble molecule composed of thousands of glucose units. This structure makes it an efficient cellular energy store and gives it valuable properties, making the ingredient particularly well-suited for supporting hydration in cosmetic products. Since natural glycogen is typically of animal origin, Mibelle Biochemistry has

developed PhytoSpherix™ Hair: a vegan, purely plant-based glycogen derived from a special, non-GMO sweet corn variety that naturally produces glycogen. This corn-based glycogen is chemically identical to mammalian glycogen.⁴

THE SCIENCE BEHIND THE ACTIVE

Previous studies have shown that the extract promotes collagen and hyaluronic acid production as well as skin hydration, confirming its versatility as a cosmetic ingredient. To demonstrate conversion of plant-based glycogen into ATP, an *in vitro* study measured intracellular ATP levels in keratinocytes. Cells treated with the extract showed up to 49% higher ATP levels than controls, indicating enhanced cellular energy production that supports energy-intensive processes such as hair growth.

In an *ex vivo* model, human anagen hair follicles were cultured with or without PhytoSpherix™ Hair. After one week, microscopic analysis revealed a 123% increase in hair shaft length versus the untreated control, while the reference compound epidermal growth factor (EGF) achieved only 86% (Figure 1). These results indicate that the extract efficiently delivers glycogen-derived energy to support follicular growth.

In a double-blind, placebo-controlled clinical trial involving women and men aged 50–64, the effects of PhytoSpherix™ Hair on hair density and growth rate were assessed using TrichoScan.® A 90-day application of a

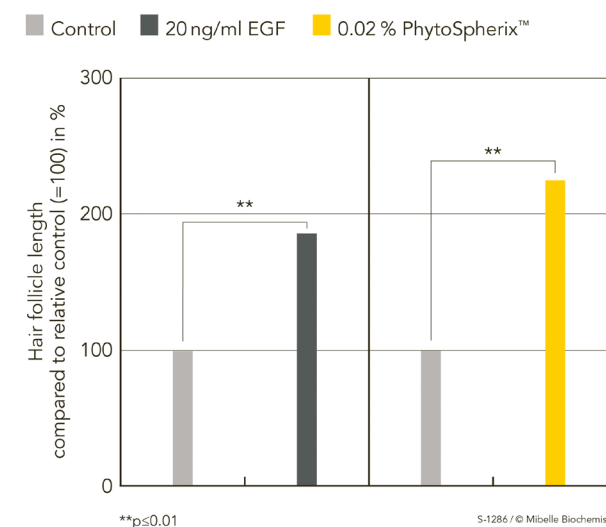


Figure 1: Improved hair follicle growth rate (performed on extracted hair follicles)

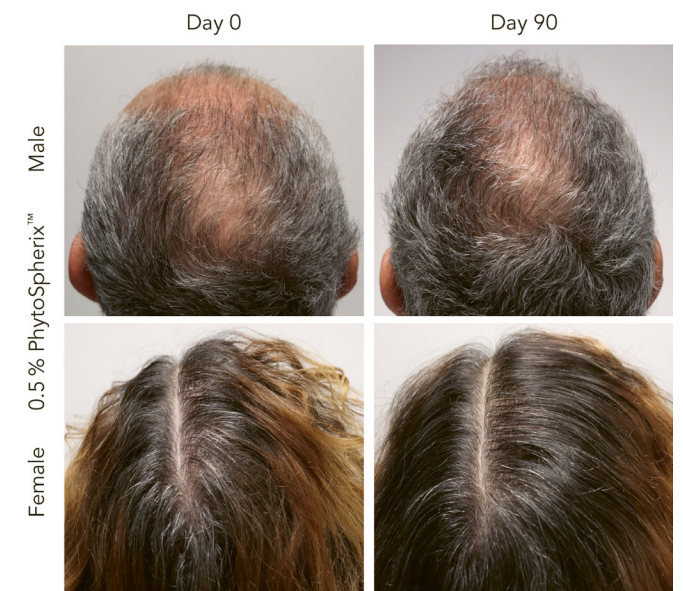


Figure 2. Visibly fuller hair

scalp serum containing 0.5% active ingredient significantly increased hair density by 3% after 45 days and 6% after 90 days, while hair growth rate declined in the placebo group. Trichogram analysis showed that the anagen to telogen ratio increased by 38% after 45 days and by 26% after 90 days with the active ingredient, whereas the placebo group exhibited marked decreases. These effects were reflected by visibly fuller hair in both male and female participants (Figure 2).

Based on its unique phytoglycogen, PhytoSpherix™ Hair provides targeted metabolic support to hair follicles, supplying readily available energy to counteract biological processes associated with reduced growth and density, and offering a scientifically substantiated approach to improving hair longevity at the follicular level. ■

<https://www.mibellebiochemistry.com/phyto-spherixtm-hair>

References

- Figlak et al. 2021. Human hair follicles operate an internal Cori cycle and modulate their growth via glycogen phosphorylase. Scientific reports.
- Rook/Wilkinson/Ebling 1998. Textbook of Dermatology, 6th edition
- Mosconi et al. 2021. Menopause impacts human brain structure, connectivity, energy metabolism, and amyloid-beta deposition. Scientific reports.
- Dutcher et al. 2017. Physics in Canada/La Physique au Canada.