**Stratixyl™**

**Description**

Functional botanical that helps skin build its natural barrier function and improve *stratum corneum* moisture and biomechanical properties.

One of the principal functions of the skin is to build a strong barrier between the body and the outside world – both protecting the body from environmental aggressions and maintaining water inside the body. This function is achieved only if the skin possesses a strong barrier function through good cell regeneration and differentiation, which is associated with the synthesis of a strong, well organized matrix – the cornified envelope. Two major phases are involved in this synthesis. First, is the expression by the keratinocytes of precursor proteins required to build this matrix (e.g. involucrin, loricrin, filaggrin), and secondly is the formation of strong covalent bonds by transglutaminases to cross-link these precursors together.

*In-vitro* and *ex-vivo* testing suggest that Stratixyl may help enhance the development of the cornified envelope by improving the expression of the skin’s barrier function precursor proteins, as well as boosting the expression and activity of transglutaminases.

*In-vivo* studies correlate these properties with the reinforcement of the structure and organization of the *stratum corneum*, leading to a better appearance and improved moisture of the skin.

Stratixyl is a biofunctional ingredient recommended for formulations targeting reinforcement of the skin barrier and moisturization, in particular those for consumers having dry, flaky skin. Additionally, it should be considered for after-shave products and products used after skin peels or dermabrasion, given that these actions may disrupt the skin’s natural barrier function.

**Properties**

- Enhances expression of cornified envelope precursors, *in-vitro* and *ex-vivo*
- Enhances expression and enzymatic activity of all epidermal transglutaminases, *in-vitro*
- Reinforces *stratum corneum* from stripping, *in-vivo*
- Compatible with Ecocert guidelines

**Cosmetic applications**

- Moisturizing formulations for dry, flaky skin
- After-peeling, after-dermabrasion formulations to maintain appearance of good looking skin
- Formulations for sensitive skin
- After-shave, after-depilation formulations to help restore *stratum corneum*
The cornified envelope is a thin, insoluble structure surrounding the corneocytes and is formed via a complex, but well organized process during terminal differentiation of epidermal keratinocytes. One of the initial events of this process is the expression of cornified envelope precursor proteins, including involucrin, loricrin, small proline-rich proteins (cornifin) and others.

Expression of all skin transglutaminases

The cornified envelope precursors are cross-linked via the formation of bonds (γ-glutamyl-ε-lysine) mediated by calcium-dependent transglutaminases (TGM). Four transglutaminase isozymes, TGM1, TGM2, TGM3 and TGM5 are expressed in the skin. In-vitro and ex-vivo immunostaining of all four transglutaminases expressed in the skin (results not shown) suggest that Stratixyl helps enhance the expression of these enzymes in the skin.

The Transglutaminase Assay is used for the in-vitro detection of transglutaminase enzymatic activity and for screening of transglutaminase modulators. Transglutaminase enzymatic activity is enhanced, in-vitro, when Stratixyl (1%) is applied on normal human keratinocytes, suggesting that Stratixyl may help improve the cross-linking of cornified envelope precursors.
**Stratum corneum: resistance, repair and moisture**

The *stratum corneum* is the outermost layer of the epidermis and is largely responsible for the vital barrier function of the skin. Daily, it is submitted to many mechanical (shaving, scrubbing) and chemical (soaps, disinfectant solutions) aggressions that weaken its structure and reduce its ability to maintain the skin’s moisture and protect it from external organisms.

A ten day, double blind *in-vivo* study was carried out on 10 volunteers (age 22 to 28). Twice each day, volunteers were asked to apply a cosmetic formulation containing 1% Stratixyl on one forearm and a placebo formulation on the other forearm. On day 7, a tape stripping was performed on both forearms. Volunteers continued to apply the test formulations for the remaining three days. Readings were taken just before stripping, one hour after stripping, on day 8 and on day 9.

**Stratum corneum structure and thickness**

Vivascope® confocal microscopy is a non-invasive window into living skin. Using this innovative technique, structure and thickness of the *stratum corneum* is evaluated.

After 7 days application of the formula containing Stratixyl, a better organized *stratum corneum* is observed on the vertical Vivascope reconstruction (very bright part of the picture), compared to the placebo. After stripping, more irregular structure and gaps are observed for the placebo side, compared to the area where Stratixyl was applied.

These results are confirmed by measurements of the *stratum corneum* thickness. One day after stripping, in the area where the placebo was applied, the *stratum corneum* is thinner by 1.88 µm (-28%) compared to before stripping. Measurements taken 2 days (Day 9) after stripping indicate that the recovery toward baseline thickness has been initiated.

On the other forearm, where the formula containing Stratixyl was applied, the skin shows very little removal of *stratum corneum*, with a complete recovery of the thickness in 48 hours.

**Stratum corneum moisture and repair**

Capacitance values measured after 7 days of application and before tape stripping suggest that Stratixyl can help improve the moisture content of the skin (results not shown).

After *stratum corneum* stripping, skin capacitance is dramatically increased. This response is linked to the establishment of damage to the skin [1].

Following this initial phase, skin repair begins. The results, to the right, show a faster recovery toward the baseline value for the area where Stratixyl was applied, suggesting that Stratixyl may help provide better and faster skin repair following skin stripping.
Specifications

Form: Limpid solution
Color: Yellow
Odor: Characteristic
Solubility: Water soluble
Preservatives: Potassium sorbate, sodium benzoate

INCI Name
AQUA/WATER, GLYCERIN, HYDROLYZED CORN PROTEIN (PROPOSED)

Formulation Guidelines

- Add to water phase below 40°C; in emulsions add on cool-down post emulsion
- Recommended use level: 1% (clinically tested at 1%)

Bibliography


The above formulation information is for guideline purposes only. Some products may be formulated outside of the parameters of these guidelines. Please contact ISP for more specific information.

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