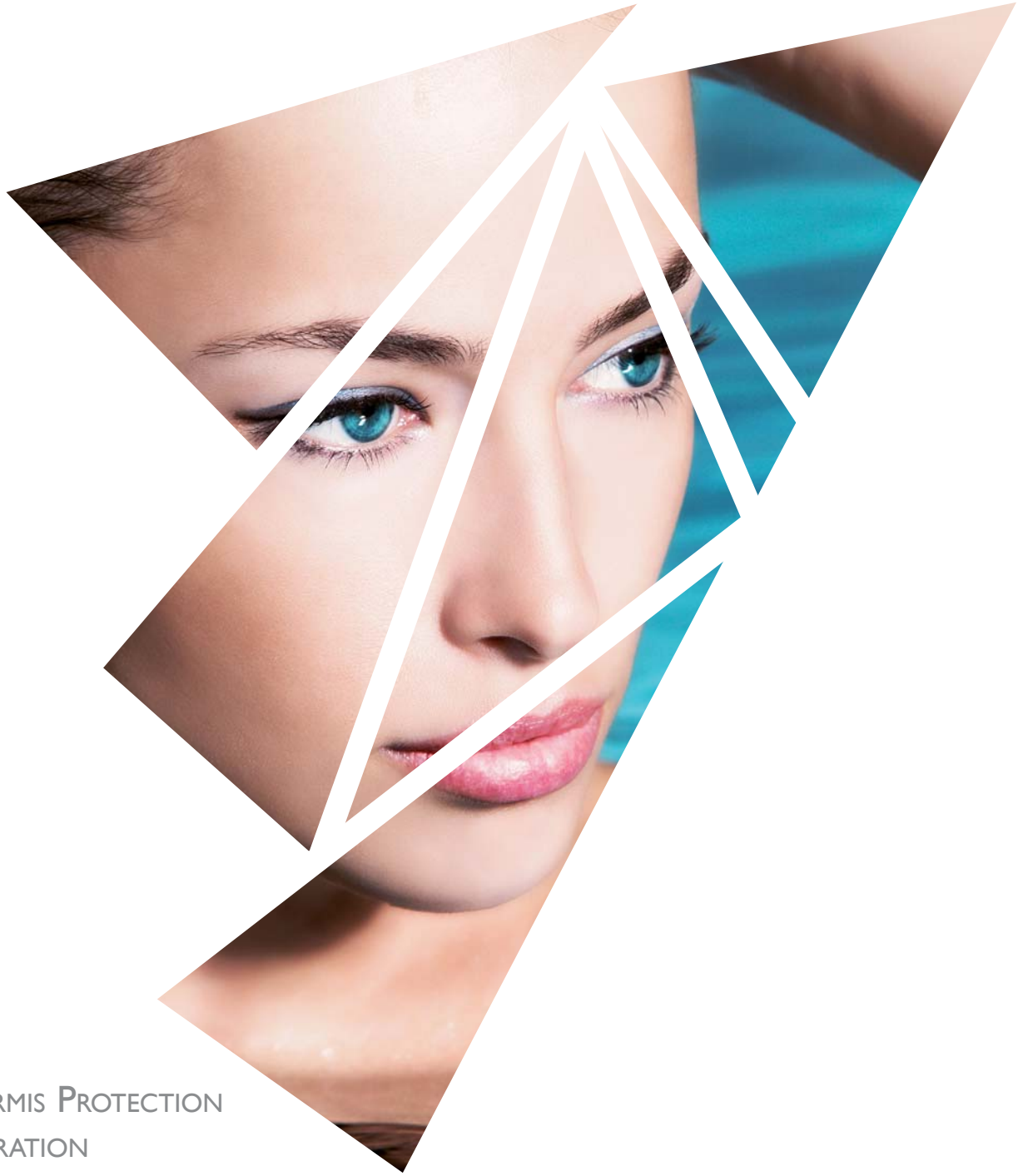
ARCT'ALG®



Epidermis Protection
- Hydration
- Regeneration
- Soothing effect

Dermis Revitalization
- Regeneration
- Firming effect

Anti-aging

Cryoprotection

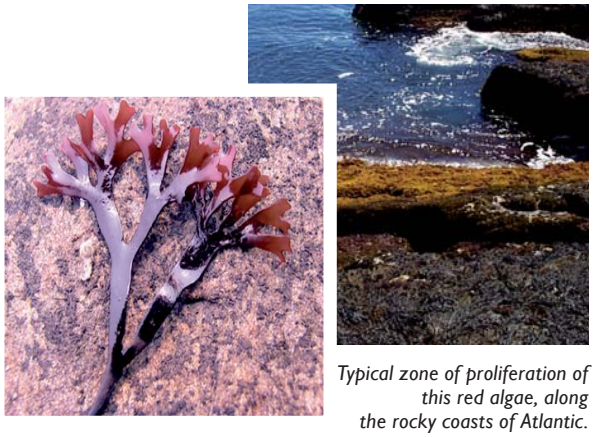
EXSYMOL
MONACO

ARCT'ALG

ARCTIC PEPTIDE: ADAPTIVE STRATEGY FOR SURVIVAL

Chondrus crispus: Red alga

Cold induces a general metabolism slowdown in every living organism. As a result, in arctic regions, various defensive strategies have been developed in order to resist these extreme conditions.
Exsymol has identified Chondrus crispus, a red alga that is capable of surviving under these extreme conditions by accumulating several metabolites.
"Over wintered" Chondrus crispus is therefore characterized by high amounts of polysaccharides (carrageenans), floridosides (combination of glycerol and galactose), taurine and by an especially high concentration of a peptide: L-citrullyl-L-arginine.
All these metabolites are involved in the preservation of the alga's integrity when exposed to extreme conditions. The alga also consumes these metabolites in order to stimulate its regeneration and growth during spring.

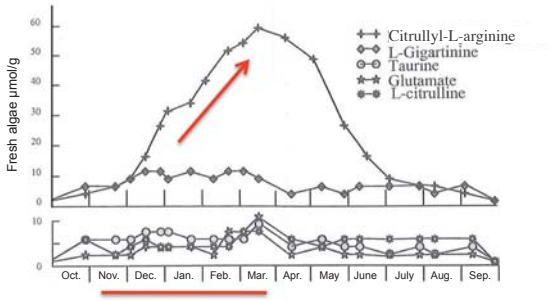


Typical zone of proliferation of this red algae, along the rocky coasts of Atlantic.

Citrullyl-arginine: a natural arctic peptide

This arctic peptide is the only metabolite the alga does accumulate, and its concentration rises as the conditions are becoming more and more extreme (drop in temperature, shorter light exposure and rise of nitrate salts). By March, the arctic peptide concentration can reach up to 10% of the alga's dry weight. It therefore appears as a critical factor for the alga survival since it is used as a stock of energy for its proliferation.

Through this induced natural adaptive process, also known as elicitation, Exsymol has foreseen an innovative way to produce natural peptides.



Anti-dehydration and skin regeneration

Skin has developed different strategies to limit water loss. Among these strategies, some are mechanical such as the lipidic film, the epidermal tight junctions, and some are biological such as keratinocytes proliferation or the natural moisturizing factors (NMF) whose osmotic properties are able to attract and retain water.
Recent studies have shown that the mechanisms responsible for maintaining an optimal skin hydration under stress highly rely on the skin regenerative properties. Skin protection and regeneration are therefore mandatory to maintain an optimal skin hydration.

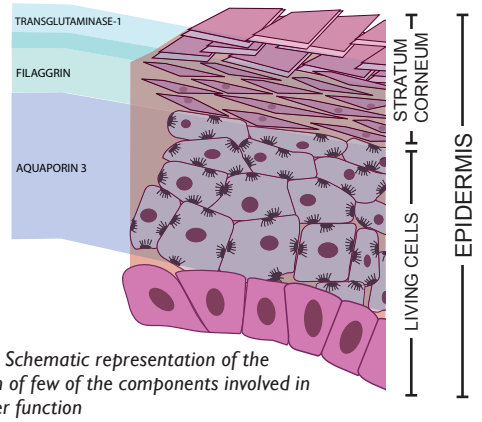
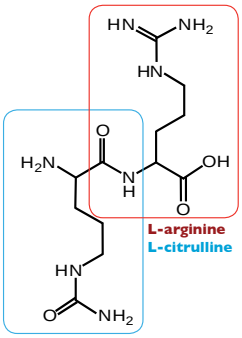


Figure 1 – Schematic representation of the repartition of few of the components involved in skin barrier function

Arctic peptide and cosmetic benefits

The arctic peptide is at the same time a component of the NMF (L-citrulline) and an energy storage compound (L-arginine):



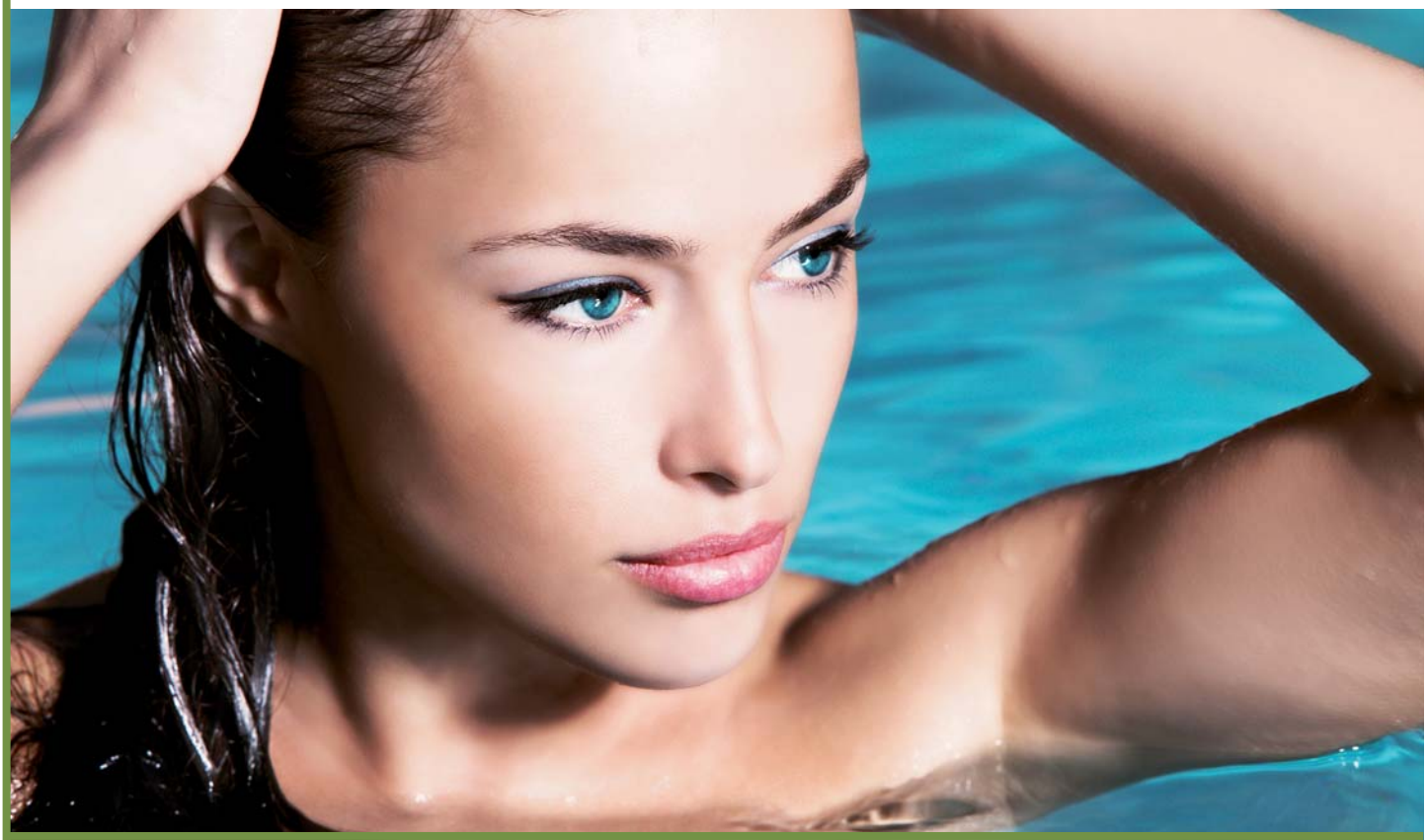
- L-citrulline is a constituent of the NMF and reinforces the skin barrier function

- L-arginine is a source of energy capable of optimizing different metabolic reactions such as regeneration and lipolysis. It also has anti-glycation properties.

ARCT'ALG: Ecoresponsible natural synthesis

The alga is sampled from nature and isolated in order to obtain a unialgal biomass of the highest purity.
The alga is then exposed to very low temperature and luminosity for a long period of time before the harvest. This treatment induces the natural production of citrullyl-arginine and the resulting "over-wintered" *Chondrus crispus* is extremely rich in arctic natural peptide.
The whole process of harvest and biosynthesis of the arctic peptide is conducted in order to maintain a sustainable development.

ARCT'ALG
Applications



INCI name: CHONDRUS CRISPUS EXTRACT

ARCT'ALG is an original and standardized red alga (Chondrus crispus) extract.
Cultivated in an arctic biotope, this alga synthesizes and accumulates a natural arctic peptide that has many cosmetic benefits as it is a constituent of the NMF and a source of arginine.

Skin benefits

- skin protection (hydration, thermo-protection…),
- skin regeneration (energy production, cytostimulation…)

CHINA COMPLIANT

Cosmetic applications

- Body and face care
- Hydration
- Skin protection
- Skin regeneration
- For all types of skins

ARCT'ALG
Natural peptide

ARCT'ALG SUSTAINABLE PROCESS

ECORESPONSIBLE PRODUCTION OF THE ARCTIC PEPTIDE

Unialgal selection

Cultivation in water tanks for controlled conditions

In partnership with experts of algae cultivation, we have transcended *Chondrus crispus* culture.

Exposure to an arctic biotope for peptide elicitation

Our standardized and innovative extraction process has generated a breathtaking revealer of beauty based on *Chondrus crispus* actives.

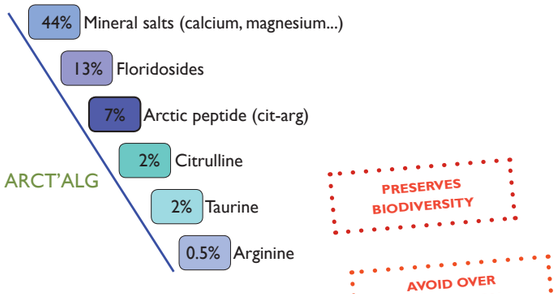
Harvest of the algae at the peak concentration of arctic peptide

Innovative and unique process to produce a natural peptide.

GREEN AND INNOVATIVE EXTRACTION

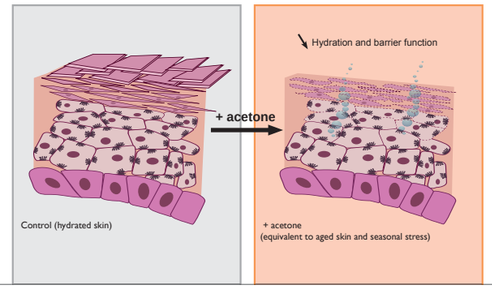
Extraction of all accumulated actives using expert technologies.

Other regular *Chondrus crispus* extracts only contains traces of cit-arg peptide.



SKIN EPIDERMAL PROTECTION AND REPAIR

Testing ARCT'ALG on dry skin models

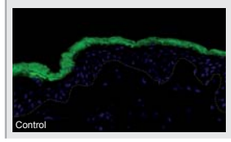


In order to assess ARCT'ALG's protective and regenerative abilities, human skin explants were exposed to acetone which leads to a disruption of the skin barrier function and to a strong dehydration.
This method was reported to induce corneocyte disorganisation and surface lipid removal leading to increased transepidermal water loss (TEWL).
This model system, mimics surface lipids' decrease associated with skin aging and seasonal stress (winter xerosis).
We have determined the benefits from topical application of ARCT'ALG (1%), based on an histological study showing a sequence of early and late events triggered by epidermal disruption with acetone.

ARCT'ALG preserves hydration

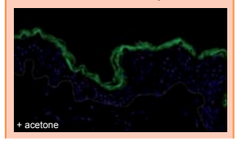
FILAGGRIN

Filaggrin is a multi-functional protein playing a key role in epidermal hydration and barrier function. It is a precursor of free amino-acid which is part of the NMF in the *stratum corneum*.



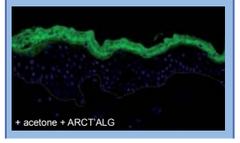
3 hours after exposure to acetone, filaggrin staining (intensity and thickness) is decreased as compared to control.

Barrier function is compromised



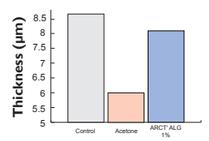
The treatment with ARCT'ALG preserved a similar filaggrin staining to the control.

Normal skin NMF protection



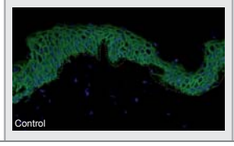
ARCT'ALG improves an adaptive processing of filaggrin precursor in response to barrier disruption.

Complete recovery



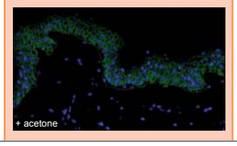
AQUAPORIN-3

Aquaporin-3 protein creates transmembrane pores that enable water transport across cell membranes, thus facilitating hydration of the basal and suprabasal layers of the epidermis.



3 hours after exposure to acetone, aquaporin-3 staining (intensity) is strongly decreased.

Limitation of water fluxes
Prevention of extensive water loss

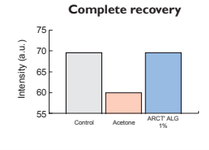


The treatment with ARCT'ALG preserved a similar aquaporin-3 staining to the control.

Normal skin waterflow

ARCT'ALG prevents extensive water evaporation and thus maintains (or rapidly restores) water circulation within the epidermis.

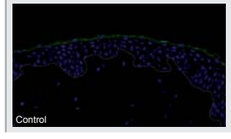
Complete recovery



ARCT'ALG optimizes regeneration

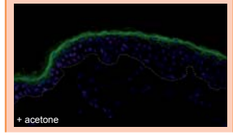
TRANSGLUTAMINASE-1

Transglutaminase-1 is an enzyme able to create crosslinks between proteins of the corneocytes envelope and is also a key marker of the stratum corneum terminal differentiation. Unstressed skin is characterised by a thin staining.



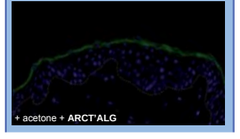
24 hours after exposure to acetone, transglutaminase-1 staining (intensity and thickness) is higher.

Barrier function is still under repair



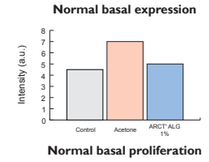
The treatment with ARCT'ALG allowed to recover a similar transglutaminase-1 staining to control.

Repaired and differentiated skin

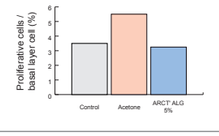


ARCT'ALG improves skin condition (dehydration limitation), which is favorable to accelerated skin barrier recovery.

Normal basal expression



Normal basal proliferation



KI67 (NUCLEARANTIGEN)

Ki67 is a specific marker of keratinocyte proliferation. The epidermis is characterised by a permanent renewal.

24 hours after exposure to acetone, Ki67 staining is higher.

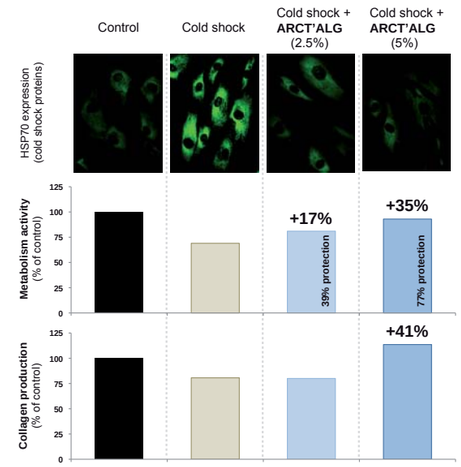
Barrier function is still under repair

The treatment with ARCT'ALG allowed to recover a similar Ki67 staining to control.

Normal epidermis renewal

Skin cryoprotection

Cold induces metabolism slow down and a decrease in activity (collagen production). ARCT'ALG is able to protect skin cells against cold.

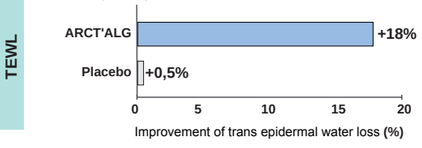


A treatment with ARCT'ALG enables cells to recovery their optimal activity.

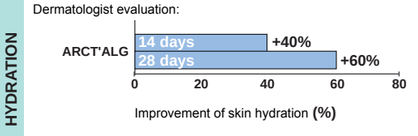
Clinical test

Realized under dermatological control, a clinical trial was performed on 35 women aged 30 to 60. The volunteers received a treatment with ARCT'ALG (1%) applied twice a day on the face for 28 days.

TEWL



HYDRATION



ARCT'ALG achieved 100% volunteers satisfaction.

ARCT'ALG shows unique capacities for protection and repairing of the epidermis, basically due to the presence of the arctic peptide citrullyl-arginine (as a source of energy, and detoxyfier).
This peptide, precursor derivative of arginine, is also a regulating agent in skin re-epithelialization (healing).

ARCT'ALG
Natural peptide

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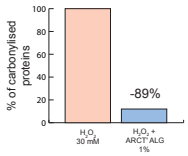
ARCT'ALG
Clinical tests: global benefits

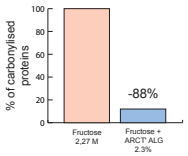
Anti-stress properties

ANTI - OXIDANT



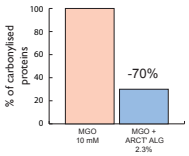
Measure of proteins carbonylation induced by ROS (H_2O_2)

ANTI - GLYCATION



Measure of proteins carbonylation (eGFP) induced by a sugar (fructose) - 7 days of incubation.

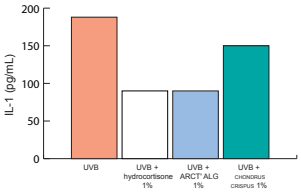
ANTI - AGEs



Measure of proteins carbonylation (eGFP) induced by a glycotoxin (MGO) - 3 days of incubation.

ARCT'ALG has demonstrated its efficacy against the oxidative cascade. It does block the by-products of glycation which are now recognized as a major cause for skin premature aging.

ANTI - INFLAMMATORY



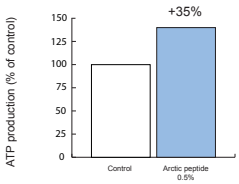
Reconstructed epidermis exposed to U.V.

ARCT'ALG has a soothing effect equivalent to hydrocortisone, limitating the inflamm'aging process. Regular Chondrus crispus extract does not offer this soothing effect.

Dermal revitalization

Mechanism: The arctic peptide is a source of arginine and a precursor for collagen production.

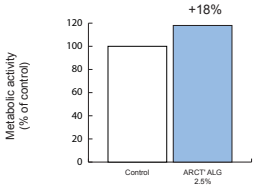
ENERGIZING



ATP production study on a fibloblast culture.

The available energy enables cells to reactivate their metabolisms for a rejuvenative process.

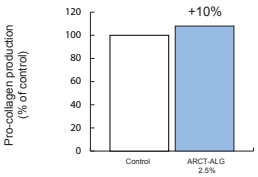
METABOLIC ACTIVITY



Metabolic activity study on cells (MTT test - in a model of aged NHDF) after 14 hours of treatment with ARCT'ALG.

Each cell's metabolism is rised and enables the production of proteins.

COLLAGEN



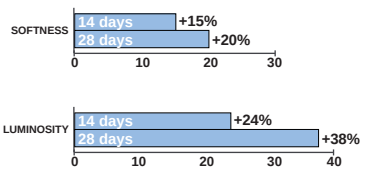
Pro collagen I production study (in a model of aged NHDF) after 14 hours of treatment with ARCT'ALG.

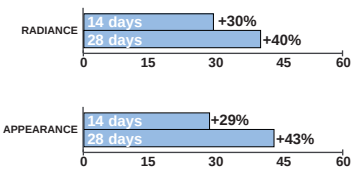
Among the produced proteins, each cell produces more collagen for a plumping effect.

Clinical test

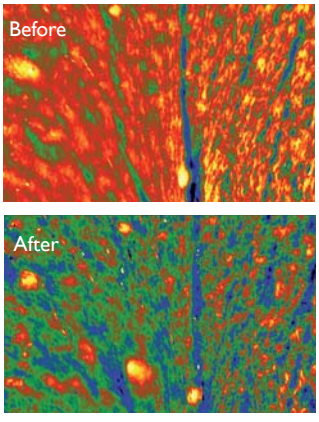
Realized under dermatological control, a clinical trial was performed on 35 women aged 30 to 60.
The volunteers received a treatment with ARCT'ALG (1%) applied twice a day on the face for 28 days.

SKIN APPEARANCE





PRIMOS EVALUATION



Wrinkle reduction: -11.5%
Roughness: -14%

IMAGE VISIA CR

ARCT'ALG
Technical characteristics

ANALYTICAL COMPOSITION

L-citrullyl-L-arginine 0.5%
Floridosides 0.9%
Taurine 0.15%
Water ..... sqf 100%

PHYSICO-CHEMICAL CHARACTERISTICS

Limpid to slightly opalescent, green to yellow liquid.
Slight algal smell.
pH ≈ 5.5
Density at 20°C ≈ 1.0
Miscible with water.
Not miscible with concentrated alcohols.

PRESERVATIVES

Different preservative systems can be studied in order to fit with your requirements. Please contact us for additional details about the available versions.

TOLERANCE AND TOXICITY STUDIES

ARCT'ALG is perfectly tolerated.
Tolerance and toxicity studies were performed using both *in vitro* (cell culture and reconstructed epidermis) and *in vivo* (human volunteers) methods.

FORMULATION

Advised doses 0.5 à 2%.
ARCT'ALG is not temperature sensitive.

AVAILABILITIES

ARCT'ALG is available in 1, 5 and 30 kg drums.

EXSYMOL
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