ARCT'ALG®

Arctic peptide: natural synthesis from an alga

EPIDERMAL PROTECTION
HYDRATION
REGENERATION
SOOTHING EFFECT

DERMIC REVITALIZATION
REGENERATION
FIRMING EFFECT

ANTI-AGING
CRYOPROTECTION
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.

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.

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**

**INCI NAME:** CHONDRUS CRISPUS EXTRACT

**SKIN BENEFITS**

According to our scientific tests, ARCT'ALG brings major benefits, to all types of formulation, for

- **skin protection** (hydration, thermo-protection...).
- and **skin regeneration** (energy production, cytostimulation...)

**COSMETIC APPLICATIONS**

According to the biological properties of the active, evidenced by our scientific validated tests,

- **ARCT'ALG** can be applied for **FACE CARE & BODY CARE**
  - in products for moisturization, skin protection, skin regeneration...
  - and for all types of skins.
ARCT'ALG
BENEFITS OF A NATURALLY-INDUCED PEPTIDE

SKIN EPIDERMAL PROTECTION AND REPAIR

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 rapid dehydration of the stratum corneum.

This method was modeled to induce skin desquamation and surface lipid removal leading to increased transepidermal water loss (TEWL).

The model system, versus surface lipid 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 is a multifunctional protein playing a key role in epidermal regeneration and barrier function. It is a precursor of free amino acids and the NMF in the stratum corneum.

Our standardized and innovative extraction process has generated a non-bleaching reovator of beauty based on Chondrus crispus extracts.

Extraction of all accumulated active using expert knowledge.

In partnership with experts of algae cultivation, we have transduced Chondrus crispus cultures.

Innovative and unique process to produce a natural peptide.

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

ARCT'ALG optimizes regeneration

KRT is a specific marker of keratinocyte proliferation. The epidermis is characterized by a high turnover.

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

Barrier function is still under repair.

The treatment with ARCT'ALG allowed to recover a similar transglutaminase-1 staining (intensity) as compared to control.

ARCT'ALG improves skin condition (healing).

The treatment with ARCT'ALG improves an adaptive process of skin barrier recovery in response to barrier disruption.

ARCT'ALG preserves hydration

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

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

ARCT'ALG preserves hydration

A treatment with ARCT'ALG allows cells to recover their optimal activity.

Clinical test

A clinical trial was performed on 20 women aged 30 to 60. The volunteers received a treatment with ARCT'ALG 1% applied once a day on the face for 28 days.

Skin cryoprotection

Cold induced transepidermal water loss and a decrease in activity (collagen production).

ARCT'ALG is able to protect skin cells against cold.

Improvement of transepidermal water loss (%)

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 detoxifier).

This peptide, precursor derivative of arginine, is also a regulating agent in skin re-epithelialization (healing).
**MECHANISM:** The arctic peptide is a source of arginine and a precursor for collagen production.

**ANTI-STRESS PROPERTIES**

<table>
<thead>
<tr>
<th>ANTI - OXIDANT</th>
<th>ANTI - GLYcation</th>
<th>ANTI AGEs</th>
<th>ANTI - INFLAMMATORY</th>
</tr>
</thead>
</table>

- Measure of protein carbonylation induced by ROS (H_2O_2).
- Measure of protein carbonylation (eGFP) induced by a sugar (fructose) - 7 days of incubation.
- Measure of protein carbonylation (eGFP) induced by a glycotoxin (MGO) - 3 days of incubation.

**DERMAL REVITALIZATION**

- The available energy enables cells to reactivate their metabolism for a rejuvenative process.
- Each cell's metabolism is raised and enables the production of proteins.
- 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**

- Softness: +15% - 20%
- Luminosity: +24% - 38%
- Radiance: +30% - 40%
- General Appearance: +20% - 43%

**Before**

- Wrinkle reduction: -11.5%
- Roughness: -14%

**After**

- Wrinkle reduction: +35%
- Roughness: +10%

**ARCT'ALG has a soothing effect equivalent to hydrocortisone, limiting the inflamm'aging process.**

**Regular Chondrus crispus extract does not offer this soothing effect.**
TECHNICAL CHARACTERISTICS

ANALYTICAL COMPOSITION

<table>
<thead>
<tr>
<th>Component</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>L-citrullyl-L-arginine*</td>
<td>0.5%</td>
</tr>
<tr>
<td>Floridosides</td>
<td>0.9%</td>
</tr>
<tr>
<td>Taurine</td>
<td>0.15%</td>
</tr>
<tr>
<td>Preservatives</td>
<td>sqf 100%</td>
</tr>
</tbody>
</table>

PHYSICO-CHEMICAL CHARACTERISTICS

- Limpid to slightly opalescent, colorless to yellowish liquid
- 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 STUDY

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%

ARCT’ALG is not temperature sensitive.

AVAILABILITY

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