Photoprotection  
Anti-photoaging  
the most natural way to reinforce skin natural defenses against outdoor and indoor radiations  

Anti-oxidation  
Anti-inflammation  
Anti-immunosuppression  
Protection against sun and domestic radiations
Light radiation and skin premature aging
Luminous radiations: environmental and domestic lights, are composed of different wavelengths, from UV to IR through visible lights.
All luminous radiations participate to skin premature aging with more or less skin depth and damages.
UV are the most noxious sunrays that can strongly affect skin and cause major damages and premature aging.
Among UV, UV-B and UV-A have been at the center of attention since science identified their noxious effects.

UV, skin’s archenemies
UV have direct and indirect damaging impacts:

1. UV radiations can directly affect DNA and cause mutations.
   These mutations may lead to three different outcomes:
   • reparition if the damage is low,
   • cell death if the damage is beyond repair,
   • skin cancer if key genes were mutated.
2. UV generate free radicals, especially ROS (reactive oxygen species) that will in turn affect:
   • DNA,
   • skin proteins (enzymes and structural proteins),
   • skin cell metabolisms.

INTENSE AND RECURRENT EXPOSURE TO LUMINOUS RADIATIONS LEADS TO SKIN PREMATURE AGING

SKIN DEFENSES AGAINST UV
SKIN DEVELOPED SEVERAL NATURAL PROTECTIONS AGAINST UV AMONG WHICH UROCANIC ACID AND MELANIN.

Urocanic acid – barrier function defense
Urocanic acid (UCA) is the 2nd most common skin natural defense system: chromophore, and absorbs UVB. It is mainly located in the stratum corneum.

Melanin – keratinocytes defense
Melanin is the most common mechanism of defense against UV and strongly absorbs UV. It is mainly located within living cells of the epidermis.

OVERWHELMED SKIN DEFENSES
SKIN NATURAL PROTECTIONS AGAINST UV ARE NOT FOOLPROOF.
Radiation overexposure degrades the protective potential of these natural defenses.

Urocanic acid
UCA isomerization generates ROS and inflammation.
In addition cis-UCA induces skin immunosuppression as galectin-7 is overexpressed.

Melanin
While absorbing UV, melanin generate ROS.
To reduce sun-induced skin damages by boosting skin natural defenses, and to prevent both sunburn consequences and skin premature aging.

Cosmetic applications
- Sun protection
- Anti-photoaging
- Anti-inflammation
- Hydration and firming
- Photo-induced spots prevention

Beauty promises
- UV noxious effects negation
- Soothing effect
- Skin dryness prevention
- Even complexion
- Anti-wrinkles
- Atopic skin prevention

Cosmetic concepts
- UV protection by absorbance: reinforce skin natural defense
- Anti-photoaging:
  - avoids consequences of immunosuppression
  - avoids toxic forms accumulation
- Anti-photoimmunosuppression:
  - fights sun-induced immunosuppression
  - prevents galectin-7 overexpression
- Prevents atopic skin sensitization
- Long lasting UV absorbance: self recycling active ingredient

Metabolic targets
- Anti-oxidant properties
- Limits the isomerization of trans-UCA into the noxious and immunosuppressive cis form
- Prevents dermic matrix degradation: MMP-1 inactivation
- DNA protection
- Prevents sunburn cells formation
- Limits inflammation, inhibiting of IL-8 and TNF-α expression
- Limits immunosuppression, inhibiting galectin-7 expression
Cell and metabolic degradations induced by sun overexposure lead to visible skin damages such as: edema, dryness, sensitivity and redness, mainly due to UV-B rapid effects.

**Optimized skin cell survival**

Among the most noxious effects of sun radiations over cells are DNA damages (CPD) that may lead to cell apoptosis. These dying cells are characterized by a dense nucleus and described as “sunburn cells”.

**DNA PROTECTION**

2.5% ENTADINE prevents CPD formation by 92%, therefore prevents DNA damages induced by UV-B direct absorbance or ROS.

(Evaluation model: RHE)

**ANTI-CELL’S DEATH (SUNBURN CELLS)**

2.5% ENTADINE prevents sunburn cells formation by 91%, therefore protects your skin under sun irradiation (UV, IR, VIS)

(Evaluation model: skin explant)

**Prevention of sunburn noxious and visible effects**

Immunosuppression and inflammation are generated by mediators following sun overexposure. Both mechanisms induce visible consequences: dryness and redness.

**ANTI-SKIN SENSITIVITY AND REDNESS PREVENTS INFLAMMATION**

2.5% ENTADINE prevents IL-8 synthesis by 81%, as damages are limited.

(Evaluation model: RHE)

**ANTI-SKIN DEHYDRATION PREVENTS BARRIER FUNCTION DEGRADATION**

2.5% ENTADINE prevents galectin-7 expression by 72%, therefore protects barrier function

(Evaluation model: RHE)

**ENTADINE**’s benefits against sun burning:

- Extends skin natural defenses efficacy for delayed erythema
- Limits immunosuppression and skin dryness
- Prevents inflammation, redness and sensitivity
- Limits sunburn visible effects consequences
Over a life time, recurrent exposure to luminous radiations leads to an accumulation of inflammation and immunosuppression. These will induce deep skin disorders and premature aging.

Protection against environmental radiations
Life time sun exposure is known to induce skin premature aging, slowly but globally disorganizing skin metabolisms and structure.

**EPIDERMAL HOMEOSTASIS**
2.5% ENTADINE decreases galectin-7 expression by 98%, therefore ensuring skin homeostasis (Evaluation model: skin explant)

**PROTECTION OF GENETIC CAPITAL**
2.5% ENTADINE prevents DNA damages by 62%, therefore preventing metabolic disorders (Evaluation model: skin explant)

**ANTI-SKIN COLLAPSE**
1.5% ENTADINE prevents TNF-α release by 28%, therefore preventing collagen synthesis inhibition (Evaluation model: HRE)

**ENTADINE** protects skin barrier function, prevents DNA damages, skin collapse, and therefore limits sun-induced photoaging.

Protection against domestic radiations
Artificial lights and multimedia electromagnetic radiations, known as the feared blue light are representative of domestic light pollution. It was reported to cause skin hyperpigmentation, to delay skin barrier recovery and to produce ROS leading to an overexpression of MMP-1.

**COLLAGEN MATRIX PROTECTION**
0.025% ENTADINE prevents MMP-1 activity by -74%, therefore preventing collagen degradation (Evaluation model: fibroblasts)

**ENTADINE**’s benefits against photoaging:
- Protects against environmental (sun) and domestic (artificial) radiations
- Prevents loss of immunity
- Prevents metabolic disorders, source of dull complexion and age spots
- Limits inflammation participating to skin structural collapse
- Prevents premature aging
ENTADINE
Mechanism of action: Global natural luminous radiations protector

ENTADINE is obtained by a patented extraction method from the seeds of *Entada phaseoloides*. This innovative extraction method relies on the self-activation of endogenous enzymes to induce specific hydrolysis.

*Entada phaseoloides* is a large vine climbing into tropical and coastal forests of the intertropical zones. Its seeds have been used as traditional medicine to treat different skin diseases. Anti-inflammatory and anti-oxidant activities are also reported in the literature.

**Identified and quantified active molecules**

- **Entadamide A**
  - Standardized content ≥ 0.25%
  - Limits urocanic acid isomerization
  - Prevents inflammation and immunosuppression
  - Photoprotector

- **Phaseoloidin**
  - Standardized content > 3%
  - Multi-potent anti-oxidant
  - Photoprotector

**Natural skin defense booster**

**COMPLEMENTS UROCANIC ACID ISOMERISATION ACTIVITY**

ENTADINE is rich in Entadamide A that limits UV-induced trans-UCA isomerization into noxious cis-UCA.

**COMPLEMENTS MELANIN ACTIVITY**

ENTADINE is rich in anti-oxidants such as phaseoloidin. As a result, ENTADINE has chromophore properties and can efficiently support melanin scavenging activity.

**Long lasting benefits**

ENTADINE is a natural source of Entadamide A, a completely safe natural UV absorber. By absorbing UV, it has the ability to be recycled into and from SOLEXYL, one of our latest released biomimetic active ingredient for long lasting benefits.

**Anti-oxidant properties**

As expected, ENTADINE is endowed with significant anti-oxidant activities, mainly due to phaseoloidin, a major constituent of the extract. The activity is confirmed thanks to the DPPH and ABTS usual procedures.

<table>
<thead>
<tr>
<th></th>
<th>DPPH</th>
<th>ABTS</th>
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<tbody>
<tr>
<td>ENTADINE</td>
<td>IC₅₀ = 0.84‰</td>
<td>IC₅₀ = 0.074‰</td>
</tr>
<tr>
<td>Vit. C (1%)</td>
<td>IC₅₀ = 0.42‰</td>
<td>IC₅₀ = 0.43‰</td>
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</tbody>
</table>
**INCI NAME**

*ENTADA PHASEOLOIDES BARK/SEED EXTRACT*

**ANALYTICAL COMPOSITION**

- Entada phaseoloides bark/seed extract ........................................ 13%
- Including Entadamide A ....................................................... ≥0.25%
- Phaseoloidin ................................................................. >3%
- Propanediol ................................................................. 50%
- Water (sq) ................................................................. 100%

**PHYSICO-CHEMICAL CHARACTERISTICS**

- Limpid to slightly opalescent liquid, orange to red
- Miscible with water and glycols
- pH ≈ 4.5

**PRESERVATIVES**

- No preservative system

**TOLERANCE AND TOXICITY STUDIES**

- ENTADINE does not show any toxicity, and tolerance studies show that it is perfectly tolerated

**FORMULATION**

- Advised doses: 1.5 to 4%

**AVAILABILITIES**

- ENTADINE is available in 5kg and 30kg drums