OTZ 10 (PRO-TAURINE)®

Skin photoaging prevention
Remarkable scavenging activity
2-in-1 active ingredient

NEW DATA
Human skin is the primary target organ for sunlight. Solar radiations, especially UV and IR, are the major responsible factors for premature skin aging. UV (main focus of research in terms of photo-aging) only account for 7% of the total amount of solar energy reaching the human skin, while IR count for more than 50%. However, it needs to be taken in consideration that UV energy level is much higher than IR's and therefore more noxious.

The ray wavelength, (UV=290-400nm, IR=760-4000nm) determines which skin compartment (epidermis, dermal-epidermic junction or dermis) will be principally targeted by "toxic energies" that might, in turn, generate various free radicals. The accumulation of cellular and/or metabolic alterations can lead to the emergence of skin clinical damage such as dehydration, wrinkles and/or aging spots.

### IR-induced skin damages

<table>
<thead>
<tr>
<th>IR-A</th>
<th>IR-B and -C</th>
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<tbody>
<tr>
<td>Affect dermal collagen balance (by targeting the mitochondria)</td>
<td>Affect the upper skin layers (mainly epidermis)</td>
</tr>
<tr>
<td>Up-regulate MMP-1 expression (responsible for collagen degradation)</td>
<td>Slow down keratinocyte proliferation rate (epidermal renewal)</td>
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<tr>
<td>Induce cell death (apoptosis)</td>
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### UV-induced skin damages

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<td>Affect the dermis and the epidermis</td>
<td>Affect mainly the epidermis</td>
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<tr>
<td>Generate structural proteins cross-linkage and/or degradation</td>
<td>Generate DNA alterations in keratinocytes (Sunburn Cells)</td>
</tr>
<tr>
<td>Alter cell metabolism (DNA mutation)</td>
<td>Slowly participate to structural protein’s alterations of the dermis</td>
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</tbody>
</table>

Active photoprotection against sun radiations-induced alterations requires an active ingredient able to complement sunscreen passive photoprotection. Indeed, as efficient as sunscreens can be, toxic species still can generate damages in any compartment of the skin (location is determined by rays wavelengths).

Generated toxic species can be found in any skin compartment. They can be of the following types:

- **ROS**, Reactive Oxygen Species
- **RNS**, Reactive Nitrogen Species
- **RCS**, Reactive Carbonyl Species (toxic aldehydes)
OTZ 10 (PRO-TAURINE) is a 10% dilution of an optimized (predictive molecular design) photo-protective compound (OTZ). OTZ 10 (PRO-TAURINE) displays antioxidant and electrophilic scavenging properties. It has demonstrated its ability to detoxify any skin layer, hence limiting UV and IR-induced cutaneous damages.

**Skin benefits**
- Protection from IR and UV-induced alterations
- Control of the premature skin aging process
- Preservation of the skin compartments quality
- High bio-availability through the cutaneous tissue
- Control of the inflammatory response

**Cosmetic Applications**
- Anti-photoaging
  1. Prevention of skin structural collapse: anti-wrinkles
  2. Sun care: tissue detoxification, epidermal reinforcement
  3. Compatible with sensitive skin; global control of skin inflammation + intracellular production of taurine for osmotic balance

**Designed for performance:**
- Bio-availability
- Broad spectrum anti-oxidant activity
- Photoconversion into an active compound: taurine
- Safe byproducts release after scavenging

**INCI name:** OXOTHIAZOLIDINE
OTZ 10 (PRO-TAURINE)
Experimental efficacy: in vitro assays

Cutaneous bio-availability
(IFSCC Magazine, Vol. 11, N°2/2008)

Skin penetration (extracellular scavenging)
Primary objective for a global photoprotective compound
=> fast absorption

• OTZ 10 permeability constant:
5 times higher than caffeine.

OTZ $K_p = 6.1 \text{mm/h}$
Caffeine $K_p = 1.2 \text{mm/h}$

Cell penetration (intracellular scavenging)
Mostly important as free radicals are also produced inside the cells
• By monitoring intracellular ROS formation after UV exposure, flow cytometry study showed that OTZ was able to reach the intracellular compartment, hence providing a 4 fold increased UV protection.

Requirements:
Access to epidermis (UV-B, -A and IR)
Access to dermis (UV-A and IR-A)

Multi-level super scavenger
(IFSCC Magazine, Vol. 11, N°2/2008)

OTZ

- Reactive Oxygen Species (ROS)
- Reactive Nitrogen Species (RNS)
- Reactive Carbonyl Species (RCS) Toxic aldehydes

- Rapid biotransformation 90% after 30 min (HPLC)
- Safe and stable product

Cosmetic benefits of taurine
- Safety of a natural skin component
- Osmoregulator
- Anti-oxidant

OTZ displays high anti-oxidative abilities. As a result, it is able to efficiently protect fibroblasts from noxious radicals such as ROS, RNS and RCS.

Requirements:
Broad antioxidant activity spectrum
Safe byproducts after scavenging

Scavenging constant

Otzen displays high anti-oxidative abilities. As a result, it is able to efficiently protect fibroblasts from noxious radicals such as ROS, RNS and RCS.

- Safe and stable product

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**IR (Infra-Red)-induced damages protection**

IR-A (700-1400nm) impact on the dermal compartment (essentially structural protein degradation) leads to premature skin aging. Unlike UV-A, once IR rays reach the dermis, they do not have a direct impact on the extra cellular matrix. IR rays mainly target fibroblast’s mitochondria, inducing the expression of proteins kinase (MAPKs) that can eventually lead to excessive MMP-1 transcription. This mechanism was identified by in vitro studies where a MMP-1 over-expression was observed after exposure to IR stress (P. Schroeder et al., JID, 2008).

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**Blue light and visible ray-induced damages protection**

Visible rays, and their average wavelength (400-760 nm) have mild to high penetration power and mild to low energy levels. Skin overexposure to visible rays may cause erythema, pigmentation problems, thermal damages and free radical production. Using electron paramagnetic resonance (EPR), we followed the apparition of oxidized forms (which have a specific triple spiked form) in response to visible rays exposure. OTZ is able to completely prevent the apparition of oxidized forms in response to visible rays exposure.

Blue light has the shortest wavelength of all visible rays. It is therefore the most energetic and most noxious ray of the visible spectrum. It was reported to cause skin hyperpigmentation, to delay skin barrier recovery and to produce ROS. Similarly to IR, blue light is responsible for the generation of ROS within mitochondria which leads to an overexpression of MMP-1 and therefore to collagen degradation.

OTZ is capable of negating the effect of blue light by scavenging free radicals and thus preventing MMP-1 overexpression and collagen degradation.
OTZ 10 (PRO-TAURINE)
Ultra-Violet evaluation: in vitro and ex vivo assays

Induced damages protection UV-A (Ultra-Violet)
(IFSCC MAGAZINE, VOL. 13 (2010), 105-112)

Cytometry studies demonstrated OTZ abilities to prevent mitochondrial and DNA damages. Used in a preventive mode, OTZ almost counteracts any cell's effects of UV exposure.

Optimized fibroblasts survival
Preventive treatment

OTZ has the ability to cooperate with melanin (a natural solar radiation absorber) in order to protect keratinocytes’ DNA and therefore, to prevent UV-induced apoptosis.

Supporting melanin natural defense activity
(EXSYMOL CO_1280GB)

Model for keratinocytes DNA protection

Requirements:
- Preserving fibroblast metabolism
- Preserving skin architecture

Requirements:
- Preserving epidermal natural defense
- Supporting skin first protective layer

Prevention against apoptotic cells
Protect skin first defense compartment

Treatment with OTZ reduces the UV-induced DNA damages and therefore the resulting apoptotic cells as observed on human reconstructed epidermis and measured using the TUNEL assay (an apoptosis specific assay that dyes in yellow → any apoptotic cell).

Requirements:
- Preserving fibroblast metabolism
- Preserving skin architecture

Skin protection
Irradiated (UV-A 15J/cm²) real human skin treated with OTZ
+ 150% Epidermal cell proliferation
+ 50% DEJ resistance
+ 75% Dermal metabolism
- 80% Tissue inflammation
- 75% MMP-1 expression

Induced damages protection UV-B (Ultra-Violet)
(IFSCC MAGAZINE, VOL. 13 (2010), 105-112)

OTZ 10 (PRO-TAURINE)
Ultra-Violet evaluation: in vitro and ex vivo assays

Induced damages protection UV-B (Ultra-Violet)
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Technical Characteristics

**ANALYTICAL COMPOSITION**

- Oxothiazolidine .............................................................. 10%
- Butylene glycol ............................................................... 20%
- Sodium benzoate ............................................................ 0.5%
- Water qsp ......................................................................... 100%

**TECHNICAL CHARACTERISTICS**

- Limpid to slightly opalescent liquid
- Colorless to slightly yellow
- pH ≈ 5.5
- Density at 20°C ≈ 1.0

**PRESERVATIVES**

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

**TOLERANCE & TOXICITY STUDIES**

OTZ 10 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: min 0.2%.
pH for formulation: between 3 and 9.
Incompatibilities: no particular formulation restriction.

**AVAILABILITIES**

OTZ 10 is available in 1, 5, and 30 kg drums.