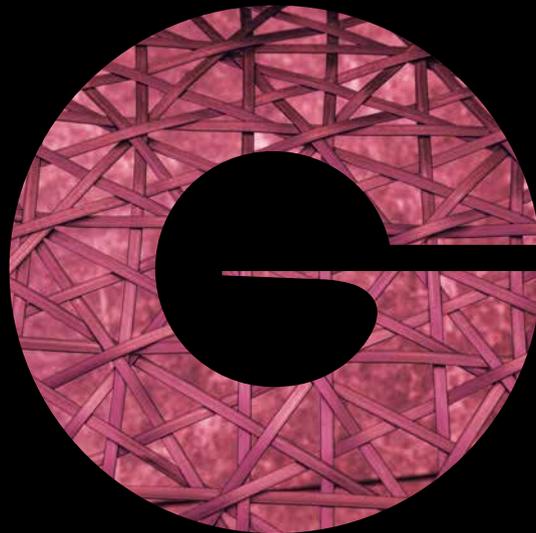


Active Beauty
Uniprotect[®] PT-3
Skin proteome protection against UV

Crafted by synthesis



Focus on the product

Sun light and its consequences on skin

Normal exposure to the sun can result in biological benefits: such as synthesis of Vitamin D, an essential coilecalciferol for skin's health. However, an over-exposure to sun and UV can lead to damages in skin cells, not only at the genetic, but also at the protein level.

These molecular damages, that may include mutations in the genome and degradation of the proteome, have visible consequences such as skin irritation, sun burns and premature ageing. To enhance the performance of the sun products, Induchem offers a specific active to protect skin's proteins.

Sunlight ► ROS ► Proteome alteration ► Ageing

When skin is exposed to UV, it generates Reactive Oxygen Species (ROS), which are free radicals. These molecules, produced as byproducts during the mitochondrial electron transport of aerobic respiration or by oxidoreductase enzymes and metal catalysed oxidation, have the potential to cause a number of detrimental effects. One of these is a direct interaction with skin's proteins by oxidising them, which chemically modifies protein's structures and functions.

At the molecular level, an oxidised protein is a protein in which methionin amino acids are oxidised and di-sulfur bridges are created on oxidised cysteins. The modification of these methionin and cystein amino acids changes the three dimensional configuration of proteins which are no longer active, and start to accumulate in cells.

Skin cells have natural repair mechanisms to protect their proteins. Such mechanisms rely on specific enzymes:

- MSRA/B (Methionin Sulfoxid Reductases A and B) reduce the oxidised methionin.
- TXN (Thioredoxin) and GSR (Glutathion Reductase) reduce the di-sulfur bridges on oxidised cysteins with the help of NADPH.

Along with ageing and UV exposure, these mechanisms become less efficient: genes of these repairing enzymes are less expressed. A major consequence is the increase of skin irritation which directly results in skin erythema, the first visible sign of skin photo-ageing¹.

Uniprotect® PT-3 reactivates the natural proteome protection against oxidative stress...

Uniprotect® PT-3 brings three major components well known for their powerful antioxidant activities: panthenyl triacetate, ethyl linoleate and tocopherol.

- Panthenyl triacetate is a precursor of panthotenic acid. Both of them are well known to play a major role in the stimulation of antioxidant mechanisms and are directly linked with the activity of the glutathione system and energetic pathway (NADPH). Proteins are repaired and protected faster².
- Ethyl linoleate is a precursor of linoleic acid. In addition to having a strong antioxidant activity, it has been proven that it directly intervenes in the synthesis of glutathione, therefore leading to a protective antioxidant activity³⁻⁴.
- Tocopherol (Vitamin E) is a key antioxidant which helps protect proteins from oxidation.

By bringing this combination of two precursors of the proteome repairing pathway and a major antioxidant at the optimal ratio, Uniprotect® PT-3 activates the major natural protection mechanisms which enable anticipation of any protein oxidative damage.

¹ J Eur Acad Dermatol Venereol 17(6):663-9

² FEBS Lett 569(1-3):169-72

³ Br J Nutr 96(5):811-9

⁴ J Lipid Res 47(11):2382-91

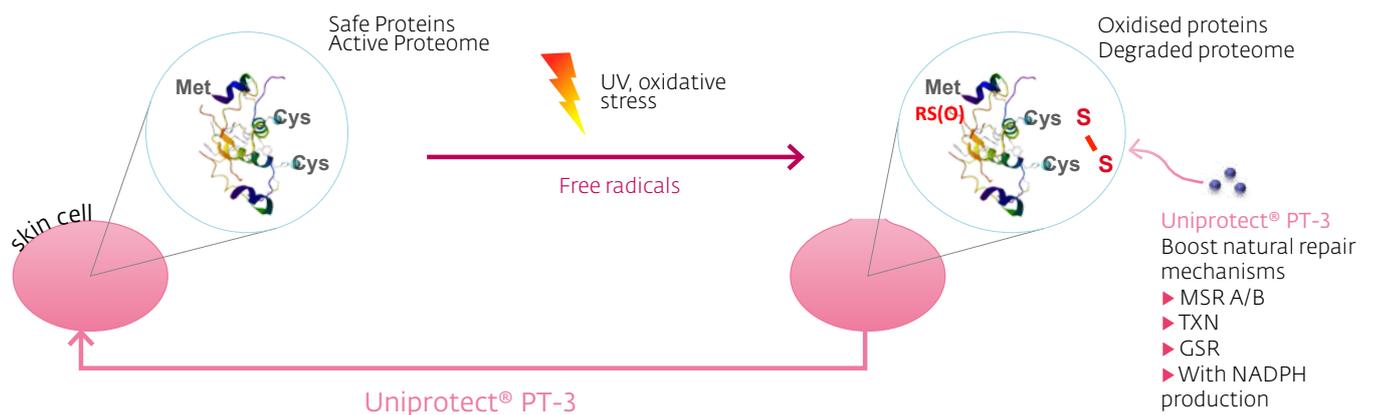
Biological activity

... to reverse proteome-related photo-ageing

Uniprotect® PT-3 acts at all stages of skin's proteome protection against oxidation:

- ▶ The skin's main natural protein protection mechanisms are reactivated: Methionin Sulfoxid Reductases A and B (MSRA/B), Glutathion Reductase (GSR) and Thioredoxin (TXN)
 - ▶ These protection mechanisms work faster thanks to Nicotinamide Adenine Dinucleotide Phosphate (NADPH) production
- All of these actions result in a strong reduction of skin's redness which is noticeable in a clinical study conducted on 25 volunteers.

As a consequence, photo-ageing is reversed.

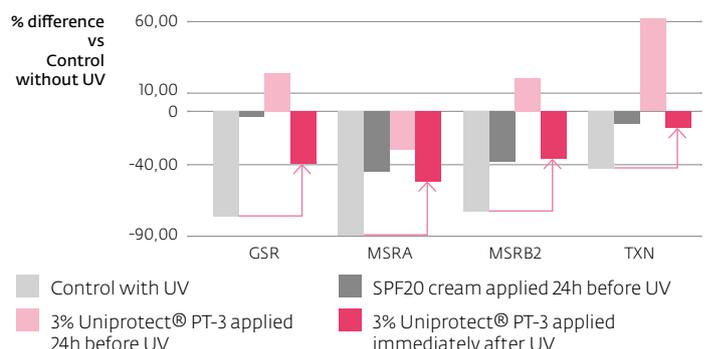


Stimulation of protein repairing enzymes for a rapid protection (*ex vivo* test)

Uniprotect® PT-3 was tested at 3% on human skin biopsies for its ability to stimulate protein repairing enzymes: Glutathione Reductase (GSR), Methionin Sulfoxid Reductases A and B (MSRA/B) and Thioredoxin (TXN). Two protocols were used: a pre-treatment followed by an irradiation (1.55 J/cm² UVB + 20J/cm² UVA) or a post-treatment directly applied on an untreated zone just after irradiation (same level). The post-treatment protocol was used to evaluate an SPF20 cream in the same conditions. Once extracted, mRNA of different protein enzymes were quantified by qRT-PCR.

Results: Pre- and post-treatment with 3% Uniprotect® PT-3 stimulates the gene expression of the major proteins repairing enzymes with better or comparable results than an SPF20 cream.

Increased stimulation of protein repairing enzymes mRNA synthesis



Efficacy

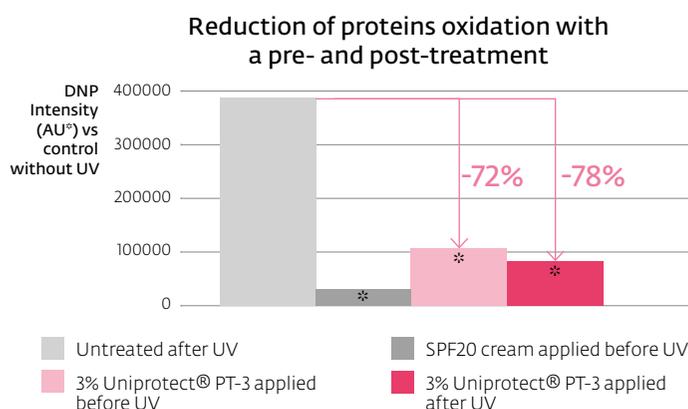
Effective protection of proteins against oxidation (*ex vivo* test)

Uniprotect® PT-3 was tested at 3% on human skin biopsies for its ability to stimulate protein repairing enzymes: Glutathione Reductase (GSR), Methionin Sulfoxid Reductases A and B (MSRA/B) and Thioredoxin (TXN). Two protocols were used: a pre-treatment followed by an irradiation (1.55 J/cm² UVB + 20J/cm² UVA) or a post-treatment directly applied on an untreated zone just after irradiation (same level). The post-treatment protocol was used to evaluate an SPF20 cream in the same conditions. After a 24h incubation, oxidised proteins were quantified with DNP** assay.

**DNP: 2,4-dinitrophenyl hydrazone

Results: Uniprotect® PT-3 at 3% significantly reduces proteins oxidation in skin by -78%, a result equivalent to an SPF20 cream, thereby showing its global proteome protection activity.

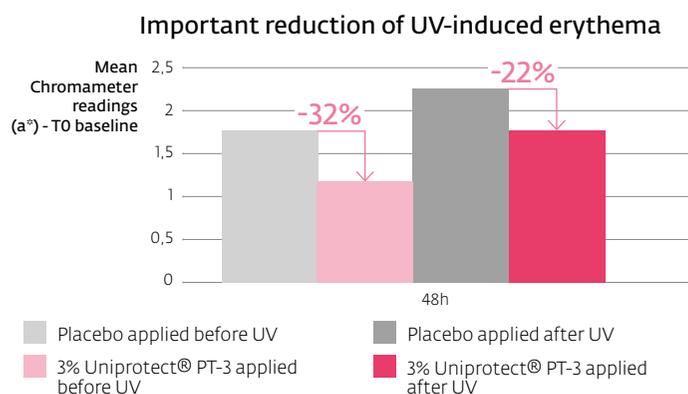
*p<0.05 compared to untreated after UV, ANOVA test



Fast reduction of UV-induced erythema in a pre/post treatment (Clinical efficacy)

The efficiency of a cream with 3% Uniprotect® PT-3 versus a placebo was evaluated in a clinical trial on 25 volunteers (aged between 21-54), and two protocols of cream application on the innersides of the forearms were followed: both placebo and the cream containing 3% Uniprotect® PT-3 were applied 20min before the UV-irradiation on two different zones as a pre-treatment. Skin was then submitted to UV exposure (1.25x Minimal Erythema Dose). Immediately after the UV-irradiation, both creams were applied on previously untreated areas as a post-treatment. Skin redness was evaluated after 48h.

Results: Within 48h, a pre- or a post-treatment with Uniprotect® PT-3 at 3% reduces UV-induced erythema by -32% and -22% respectively.



**DNP: 2,4-dinitrophenyl hydrazone

Summary



Technical information

INCI:	Panthenyl Triacetate (and) Ethyl Linoleate (and) Oleyl Alcohol (and) Tocopherol
Origin:	Organic synthesis
Preservation:	Preservative free
Appearance:	Clear, yellow liquid
Solubility:	Oil-soluble
Dosage:	1-3%
Processing:	Can be added at the end of the formulation process under stirring or homogenising or can be heated for a short time with the oil phase of formulation. Formulate at temperature below 50°C.

Claims

Claims:	Anti photo-ageing, antioxidant, UV protection.
Applications:	Sun care, after-sun, day care, protective treatments, anti-ageing.

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