



# Foreseen Shield Nopal

*Limiting ageing caused by solar rays*

## A STORY

### The Nopal | *Opuntia ficus indica*, Cactaceae A Mexican legendary cactus

Born in the centre of Mexico, that cactus with an original shape characterized by its organization with cladodes (or raquettes) has been introduced in the Old World in the 16th century where it specially grew in the Mediterranean area. Nowadays it is cultivated for its fruits, the Barbarie figs and the young edible cladodes (called nopalitos) and their numerous culinary and medicine uses, discovered by Meso-American people since the 16th century. Indeed, nopal would be healing, anti-oxidating (thanks to the vitamin E it contains), and, according to some studies, it would help to decrease glucose and lipids in blood. It is designed on the Mexican flag since the independance of Mexico.

## Key points

### An active plant cell

Developed to deliver the highest amount of original active molecules.

### A high tech natural ingredient

Created to preserve and improve the identity and the benefits of a natural product.

### A global anti-ageing action

Fights photo ageing at different key levels

Because to be exposed to sun is both essential and dangerous for skin, it is necessary to limit at maximum the damages induced by solar rays. To get a skin better protected and looking younger.



## PRODUCT BENEFITS

### Anti ageing

#### Anti wrinkle

Decreases deep and superficial wrinkles on the face, including mature skins, especially crow's feet.

#### Soothing

Decreases irritations by modulating the skin's immune defense system.

#### Protecting

Preserves DNA and limits DNA damages induced by UVB.

#### Anti-spot

Reduces pigmentation defects induced by UVB.

#### Anti-oxidant

Slows down general cell oxidation, reduces excessive production of free radicals.

To be used in skincare or make-up products like cream, fluid, serum, balm, lotion, milk, foundation, concealer, etc., in any cosmetic or skincare product dedicated to fighting and preventing photo ageing.

**HOW IT WORKS**

# Foreseen Shield Nopal: to counter effects of UV rays on key cell protecting processes

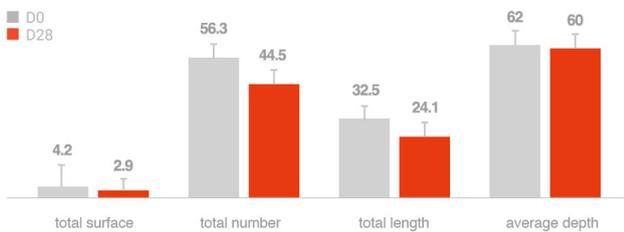
Foreseen Shield Nopal limits the numerous bad effects induced by UV rays, which damage and make skin old quicker, at levels of the dermis (UVA) and the epidermis (UVB). Indeed, it protects skin cells in their environment by limiting the creation of free radicals that desorganize their functions, but also protects them up to their DNA by limiting their destruction. Meanwhile it decreases the anarchical production of melanin caused by UV, and it increases the tolerance of skin, by limiting the production of cytokines produced by aggressed epidermis cells.

Thanks to those actions, epidermis cells keep on regenerating tissues and on protecting skin system longer.

## Clinical testing results

### Anti-wrinkle effect after 28 days

AVERAGE DATA



**Results of the study**

- Decrease of the total surface of wrinkles by 31%
- Decrease of the number of wrinkles by 21%
- Decrease of the length of wrinkles by 26%

**Declaration of the women in the panel**

- 81% declared that their spots seemed reduced
- 85% declared that wrinkles seemed to have decreased

**Conditions of the study**

- Survey made on 20 women, from 47 to 66 years old with crow's feet during 28 days,
- Emulsion with 0.1% of Foreseen Shield Nopal (powder form)
- Assessment made by analysis of cutaneous prints (Quantirides)

### Technical information on the formulation of Foreseen Shield Nopal

**INCI name of cells**

opuntia ficus indica leaf cell extract

**form**

cells (100%) in powder

**aspect**

beige powder

**concentration**

starting at 0.1%

**dispersible**

in any formulation

## In vitro testing results

### The skin, UV and DNA

The exposition of skin to solar rays, UVA and UVB, stimulates skin ageing through the combination of several modifications at the level of epidermis and the dermis. Because UV rays constitute the most active part of the solar radiation that affect living organisms. UVB are absorbed essentially at the level of the epidermis and superficial dermis whereas UVA penetrate more deeply into skin.

Intense UV radiation kills most of skin cells and those that are not killed are severely damaged. When they have become damaged, cells become fragile and don't work properly. UV induce genetical mutations in cell DNA, especially UVB. UVA are very dimly absorbed by DNA bases but they can excite groups of cell or photosensitizing atoms, that will lead to the creation of free radicals that will also induce injuries on DNA. According to new studies (2006), in skin, the global rate of de lesions made in DNA following a UVB irradiation is about 156 lesions/cell/J.m<sup>-2</sup> when it is only about 0,024 lesion/cell/J.m<sup>-2</sup> after a UVA irradiation.

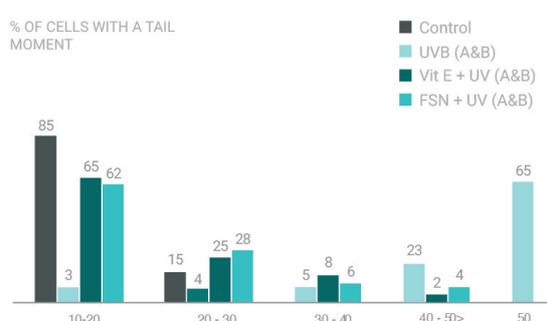
If UVA modify only indirectly cell DNA, they damage extra-cellular matrix and break fibres: skin loses firmness and elasticity. Therefore a high exposition to UVA causes a premature ageing of skin and increases wrinkle formation.

### Study of the cell DNA

To evaluate the effect of Foreseen Shield Nopal on damages made by UV on DNA of epidermis cells, Naolys used the Comets test, also called «Single Cell Gel Electrophoresis» (SCGE). It is an electrophoresis technique on agarose microgel created at the end of seventies. It allows to detect and measure the deterioration of DNA induced by specific agents individualized cells. It is also used to evaluate DNA repairs after a chemical exposition or an irradiation.

Naolys used this test to measure damages caused on DNA of keratinocytes, by estimating the size of DNA in the tail of the comets after an irradiation of UVB and UVA rays. That size of DNA changed according to the irradiation dose.

### Study of DNA fragmentation



#### Decrease of the DNA fragmentation

→ At concentrations of 0.1%, the majority of irradiated cells (93%) have a «tail moment» higher than 30%, and that 65% of cells have a «tail moment» higher than 50. That result means that DNA of cells was very fragmented by UVA and UVB rays. Only 7% of cells present a «tail moment» lower than 30. In conclusion, in the conditions of irradiation, the product Foreseen Shield Nopal (FSN) induces a significant decreasing of the DNA fragmentation due to UVB and UVA rays.

## The skin's immune defense system and UV

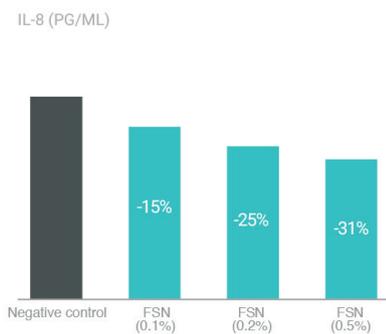
The studies run those last years seem to show that exposition to UV rays can degrade the activity and the distribution of some key actors responsible for the beginning of the immune response. But we know that the skin immune system is made of many immuno-competent cell types: Langerhans cells, keratinocytes, lymphocytes T and melanocytes. And to communicate between themselves, those cells use natural proteins: cytokines. To assess the action of Foreseen Shield Nopal, Naolys decided to study two cytokines, two interleukines, while checking the activity of lymphocytes, which are a variety of white blood cells (or leucocytes) that play a key part in the immune response. Interleukines belong to the cytokines family, that are natural glycoproteins (around hundred), synthesized by many types of cells, that might be located on cell membranes or to be secreted following a stimulation in the dermis or the epidermis. They are mediatory and regulator protein, or messengers between leucocytes (white blood cells) to give an immune response; they work through receptors that are located on cells.

IL-8 is a cytokine synthesized by endothelial cells induced by the presence of some agents potentially pathogens.

IL-10 is a cytokine produced by different blood cells; they play a part in the regulation of the inflammatory reaction by decreasing the innate immune response.

As the irradiation made by UV rays on skin leads to an immunosuppression characterized by an increase of interleukines and a decrease of the proliferation of lymphocytes, and that the action of Foreseen Shield Nopal induces the decrease of those interleukines and a proliferation of lymphocytes, that means that Foreseen Shield Nopal plays a part of immunomodulator by bringing back the balance modified by UV rays.

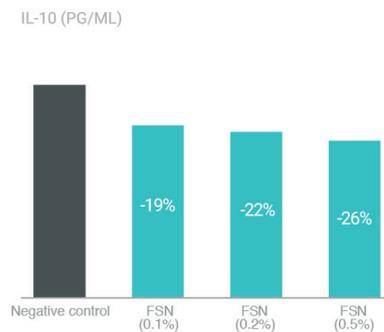
### Study of the IL-8



#### Decrease of the IL-8

→ At concentrations of 0.1%, 0.2% and 0.5%, decrease of IL-8, respectively by 15%, 25% and 31%, after exposure to UVB, after 24 hours in contact

### Study of the IL-10



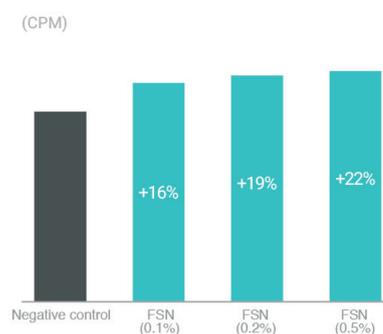
#### Decrease of the IL-10

→ At concentrations of 0.1%, 0.2% and 0.5% decrease of IL-10, respectively by 19%, 22% and 26%, after exposure to UVB, after 24 hours in contact

#### Increase of the proliferation of lymphocytes

→ At concentrations of 0.1%, 0.2% and 0.5% the product restores the proliferation of lymphocytes put in co-culture with irradiated keratinocytes after 24 hours in contact, respectively by 16%, 19% and 22%. That result corresponds perfectly with the decrease of the immunomodulating interleukines (IL-8 and IL-10)

### Study of the lymphocytes



## Study of pigmentation

The skin pigmentation is the result of the production of melanin in the melanosomes, small organelles in melanocytes, and that is transferred to keratinocytes and hair follicles.

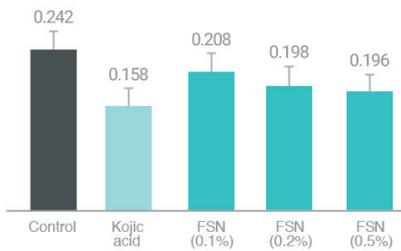
The synthesis of melanin begins with an amino acid, tyrosine, which is catalysed by the enzyme, tyrosinase, itself synthesized in the form of an inactive precursor which is activated when the melanocytes are stimulated by alpha-MSH via cAMP. Tyrosine is transformed into DOPA (3,4-dihydroxyphenylalanine) which is then oxidized into DOPAquinone, which are oxidised into indole compounds. After several other chemical reactions, these indole compounds bond to each other to form eumelanin, a brown-black pigment, and pheomelanin, a yellow-red pigment: the melanins.

And UV rays will also increase the production of melanin.

Naolys chose to study the quantity of global melanin and the activity of tyrosinase in a culture of melanocytes.

### Study of the melanin rate

ABSORBANCE (475NM)

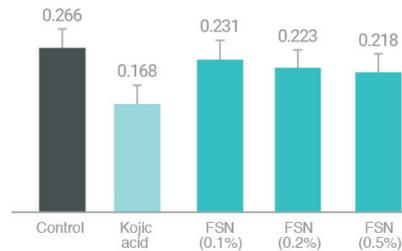


#### Decrease of the melanin rate

→ At concentrations of 0.1%, 0.2% and 0.5%, decrease of the melanin rate respectively by 14%, 18% and 19% in melanocytes in culture

### Study of the tyrosinase

ABSORBANCE (475NM)



#### Decrease of the activity of the tyrosinase

→ At concentrations of 0.1%, 0.2% and 0.5% decrease of the activity of the enzyme tyrosinase respectively by 13%, 16% and 18%, in melanocytes in culture

## Study of the lipid peroxidation

Because it is a reaction indicating oxidative stress, Naolys chose to study the release of MDA during physiological lipid peroxidation and lipid peroxidation induced by UVB.

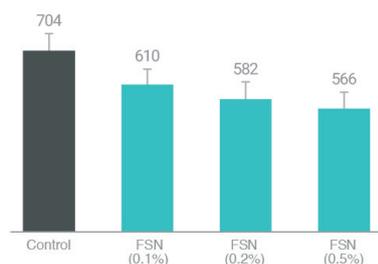
When we measure the MDA (malondialdehyde), one of the chemical products created by the chemical chain reaction induced by the free radicals, indicating of cytotoxicity by oxidative processes, then we have a good information about the anti-oxidant activity of a substance.

Normally, the endogenous production of free radicals (physiological lipid peroxydation) is counterbalanced by various defense mechanisms. However, many situations can induce the appearance of an excess of free radicals (induced lipid peroxidation) such as intense exposition to sun (UV rays), intoxication by certain chemical products, contamination by toxins, intense inflammatory reactions, etc.

These oxygenated free radicals attack phospholipid membranes, thereby altering the properties of the cell membrane. They also induce the formation of lipid derived cytotoxic mediators which react with proteins. The consequences are numerous and can lead to several pathologies (inflammation, arteriosclerosis, etc.)

### Lipid peroxidation in the physiological conditions

MDA (MM/MG OF PROTEINS)

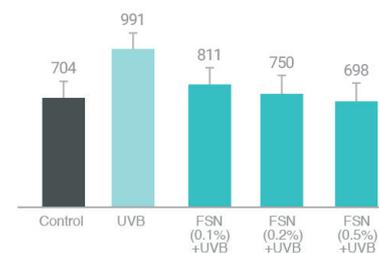


#### Decrease of MDA (Malondialdehyde) rate

→ At concentrations of 0.1%, 0.2% and 0.5%, decrease of the physiological lipid peroxidation, which was translated by a decrease of the MDA rate by 13%, 17% and 20% respectively

### Lipid peroxidation induced by UVB

MDA (MM/MG OF PROTEINS)



#### Decrease of MDA (Malondialdehyde) rate

→ At concentrations of 0.1%, 0.2% and 0.5% , decrease of the lipid peroxidation induced by UVB (150mJ/cm<sup>2</sup>) which was translated by a decrease of the MDA rate by 18%, 24% and 30% respectively