NEUROLIGHT.61 G
Anti-Dark Spots Neuroactive Ingredient

Pigment spots are characteristic of aged skin and of photo-exposed skin, both of which have cumulated a high cellular stress level.
Recent studies demonstrate the role of two types of intrinsic factor in the formation of dark spots: cellular stress molecules and epidermic neuropeptides.
Codif International laboratories have put in evidence the role of the neuropeptide Substance P in the export of melanin.

By inhibiting cellular stress molecules and the action of Substance P, Neurolight.61G explores an original and innovative action mechanism to significantly reduce the size and the pigmentation of dark spots.

BE INSPIRED

Neurolight.61 G is an aqueous extract of *Pancratium maritimum*, also known as Sea Daffodil or Sand Lily.

Native to Crete and more specifically to Chania, it is also found on the Breton islands of Hoedic and Houat. The Sea Daffodil takes root in sandy soil, it has the unusual feature of being able to bury itself more deeply in order to prevent it from being worked loose, and to easily lengthen its stem if there should be too significant an overlay of sand. It flowers during the hottest summer months. Its delicate, ephemeral flowers open at dusk and give off an exotic, fruity aroma.

*Pancratium maritimum* has been cultivated since ancient times around the Mediterranean area and can be found on Preclassic Cretan frescoes including those of the Minoan artist in the Palace of Knossos.

Today the Sea Daffodil is a protected plant, therefore the plants used in the production of Neurolight.61 G come exclusively from greenhouse cultivation.
Role of cellular stress in the formation of pigment spots:

1. Pigment spots are the result of a group of pigment-producing cells in response to repeated skin stress.

2. In cells, p53 protein is traditionally defined as THE stress protein. Its expression is multiplied in case of intense cellular stress.

3. Recently, it has been proven that p53 directly regulates the expression of a protein called POMC (pro-opio-melano-cortin complex).

4. POMC encodes alpha-MSH which is involved in the activation of melanogenesis.

The role of p53 protein is critical for cell survival, therefore it is not conceivable to alter its expression.

Inhibition of POMC expression, would make it possible to inhibit the activation and thus the overproduction of melanin which results in pigment spots.

Role of epidermic neuropeptides in the formation of pigment spots:

Thanks to their dendrites, melanocytes communicate with keratinocytes and nervous fibres.

1. Melanocytes communicate with keratinocytes for the export of synthesised melanin.

2. Nervous fibres communicate with melanocytes by releasing messengers called neuropeptides. When they bind their receptors at the surface of dendrites, neuropeptides trigger the synthesis and/or the export of melanin to the keratinocytes.

3. There is a correlation between the degree of skin innervation and photo-induced skin damage including pigment spots. The formation of dark spots, characteristic of photodamaged skins, is therefore linked to a high innervation degree of the epidermis and an important release of neuropeptides.

4. One of the known epidermic neuropeptides, Substance P has its TacR1 receptor on the surface of the melanocyte dendrites. Its binding action activates the export of melanin to the upper layers of the skin.

Limiting the length of dendrites as well as the synthesis of Substance P receptors enables reduction of the quantity of melanin exported to the surface of the pigment spots.

Sources:
Neurolight.61 G inhibits POMC expression and intracellular melanin synthesis.

Used at 0.33%, Neurolight.61 G inhibits POMC expression by 65%. This inhibition directly results in a 73% reduction in melanin synthesis.

*p<0.05 Student's t-test
Cultures of B16 melanocytes. Analysis of POMC expression by RT-qPCR. Analysis of the intracellular melanin synthesis produced by measuring optical density.

Neurolight.61 G reduces the melanocyte dendricity and the synthesis of receptors for Substance P.

Used at 0.033%, Neurolight.61 G reduces the length of dendrites by 10%.
At 0.33%, Neurolight.61 G reduces the synthesis of the receptor TacR1 for Substance P by 50%.
These 2 simultaneous inhibitions reduce the interactive capabilities of Substance P with the melanocytes.

Cultures of B16 melanocytes. Analysis of the TacR1 expression by RT-qPCR. Analysis of the dendricity by fluorescent marking on human melanocytes cultures.

Neurolight.61 G inhibits the effects of Substance P on the export of melanin.

Used at 0.16%, Neurolight.61 G inhibits the export of melanin initiated by Substance P by 38%.
This observation results from the preliminary reduction in dendricity and the quantity of receptor TacR1 on the surface of the melanocytes.

*p<0.05 ; **p<0.01 Student’s t-test
Cultures of B16 melanocytes in the absence or presence of 1nM of Substance P. Analysis of the melanin synthesis produced by measuring optical density.

Neurolight.61 G significantly inhibits the synthesis and export of the melanin.

Acting jointly on the cellular stress factors and the neuropeptide Substance P, Neurolight.61G (0.33%) inhibits:
- intracellular melanin synthesis by -73%*
- the export of melanin by -62%* (quantification of extracellular melanin)

Comparison with the reference molecules
- 0.33% Neurolight.61 G : 0.001% dry extract
- kojic acid : 0.005% dry extract
- arbutin : 0.003% dry extract

*p<0.05 Student’s t-test
Cultures of B16 melanocytes. Analysis of the melanin synthesis produced by measuring optical density.
The elucidation of the role of Substance P in the export of melanin is revolutionising the treatment of pigment spots. This finding highlights a major metabolic pathway, the role of which in skin pigmentation has hitherto been little researched; the neural pathway.

Neurolight.61 G, acting simultaneously on the neural pathway and the cellular stress pathway, provides an effective and original solution for the treatment of pigment spots.

**Protocol:**
- 15 volunteers with pigment spots on the hands
- 2 applications per day for a duration of 84 days
- Neurolight.61 G applied at 1.5%
- Assessment of the surface of the pigment spots
- Assessment of the coloration of the pigment spots (chromametric analysis)

Chromametric analysis enables the definition of a luminance parameter $L^*$ (measures skin clarity) and a chrominance factor $b^*$ (defines the range from blues to yellows). These parameters have been studied in order to measure the Individual Typological Angle (ITA), which defines the degree of a person’s skin pigmentation.

**RESULTS:**

**Neurolight.61 G significantly reduces the surface of the pigment spots**

After 42 days: decrease of the surface of dark spots by -18.9% on average and up to -63.4%
After 84 days: decrease of the surface of dark spots by -24.8%* on average and up to -61.1%

*p<0.05 Student’s t-test

**Neurolight.61 G significantly clarifies the pigmentation of dark spots without lightening the pigmentation of the skin.**

After 84 days: clarification of dark spots by 12.1%* on average and up to 61.5%
After 84 days, decrease in the difference of pigmentation spot/skin by 11.6% on average and up to 53%

The elucidation of the role of Substance P in the export of melanin is revolutionising the treatment of pigment spots. This finding highlights a major metabolic pathway, the role of which in skin pigmentation has hitherto been little researched; the neural pathway.
NEUROLIGHT.61 G: Anti-Dark Spot Neuroactive Ingredient

Cosmetic activities

- Inhibition of the pro-melanogenic effects of the neuropeptide Substance P
- Inhibition of the POMC messenger
- Inhibition of melanin synthesis
- Inhibition of melanin export
- Surface reduction of the pigment spots
- Coloration reduction of the pigment spots

INCI name

Glycerin (and) Water (and) Pancratium maritimum extract

Recommended usage %

NEUROLIGHT.61 G: 1.5%

CODIF Recherche & Nature is committed to sustainable development.

All our wastewater is processed and purified using filtrating gardens. A succession of airtight horizontal and vertical filters is used to depollute wastewater by the roots of plant species chosen for their draining properties.

Iris, water mint, flowering rush, willows etc… now form part of the image of the brand which is recognized for its commitment to the preservation of natural resources.