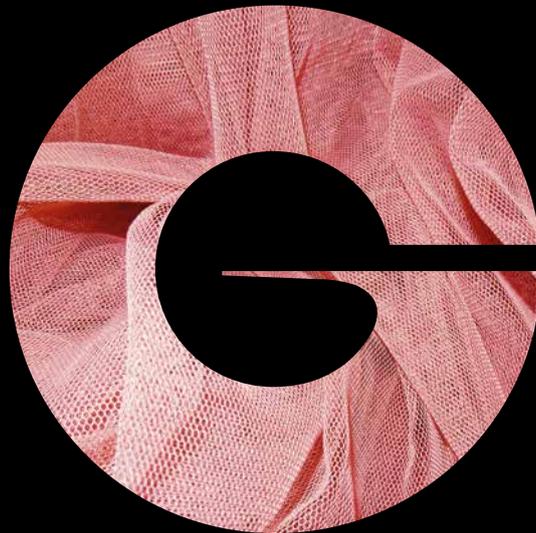


Active Beauty  
Inoveol<sup>®</sup> OLEU  
The skin bodyguard

Crafted by white and green technologies



## Focus on the product

### Olive oil: taking care of our skin for centuries

Used for centuries by the Mediterranean population for its healthcare beneficial properties, the olive oil is a mythic source of youth and beauty. Arising from the olive tree, oleuropein is traditionally recognised to reinforce the natural shield of the skin through its antioxidant, antimicrobial and anti-inflammatory properties. Inoveol® OLEU is an hydro-boosted version of oleuropein.

Oleuropein is extracted from Olive Leaf and enriched with oleuropein, which is then modified by means of an enzymatic reaction to create a unique sugar derivative of this exceptional polyphenol. It is highly stable, purified and shows excellent water solubility which enables its successful incorporation in innovative cosmetic products.



Inoveol® OLEU is a natural and high-tech active with yet unequalled skin protection potentialities.

### Focus on skin pollution

The environmental pollution strongly influences the human health through the development of respiratory and cardiovascular injuries but also disruption of skin barrier function. The skin is a common pathway for pollutant aggressions through the important surface of contact with the external environment. At the skin level, the pollution induces inflammation, allergic reaction, oxidative stress, delay of wound healing mediated essentially by pollutant-induced barrier default and consequently promotes the premature ageing<sup>1</sup>.

#### NF-κB inhibition

The nuclear factor kappa-light-chain-enhancer of activated B cells (NF-κB) are proteins which comprise a family of structurally-related eukaryotic transcription factors that are involved in the control of a large number of normal cellular and organismal processes, such as immune and inflammatory responses, developmental processes, cellular growth, and apoptosis (for instance: interleukine 8: IL-8, and Matrix metalloproteinase 9: MMP-9). This will foster an inflammatory response, contributing to premature ageing.

#### Nrf2 activation

The nuclear factor erythroid-derived 2-like 2 (Nfe2l2) (also called NF-E2-related factor 2 (Nrf2)) is a transcription factor involved in oxidative stress defenses which triggers the transcription of many antioxidant genes. The activation of Nrf2 modulates the detoxifying and antioxidant pathways permitting to control the pollution stress and leading to a homeostasis return. As a consequence, a strong activation of Nrf2 pathway plays a key role in antipollution defense.

<sup>1</sup> (Pan et al. 2015)

# Biological activity

## Synergistic actions against daily pollution and inflamm'ageing

The advanced research in phyto-actives has revealed the most innovative active to fight against skin ageing mechanisms.

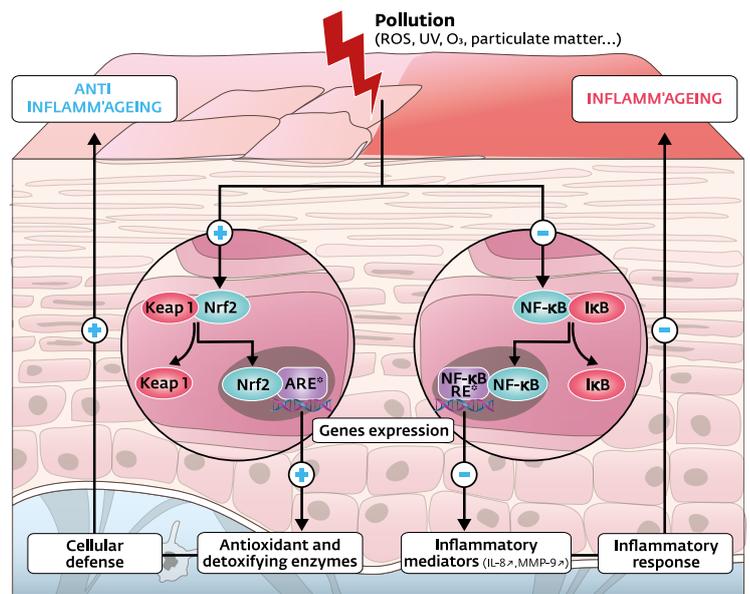
Purified and stabilised version of the most pure active of olive tree, Inoveol® OLEU has the great potential of simultaneously hindering multiple cellular ageing processes : inhibition of MMP-9 (collagenase) and IL-8 (cytokine) release, through a control of the NF-κB pathway with an additional soothing effect.

Additionally, to bring further protection, Inoveol® OLEU plays a positive role on the activation of Nrf2.

**When nature meets technology, the skin gets protected and embellished.**

**Inoveol® OLEU actions**

\* ARE : Antioxidant Response Element - RE : Response Element



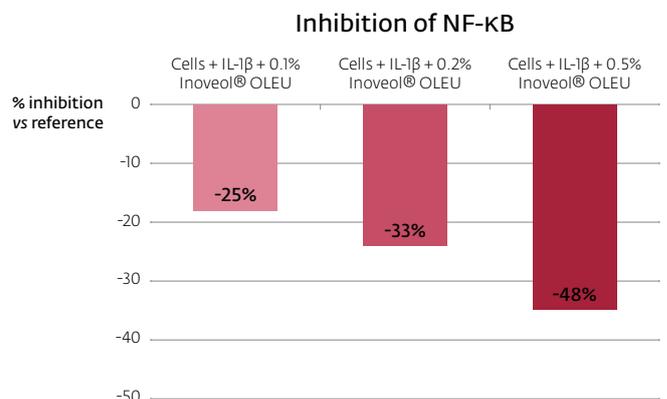
## Anti-ageing and soothing effect (*in vitro*)

### 1. Inhibition of NF-κB response

Human cells (Caco-2/cl7) were co-incubated with or without 0.1%, 0.2% and 0.5% of the active during 24 hours with 10 ng/ml cytokines IL-1β to trigger inflammation process. Approximately 50,000 cells were seeded in each plate well, in a volume of 90 μl, and the study was run in triplicate for each concentration.

**Results:** Inoveol® OLEU inhibits the NF-κB pathway in a dose-dependent manner. **0.1% of the active allows a decrease down to -25% of the NF-κB pathway, while 0.5% of the active enables to reach down to -48% inhibition.**

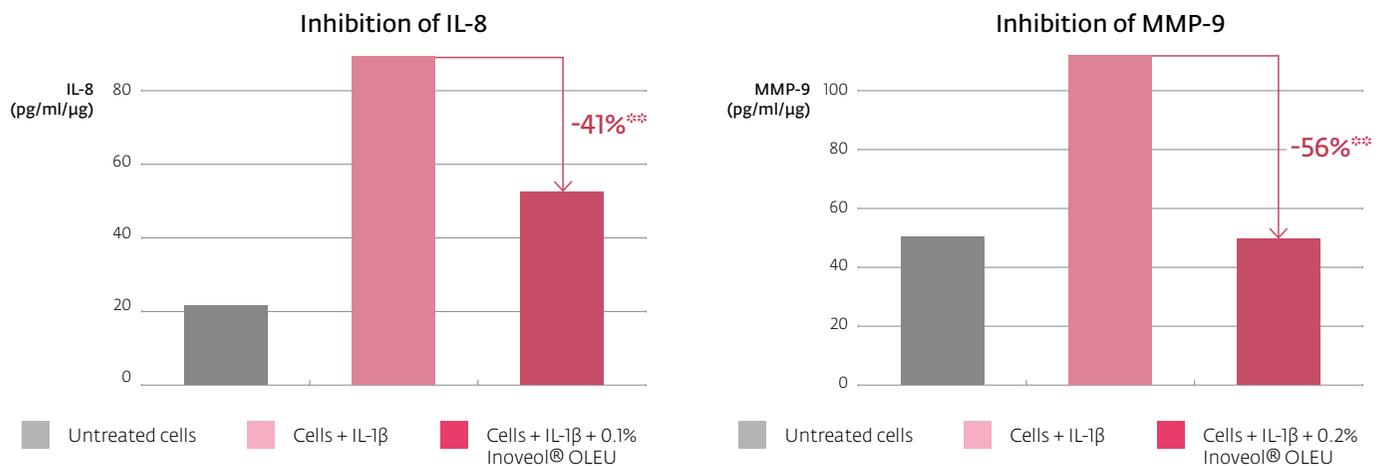
By decreasing NF-κB response, it is possible to decrease IL-8 and MMP-9 production (see below), together with a soothing effect.



# Biological activity

## 2. Prevention of IL-8 and MMP-9 production

Normal Human Epidermal Keratinocytes (NHEK) were incubated with 0.1% or 0.2% of the active for 24 hours, then were treated for 24 hours with 1 ng/ml cytokines IL-1 $\beta$  to trigger inflammation process. Tests were also run without the active, with or without the addition of IL-1 $\beta$ . Approximately 20,000 NHEK were seeded in each plate well, and the study was run in duplicate or triplicate for each concentration. IL-8 and MMP-9 were then dosed using ELISA-based assays.



\*\* p<0.01 Student's t-test

**Results:** Inoveol® OLEU inhibits both the productions of IL-8 and MMP-9, resulting in a decrease of ageing phenomenon, and in a better control of irritation and skin disorders: **0.1% of the active allows a significant decrease down to -41% of IL-8 release, 0.2% of the active enables to reach a significant decrease down to -56% of MMP-9 production.**

## Antipollution activity (*in vitro*)

### Activation of Nrf2 pathway

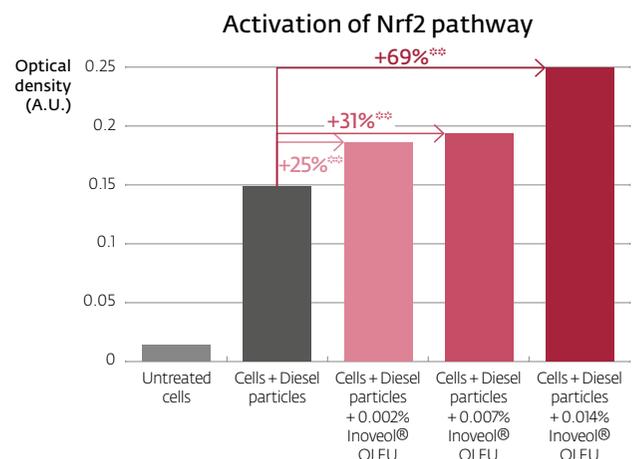
Normal human epidermal keratinocytes (NHEK) were seeded in 96-well plates and at D0, culture media were changed to fresh medium supplemented with the active at 0.002%, 0.007% or 0.014%. Cells were cultivated for 24h and NHEK were then exposed to Diesel particles extract (DEP, from the NIST, referenced SRM-1975) for 6h. Nrf2 activation was measured using assay kits.

**Results:** The pollutant stress mediated by Diesel particles promotes a significant induction of Nrf2 activation by a factor 11 in comparison with basal conditions.

In presence of the pollutant, we observed a **significant dose-dependent increase of Nrf2 activation with Inoveol® OLEU:**

- ▶ **+25%** at 0.002%
- ▶ **+31%** at 0.007%
- ▶ **+69%** at 0.014%.

\*\* p<0.01 Student's t-test



# Summary



## Technical information

|               |   |
|---------------|---|
| INCI:         | Water (and) Oleuropeinyl Glucoside  |
| Origin:       | Biosynthetic  |
| Preservation: | Preservative free   |
| Appearance:   | Beige to brown liquid   |
| Solubility:   | Soluble in water  |
| Dosage:       | 0.1-0.5%  |
| Processing:   | Can be incorporated in any formula in liquid form at pH below 6.0 and temperature below 45°C. |

## Claims

Claims: Anti-inflamm'ageing, antioxidant, soothing, antipollution.

Applications: Soothing cream, anti-irritant serum, antipollution formulation, regenerating cream, anti-age mask, day and night body cream.

# Givaudan Active Beauty Sales Offices

## Europe

Givaudan France SAS  
17-23 rue de la Voie des Bans  
FR-95100 Argenteuil (France)

Givaudan UK Ltd  
Magna House, 76-80 Church Street  
Staines, TW18 4XR (United Kingdom)

## North America

Givaudan Fragrances Corp.  
40 W - 57<sup>th</sup> Street - Floor 17  
NY 10019 - New York (United States)

## Asia Pacific

Givaudan Singapore Pte Ltd  
1 Pioneer Turn  
627576 Singapore (Singapore)

Givaudan Shanghai Ltd  
298 Li Shi Zhen Road  
Pudong Zhang Jiang High Tech Park  
201203 Shanghai (China)

## Latin America

Givaudan do Brasil Ltda  
Av. Eng<sup>a</sup> Billings  
2185, Edifício 31, 1<sup>o</sup> Andar - Jaguaré  
05321-010 São Paulo - SP (Brazil)

[global.cosmetic@givaudan.com](mailto:global.cosmetic@givaudan.com)

The data in this document ("Data"): (i) has been prepared by Givaudan in accordance with Givaudan's internal protocols and procedures; (ii) is provided to Customer for its information and internal use only; (iii) is provided without warranty of any kind, including, without limitation, any implied warranty of accuracy, merchantability, fitness for particular purpose or non-infringement of third party intellectual property rights. In no event shall Givaudan be liable to Customer or any third party for any losses, indemnities or damages of any kind (including, without limitation, any and all direct, special, indirect, incidental, or consequential damages or lost profits or revenues) that may arise out of, or in connection with, the use of the Data by Customer. Customer is solely responsible for assessing the accuracy and reliability of the Data for its own purposes (including, without limitation, Customer's end-use applications), and assumes all risks and liabilities arising out of or in connection with the use of the Data.  
LEAFLET-INOVEOL-OLEU-04.17

[www.givaudan.com](http://www.givaudan.com)