

Next level pollution protection

Greentech has developed a powerful anti-pollution skin protector, **Urbalys**, using an extract from berries. The active ingredient stimulates pivotal barrier functions to fight the negative effects of pollution. **By Edwige Ranouille, E Bony, Carine Boutot, Jean-Yves Berthon and E Filaire**

Air pollution is considered a main characteristic of areas where human population density is at a high level¹. It contains a quantity of microscopic suspended particulate matter carrying toxic chemical molecules, including polycyclic aromatic hydrocarbons (PAHs). Air pollution has been recognised as the most significant environmental health issue in the world.

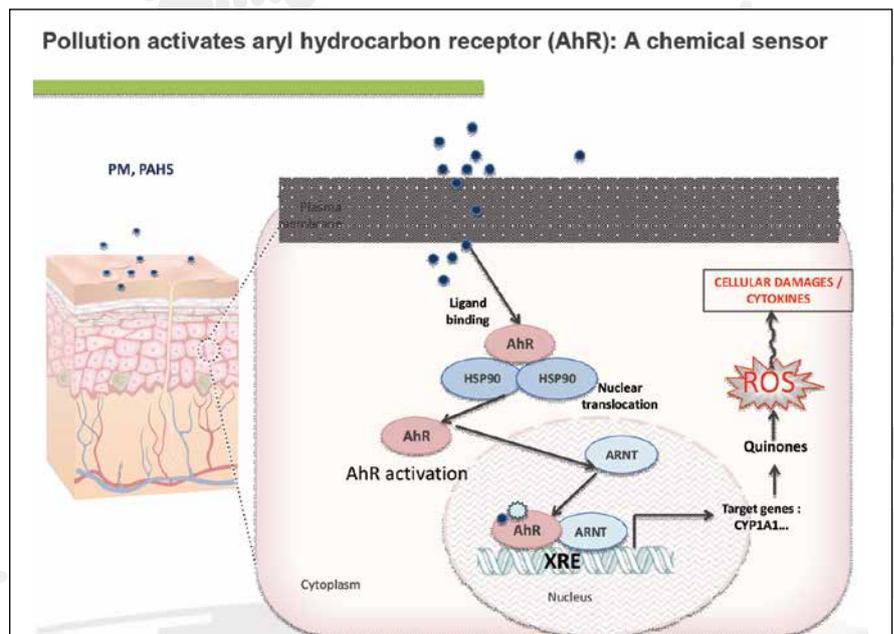
Particulate matter penetrates the skin, either through hair follicles or transdermally, and exerts its detrimental effects through the generation of reactive oxygen species (ROS), which contribute to skin ageing. This is characterised by pigmentation on the face and wrinkles. ROS activate the mitogen-activated protein kinase (MAPK) signaling pathway, including ERK1/2, JNK and p38 MAPK. The activated MAPK then induces various transcription factors, such as Nuclear Factor Kappa B (NF-κB) and activator Protein-1. As a result of translocation of the activated transcription factors, inflammatory cytokines are generated. These are closely related to inflammatory

skin diseases and skin ageing². PAHs and PM are also well-established to activate the aryl hydrocarbon receptor (AhR) pathway, increasing ROS production³.

Upon ligation by PAHs and PM, the activated AhR translocates from the cytoplasm into the nucleus (see Figure 1). This translocated AhR binds to its specific DNA recognition site, the xenobiotic-responsive element, and upregulates the transcription of responsive genes, such as cytochrome P450 family 1 member A1 (CYP1A1). Besides its physiological role in the detoxification of dioxins, the activity of CYP1A1 can be deleterious as it generates mutagenic metabolites and ROS⁴.

Endogenous defense mechanisms include specifically the nuclear factor erythroid 2-related factor 2 (Nrf2) pathway, which is activated in order to fight the deleterious effects of all pollutants on skin and plays a role in skin homeostasis and renovation⁵.

Figure 1: PAHs and particulate matter induce ROS generation and pro-inflammatory cytokines. ROS generated by CYP1A1 stimulates the production of TNF-α and IL-8



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FEATURES

- Natural & botanically derived
- Contains wholesome skin conditioning ingredients
- Suitable for COSMOS/Ecocert formulations

ADVANTAGES

- High affinity with skin lipids for great emolliency
- Suitable for use with all skin types
- Viscosity building effect

BENEFITS

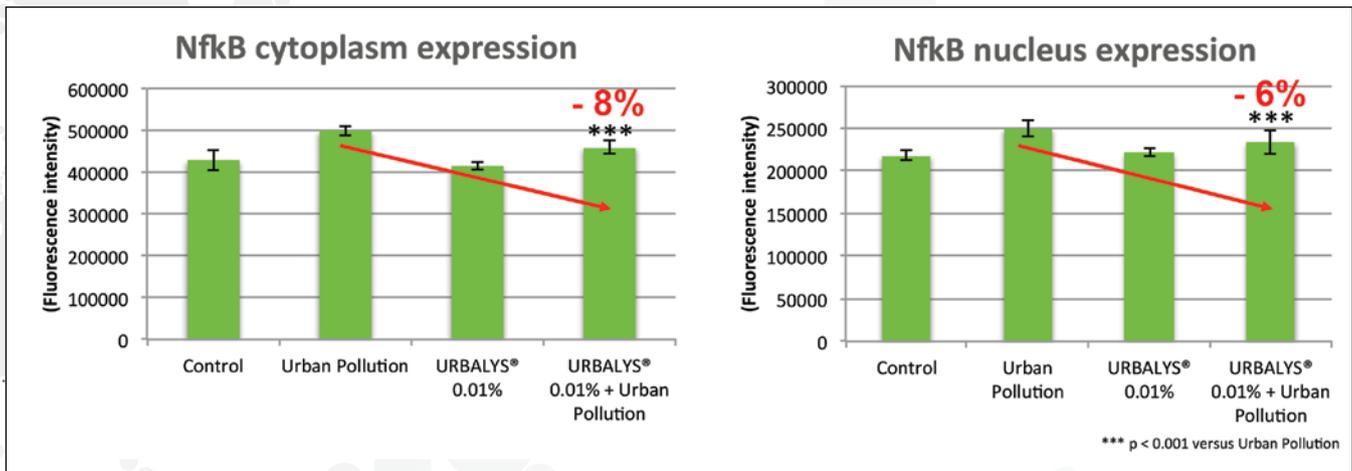
- Excellent alternative to petrolatum
- Increases skin smoothness
- Creates intensive, moisturized feel



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Figure 2: NF-kappa B cytoplasm and nucleus expression after urban pollution, extract from S.C., or co-treatment with urban dust and S.C. extract. *** p < 0.001 versus urban pollution



Nrf2 regulates a variety of antioxidant enzymes, such as NQO1, thioredoxin or heme oxygenase-1 and several phase I and II drug metabolising enzymes. Phase II protective enzymes are responsible for the antioxidant response, xenobiotic disposition, inflammatory response, metabolic programming cell proliferation and survival, through the antioxidant-response element. The activity of Nrf2 is regulated and stabilised by mechanisms such as Keap1 and DJ-1, a multifunctional protein involved in various physiological processes. These include transcriptional regulation, anti-oxidative stress reaction, mitochondrial regulation and signal transduction⁶.

INSPIRED BY TRADITIONAL MEDICINE

A possible approach to attack ROS-mediated skin disorders is based on the use of substances found in plants as secondary metabolites. Various phytochemicals and herbal extracts exert their antioxidant properties by activating the Nrf2 system in human epidermal keratinocytes⁴. *Schisandra*

chinensis (S.C.), the Chinese magnolia-vine, has a long history in traditional Chinese herbal medicine and has been used in Asia for thousands of years. As the main active ingredient in S.C., the ligands have various pharmacological effects such as antioxidative, anti-inflammatory, antitumor, and hepatoprotective. These benefits have led Greentech's scientists to believe that S.C. has various biological effects, which may activate the endogenous mechanisms of defense and the biological pathways to fight against pollutants. Using an *in vitro* model, Greentech established that dual treatment with urban dust and S.C. extract could modulate the expression of Nrf2 and DJ-1. It also reduced NF-kB (see Figure 2) and AhR, showing that this active extract may provide skin with extensive protection against daily environmental aggressors. In a skin-equivalent model stressed using urban dust, the extract provided a global protection of skin components as shown by key proteins involved in the epidermal barrier. Using an *in vivo* model, Greentech reported an improvement

in skin's parameters, such as radiance and luminosity.

Greentech's active ingredient, Urbalys, produced using S.C. extract, can be used to buffer ROS and enhance skin barrier function, allowing a global preservation of cutaneous structures. Urbalys is available throughout southern Africa from Natchem.

REFERENCES:

1. Poonam Puriet et al., *Effects of air pollution on the skin: A review*. Indian J. Dermatol. Venereol. Leprol. (2017) 83; 415-423.
2. Sung Ho Jeong, et al.; *Up-regulation of TNF-alpha secretion by cigarette smoke is mediated by Egr-1 in HaCaT human keratinocytes*, Exp. Dermatol. (2010) 19; e206-e212.
3. Yue Matsumoto, et al.; *Aryl hydrocarbon receptor plays a significant role in mediating airborne particulate induced carcinogenesis in mice*, Environ. Sci. Technol. (2007) 41; 3775-3780.
4. Masutaka Furue et al., *Antioxidants for Healthy Skin: The Emerging Role of Aryl Hydrocarbon Receptors and Nuclear Factor-Erythroid 2-Related Factor-2*. Nutrients (2017) 9; 23.
5. Maya Ben-Yehuda Greenwald et al.; *A novel role of topical iodine in skin: Activation of the Nrf2 pathway*. Free Radic. Biol. Med. (2017) 104; 238-248.
6. Jin Im et al.; *DJ-1 induces thioredoxin 1 expression through the Nrf2 pathway*. Hum Mol Genet (2012) 21; 3013-3024.

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