# Skin aging exposome: factors and causes

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Health and Personal Care Market shows interesting data from the point of view of consumers who are more and more attentive to the safety of the products they apply on their skin. They are curious to know which are the right ingredients to protect the skin from external aggressions coming from the environment. All the factors that can negatively affect the health of the individual are contained in a single term: "EXPOSOME", in fact the exact description of the term includes the totality of the exposures to which an individual is subjected from birth to death (1).

## THE PHENOMENON

This "phenomenon" includes both external and internal factors as well as the human body's response to these factors. Current research on Exposome aims to understand the effects that all factors have on specific organs. Within this context, there are recent needs to classify all the factors to which human skin is exposed by coining a new terminology as "Skin Exposome".

Human skin represents the largest organ in the human body and is one of the most important as it performs a fundamental function, constitutes a shield to protect all physiological processes and maintains the unaltered functionality of the other organs.

Its barrier function makes it an organ exposed during life cycle to a wide variety of environmental factors, these factors trigger biological responses to counter any threats and therefore the skin is a constantly evolving organ that aims to adapt after being influenced by external and internal factors (genetic and non-genetic). (1)

Environmental factors recognized as a cause of skin exposure include: ultraviolet rays, air pollution, tobacco smoking, nutrition and cosmetic products. (1) (Fig. 1)

## UV RAYS

Ultraviolet radiation has long been known for the potential damage it can cause to the skin. It is known that being too much under sun exposure could burn the skin and cause unpleasant inflammatory


*Figure 1 - All factors belonging to Exposome causing skin aging.*

processes, but to fully understand the potential danger to which the skin is exposed, must be made a distinction between UVB and UVA rays. UVB radiation is the most energetic but only penetrates the superficial layers of the skin, up to the epidermal basal layer. UVA radiation is less energetic, but it is present in larger quantities and penetrates deeper into the skin reaching the dermis and hypodermis. The role of ultraviolet radiation (UV) in skin aging is well defined and therefore affects all three compartments of the skin namely the epidermis, the dermis and the hypodermis and the term photoaging has been coined to emphasize this causal relationship and effect. (1-2) (Fig. 2)

## POLLUTION

Directly related to skin aging it's possible to find an important factor of Skin Exposome such as air pollution, which is defined as a contamination of the internal or external environment by any chemical, physical or biological agents. Air pollution is composed of two main types of primary pollutants; particulate matter (PM), which are commonly referred to as fine (PM2.5, PM10) or coarse particles, and gases ($O_3$, $CO_2$, CO, $SO_2$, $NO_2$) or volatile organic compounds. Most of the studies conducted on pollution shows a direct correlation with skin aging. For example in China, where rural and urban pollution is particularly present, chronic exposure of the skin to traffic has led to the appearance of skin spots and wrinkles in subjects of Asian origin. (1)

## TOBACCO SMOKING & NUTRITION

Tobacco smoking and unhealthy diet can represent the factors involved in the Skin Aging Exposome, in fact, tobacco smoked is characterized by the presence of numerous chemical molecules that are harmful to the human body and especially to the skin which also suffers from passive smoke. Nutrition also plays a fundamental role in mitigating damage from Exposome, in fact some food rich in antioxidants molecules can improve the skin's natural defenses by counteracting the formation of radical species involved in skin aging. (1)

## COSMETIC PRODUCTS

One of the most interesting factors is certainly represented by the class of cosmetic products. First of all, according to Regulation (EC) No 1223/2009 all cosmetic products must be safe and designed to beautifying, improving and keeping the skin in good condition. Cosmetics are part of Skin Exposome but differ from the previously mentioned environmental factors because they are used voluntarily to reduce or prevent skin aging. In fact, many ingredients have demonstrated their ability to prevent or correct the signs of aging thanks to numerous in-vitro and in-vivo tests carried out.

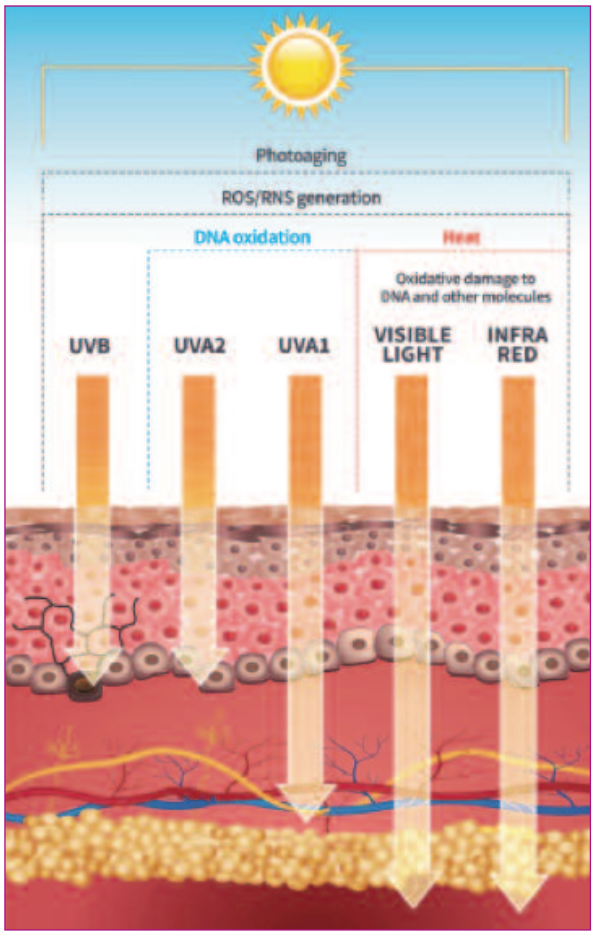


*Figure 2 - Penetration of UV rays into the different skin layers (photoaging).*

ROELMI HPC has developed science-based active ingredients aimed at counteracting and mitigating the negative

effects of Skin Exposome involved in skin aging. By focusing on an approach to improve and coadiuvate the reparative processes of inflamed and sensitive skin, ROELMI HPC has developed Plerasan® Line capable of preventing damages induced by sun rays by stimulating and improving the natural immune defenses of fragile skin. Another ideal product called PhytoSerene to mitigate Skin Exposome damages, composed by Phytosterols extracted from pine bark enriched in beta-sitosterols, which has been shown through in vivo tests to improve the skin barrier by protecting the epidermis from aggressive external agents.

Finally, thanks to R&D Department ROELMI HPC has carried out some interesting studies involving the skin microbiota.

In fact, there is a correlation between Skin Exposome and skin microbiota alterations, which results in skin diseases such as acne, eczema, etc. (3)

It is possible to limit the skin damage and consequently balance commensal bacteria by using cosmetic products suitable for your skin. Within this context, active ingredients such as AEctive® manage to rebalance the microorganisms' micro-environment while preserving their osmotic balance and vitality.

Therefore, we firmly believe that future researches should be focused on a better understanding of the interaction between distinct exposure factors and the resulting effects on skin aging to develop new studies and anti-aging strategies.

## REFERENCES AND NOTES


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