

GENETICS AND GENODERMATOSES

A MULTI-OMICS APPROACH TO STUDY THE EFFECTS OF CHRONIC EXPOSURE OF POLLUTION ON SKIN REVEALS A COMPLEX INTERPLAY BETWEEN HOST, POLLUTANTS AND MICROBES

Namita Misra⁽¹⁾ - Nasrine Bourokba⁽²⁾ - Sakina Mezzache⁽¹⁾ - Eric Arbey⁽¹⁾ - Cecile Clavaud⁽¹⁾ - Luc Aguilar⁽¹⁾ - Nukhet Cavusoglu⁽¹⁾

L'oreal Sa, Research & Innovation, Aulnay-sous-bois, France⁽¹⁾ - L'oreal Sa, Research & Innovation, Aulnay-sous-bois, French Guiana⁽²⁾

Background: Skin acts as a protective barrier against direct contact with pollutants. Inhalation and systemic exposure can have an indirect effect on it. In addition, it is probable that the skin microbiome modulates this response and acts in concert with, or independent of the host factors.

Objectives: To investigate alterations in skin in response to chronic exposure to pollution taking a multi-omics approach.

Methods: Metabolomics, Lipidomics and targeted proteins & enzymes were analyzed on facial D-Squame samples from 204 healthy women (n=102 per city), aged 25-45 years living for at least 15 years in the polluted (Baoding) or less polluted (Dalian) cities in China. After shortlisting 10 cities, the two cities were selected based on significantly discriminant Air Quality Index over a period of 1 year.

Results & Conclusion: Women from polluted and less polluted cities showed distinct metabolic profiles. Chronic exposure to air pollution manifested in perturbation in 2 major groups of metabolites, amino-acids and fatty-acids. Profiling data from 468 identified metabolites served to characterize pollution-dependent biochemical events. Increased levels of certain metabolites pointed toward a higher susceptibility to UV exposure and oxidative stress in skin-samples from polluted (Baoding) city population. Accumulation of amino-acids, N-acetyl amino-acids, gamma-glutamyl amino-acids, and urea cycle intermediates in these samples was supportive of increased filaggrin proteolysis, providing the natural moisturizing factor (NMF) to maintain skin hydration under the polluted and possibly dehydrated condition. This observation was also supported by protein analysis and enzyme assays. Accumulation of fatty acids was also observed in the polluted skin suggestive of increased fatty acid synthesis/release possibly to provide the building blocks



and energy substrates needed for barrier repair. Finally, certain metabolites indicate towards a potential dysbiosis. Overall, these signatures pointed toward macromolecular degeneration by pollution that could manifest as clinical sign of early skin aging and/or other imperfections.

