Professor Martin Alphonse of the Johns Hopkins Department of Dermatology and AMOREPACIFIC Research Team Announce Groundbreaking Study on Modulating Skin Immune Response to Environmental Pollutants

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◆ New Horizons in Aging Research and Immunology

Professor Alphonse from the Johns Hopkins Department of Dermatology, in collaboration with the AMOREPACIFIC research team, has presented pioneering research on the modulation of immune responses to environmental pollutants, focusing primarily on the effects of air pollution on skin aging, a known as exposomal aging. One of the main pollutants examined in this study is Particulate Matter 2.5 (PM2.5), an air pollutant that has been linked to increased susceptibility to infectious diseases and is recognized by immune system cells.

While the effects of Oleanane saponin-green tea root extract (Senomune) on structural skin cells have been previously studied, this research uniquely explores its role in modulating immune cells and their immunometabolic and functional responses.

◆ The Impact of Senomune on Immune Cell Response and Metabolic Profile

Professor Alphonse and the AMOREPACIFIC research team pre-treated peripheral blood mononuclear cells (PBMCs) with Senomune (100㎍/㎖) before exposing them to PM2.5 to examine the modulation of immune response. Using a functional Met-Flow assay, they assessed changes in the immune cell landscape, metabolic modifications, cytokine profiles in immune cells pre-treated with Senomune, both with and without PM2.5 exposures.

Results indicated that PBMCs exposed to PM2.5 alone led to a reduction in the number of peripheral T-regulatory (CD4+ CD25+) cells (pTregs) and B-cells (CD19+): Pretreatment with Senomune significantly increased pTreg ($p<0.0001$) and B-cell ($p<0.001$) numbers in PM2.5-exposed PBMCs.

Conversely, PM2.5 exposure alone increased levels of M2 Macrophages (CD11b+ CD163+) ($p<0.01$), which were reduced by Senomune treatment ($p<0.001$)

◆ Regulation of Metabolic Pathways Inflammatory Responses

Senomune pretreatment also increased glycolysis ($p<0.001$) and fatty acid synthesis ($p<0.01$) while reducing the pentose phosphate pathway (PPP) ($p<0.001$) compare to untreated PBMCs. Furthermore, pretreatment with Senomune reduced the expression of inflammatory cytokines such as TNF ($p<0.001$) and IFN-g ($p<0.01$) in PM2.5-exposed PBMCs.

◆ Significance of the Study and Future Directions

This study is significant as it demonstrated the potential of natural compounds like Senomune to modulate the skin's immune response to harmful environmental pollutants such as PM2.5. Professor Alphonse commented,

"This research confirms that Senomune can modulate immune cells and their function in response to PM2.5 exposures, regulating the immunometabolic profile of immune cells." He added, "The findings could further the exploration of natural compounds in preventing skin aging due to environmental pollutants and enhancing skin health."

This collaborative research effort between the Johns Hopkins Department of Dermatology and AMOREPACIFIC is set to open new avenues pollutant-induced skin aging and the incorporation natural substances in skincare products. The collaboration reflects a significant step forward in both understanding and managing the complex interactions between environmental stressors and skin health.