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Background/Objective

“Immunosenescence” is the impaired immune response associated with normal aging, contributing to an increased susceptibility to infectious diseases and cancer.

Skin immunosenescence is characterized by a decreased number of Langerhans cells, an increased number of regulatory CD4⁺FOXP3⁺ T-cells and an overexpression of the inhibitory marker PD1 on CD4⁺ lymphocytes surface with age.

The aim of this work was to characterize the immunosenescence profile of human skin resident conventional T lymphocytes and the innate lymphoid cell population.

Material and Methods

Study population

Skin samples from healthy young (<30 years; n=6) and old subjects (>60 years; n=6) were obtained from the plastic and reconstructive department of Saint-Louis hospital (mammary reduction surgery or face lift surgery).

Skin samples

Samples were cultured at 37°C in a complete RPMI medium (Roswell Park Memorial Institute) prepared from RPMI 1640 (Sigma-Aldrich) supplemented with 10% Fetal Bovine Serum (FBS), 1% glutamine and 1% penicillin/streptomycin. The lymphocytes present in the supernatant were recovered and filtered after 21 days of culture.

Flow cytometric analysis

Flow cytometric analysis was performed using BD LSRFortessa™ (sixteen colors, BD Bioscience).
Data were analyzed with BD FACSDIVA™ software (BD Biosciences).

Results

No alteration of the percentages of skin CD3⁺, CD4⁺ or CD8⁺ T-cells with age

Decreased frequency of skin CD45RA⁺ naive T-cells with age ($p<0.05$)

Upregulation of CD39 expression on CD3⁺CD4⁺ T-cells surface in old skin ($p<0.05$)

Upregulation of PD1 expression on skin CD3⁺CD4⁺ T-cells surface with age ($p<0.05$)

No alteration of the percentages of skin γ/δ T lymphocytes with age

Decreased number of skin ILC2 with age ($p<0.05$)

Figure 1: mean expression ($\pm$ SD, n=6) of surface markers by skin resident T lymphocytes in young and old subjects

Figure 2: modified phenotype of skin resident T-cells with age in a representative young (A) and elderly subject (B) after flow cytometric analysis

Conclusion

Upregulation of CD39 and PD1 expression on skin T-cells surface and decreased proportion of skin naïve T-cells with age could contribute to reduced generation of skin long-lived memory T-cells resulting in a lower response against infectious disease, an impaired vaccine response, and a decreased anti-tumoral response.

Decreased number of skin resident ILC2 could explain the decreased incidence of atopic dermatitis in elderly patients.