Cytotoxic immune cell in sick and healthy skin a key to understanding vitiligo

20 February 2017

With the aid of thousands of skin biopsies and over a hundred kilograms of skin, researchers at Karolinska Institutet have observed how two subgroups of immune cell behave in healthy skin. This functional dichotomy is preserved in the inflammatory diseases psoriasis and vitiligo. The study, which is published in the journal Immunity, opens the way for more targeted local treatments for patchy inflammatory skin disorders.

Healthy skin is protected against microbial attack by different kinds of immune cell, including T cells. Patchy inflammatory skin diseases throw the skin's local immune system out of balance. In people with vitiligo, which causes patchy loss of pigmentation, a certain kind of T cell is dominant in the afflicted areas of skin; patients with psoriasis, on the other hand, exhibit an increase in another kind of T cell.

In the present study, two research groups led by Yenan Bryceson and Liv Eidsmo show how these two subgroups of T cell operate to protect healthy skin from external attacks and retain their unique functions in psoriasis and vitiligo.

Doctoral student Stanley Cheuk and colleagues used up to 1,500 skin biopsies per experiment and a total of several hundred kilograms of healthy skin for the critical parts of the study.

"By combining the genetic analysis of a small population of immune cells from healthy skin with functional experiments we were able to define two subgroups of memory immune cell and in detail decipher/dissect how these cells behave in healthy and inflamed skin," explains Liv Eidsmo, researcher at Karolinska Institutet's Department of Medicine.

Vitiligo is characterised by the accumulation of a subgroup of T cells called CD49a+, which recognise and are ready to kill pigment cells. In psoriasis, another kind of T cell, CD49a- accumulates in the afflicted skin and produces the inflammation-causing protein IL-17. In healthy skin, CD49a+ and CD49a cells are dormant, but quickly respond with inflammatory and cytotoxic effects when stimulated by IL-15, a protein secreted from skin cells as a rapid-response defence against microbial attack.

"If we can decipher the local immunological changes that give rise to the accumulation of one of the subgroups involved in these patchy skin disorders, we'll be on the way to more targeted treatments," says Dr Eidsmo.

More information: Stanley Cheuk et al. CD49a Expression Defines Tissue-Resident CD8+ T Cells Poised for Cytotoxic Function in Human Skin, *Immunity* (2017). DOI: 10.1016/j.immuni.2017.01.009

Provided by Karolinska Institutet