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Skin cell breakthrough could lead to new treatments.

An international research team has discovered how different populations of immune cells come to enter and then reside long-term in the skin, a discovery that could lead to therapies targeting the harmful cells that can cause skin diseases while keeping protective cells intact.

It is hoped the breakthrough could lead to new treatments for skin cancers, infections, and other serious conditions.

The international study, led by Professor Laura Mackay from the Doherty Institute and the University of Melbourne, included Federation's Professor of Immunology Stuart Berzins and researchers at the Fiona Elsey Cancer Research Institute (FECRI), led by Professor George Kannourakis, director of the Institute and a co-author on the study.

The study was published in *Science*, one of the world's leading research journals.

The researchers found how two different types of immune cells, or T cells, come to enter and then reside long-term in the skin, discovering that two distinct processes are involved.

"They're both T cells — one type is specialised at attacking tumours and viruses, and the other is effective with bacteria and wound healing. They are both white blood cells, but they do two different things," Professor Berzins said.

"If you have a cancer or a bacterial infection, you want your immune system to attack it, whereas if you have a wound, you want your immune system to heal it. These tasks involve different immune cells that can stay in your skin after an immune response in case the same problem arises, but interestingly, both cell types are associated with problems as well."

The cells that are effective at attacking viruses and tumours can trigger autoimmune diseases like vitiligo, a condition that causes people to lose pigmentation in their skin. The cells associated with bacterial immunity and wound healing can cause chronic conditions like psoriasis.

Professor Kannourakis said FECRI contributed to the study through its tissue banking facility and relationships with surgeons at Grampians Health and St John of God Hospital, which enabled human skin samples to be made available to the broader research team.

Professor Kannourakis and Professor Berzins helped coordinate this process and provided technical expertise to the project.

"Having identified two pathways that control the immune cells means that it should be possible to target one pathway or the other with treatments," Professor Berzins said.

“The cells that are causing psoriasis could be targeted without getting rid of T cells that are important for fighting off bacteria.
"In other circumstances, the pathway could be harnessed to recruit more cells to boost immune responses that fight cancers and viruses."

Professor Kannourakis said the work showed how regional centres like Federation University and FECRI can collaborate with metropolitan centres and achieve world-class research.

"Identifying these mechanisms means we can potentially manipulate the pathways that attract those cells and keep them in the skin," Professor Kannourakis said.

"The implication of this discovery is that we may now be able to better treat conditions such as severe eczema, psoriasis and possibly skin lymphomas by targeting these cells."