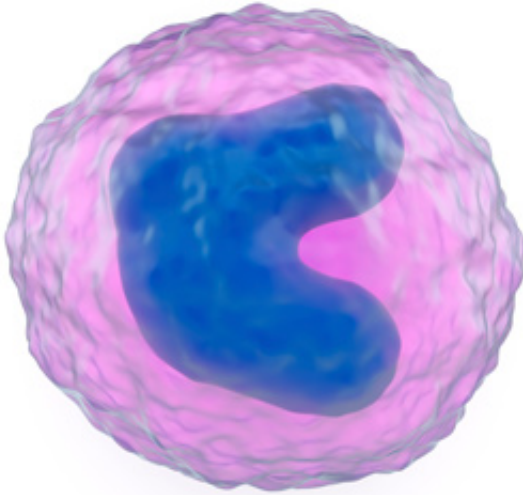


Understanding the origins and function of CD14⁺ immune cells

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Human dermal CD14⁺ cells are a class of macrophages derived from blood monocytes. Credit: somersault18:24/iStock/Thinkstock

Dendritic cells and macrophages are immune cells that orchestrate diverse immune functions within many body tissues, including the skin. New work by A*STAR researchers and colleagues shows that CD14⁺ cells in the skin—long classified as dendritic cells—are actually macrophages derived from blood monocytes which means they operate differently within the human immune system.

Dendritic [cells](#) and macrophages are broadly similar: both take up antigens and present them to [immune cells](#), called T [lymphocytes](#), which drive immune defenses within the body. However, [dendritic cells](#) and macrophages orchestrate different [immune functions](#) and target different T lymphocyte types. For example, skin dendritic cells that take up antigens migrate to the lymph nodes and present the antigen to so-called naive T

lymphocytes that have not been previously exposed to other antigens. But skin macrophages, which are derived from blood monocytes, present antigen to so-called memory T lymphocytes within the skin that are already tuned to respond to one particular antigen.

Immunologists had initially identified CD14⁺ cells within the skin as dendritic cells. This was partially due to their ability to migrate out of chunks of skin that are placed in a cell culture dish. However, CD14⁺ cells are only weakly able to stimulate naive T lymphocytes, calling into question their classification as dendritic cells, since activation of naive T lymphocytes is a key characteristic of dendritic cells. In addition, recent gene expression analyses by Florent Ginhoux and Naomi McGovern from A*STAR's Singapore Immunology Network and colleagues demonstrated that CD14⁺ cells express many of the same genes as monocytes within the blood, which suggested that skin CD14⁺ cells may actually be monocyte-derived macrophages.

The researchers therefore examined what would happen to CD14⁺ cells in skin in humans whose blood monocytes were being ablated as preparation for a hematopoietic stem cell transplant. They found that as monocytes were depleted in the blood, CD14⁺ cells in the skin were lost. During the recovery period, monocyte numbers in the blood rebounded, followed by a restoration of CD14⁺ cells in the skin. These findings suggest that, in humans, CD14⁺ cells in the skin are derived from monocytes.

The researchers found further evidence that skin CD14⁺ cells better stimulate memory T lymphocytes than naive T lymphocytes, indicating that CD14⁺ cells behave more like [macrophages](#) than dendritic cells.

"Understanding the biology of monocyte-derived cells within human skin will aid in development of

new therapies for inflammatory [skin](#) conditions, including psoriasis and eczema," says Ginhoux.

More information: McGovern, N., Schlitzer, A., Gunawan, M., Jardine, L., Shin, A., et al. Human dermal CD14⁺ cells are a transient population of monocyte-derived macrophages. *Immunity* 41, 465–477 (2014).

[dx.doi.org/10.1016/j.immuni.2014.08.006](https://doi.org/10.1016/j.immuni.2014.08.006)

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