

# Tonsils make T cells, too, study shows

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A new study provides evidence that a critical type of immune cell can develop in human tonsils. The cells, called T lymphocytes, or T cells, have been thought to develop only in the thymus, an organ of the immune system that sits on the heart.

The study, led by researchers at the Ohio State University Comprehensive Cancer Center – Arthur G. James Cancer Hospital and Richard J. Solove Research Institute (OSUCCC – James), could improve the understanding of T-cell cancers and autoimmune diseases, and how stem-cell transplantation is done.

The study identified [T cells](#) at five distinct stages of development in the tonsil. These stages, identified using molecular signposts on the cells, were very similar to the stages of T-cell development in the [thymus](#), although some differences were found as well.

The study also discovered that the cells develop in a particular region of the tonsil, in areas near the fibrous scaffold of the tonsil.

The findings are published in the *Journal of Clinical Investigation*.

"We've known for a long time that a functional thymus is necessary to develop a complete repertoire of T-cells, but whether a T-cell factory existed outside the thymus has been controversial," says principal investigator Dr. Michael A. Caligiuri, director of Ohio State's Comprehensive Cancer Center and CEO of the James Cancer Hospital and Solove Research Institute.

"I believe our study answers that question. It is the first report to describe a comprehensive, stepwise model for T-cell development outside the thymus."

It also raises a number of questions. Caligiuri notes that it's still unclear whether T-cells that develop in the tonsil also mature there or whether they leave the tonsil to mature elsewhere.

"The complete implications of this phenomenon for human health and disease are not entirely known," adds first-author Susan McClory, a graduate fellow in Caligiuri's laboratory. "It could be important in the development of T-cell cancers and autoimmune diseases, or it might suggest a location for T-cell development when thymus function is poor. We hope to do additional studies to explore these possibilities," she says.

Caligiuri, McClory and their colleagues conducted the study using tonsil tissue obtained from children undergoing routine tonsillectomy at Nationwide Children's Hospital in Columbus, and thymic tissue obtained from children undergoing thoracic surgery.

Using the molecular features of T-cells as they develop in the thymus, the researchers identified five populations of maturing T cells in the [tonsils](#). They found, for example, that the first two of those groups resembled cells of the earliest stages of T cells that developed in the thymus, while cells in the fifth group were similar to nearly mature T-cells in the thymus.

They also showed that all five of the cell groups had the capacity to develop into T cells in laboratory tests, and that the first four populations had the capacity to develop into [immune cells](#) called natural killer [cells](#).

"Overall, our work suggests that the tonsils serve as a T-cell factory, along with the thymus," Caligiuri says. "Next, we need to learn what

proportion of T-cells is derived within the tonsil compared with the thymus."

Provided by Ohio State University Medical Center

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