



**The PTEN Hamartoma Tumor Syndrome Foundation's mission is to educate about PTEN syndromes, provide financial support to patients, and support scientific research. Your financial contribution will help provide hope to those battling this rare disease, promote awareness, and find a cure.**



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## PTEN's Role in the Immune System

Patients with genetic defects in the phosphatase enzyme PTEN have well known susceptibility to develop tumors. What is less known is that PTEN plays a very important role in immune cells as well. As a group of international clinicians and scientists we have investigated the immune system in patients with PTEN hamartoma tumor syndrome. This research has shown that almost one in four PTEN patients develop autoimmune disease, especially of the thyroid gland. Some patients also develop benign overgrowth of immunologically active tissues such as the tonsils. Fortunately, only a few individuals develop serious immune deficiency.

Studying the immune system is an essential first step towards developing improved diagnostics as well as treatments for the disease. For a fully functional immune system it is important to be able to fight infections fast and efficient as well as to avoid too strong immune responses that can cause tissue damage. We observed that in PTEN patients immune cells called lymphocytes are reduced in the blood but are increased in the lymph nodes. Those immune cells are not only involved in fighting bacterial and viral infections but confer the increased susceptibility to the development of autoimmune conditions, which occur when the patient's immune system causes the destruction of healthy cells and tissue. We have had a closer look at specialized cell types of the immune system to figure out which components might cause these issues. We observed that immune cells that are important for generating antibodies against pathogens are affected in PTEN patients. This helps to explain why some patients develop autoimmune disease and some have problems with fighting infections.

Just as important for health and disease are the so-called regulatory T lymphocytes. The role of regulatory T cells is to dampen immune responses at the end of an infection, thereby restoring immune homeostasis. We recently discovered an interesting mechanism which helps PHTS patients to maintain their immune homeostasis despite their PTEN mutation status.

Understanding the role of PTEN in the immune system will likely not only be important for patients with genetic defects in PTEN but might - in the long term - be relevant for other patients with autoimmune, inflammatory and allergic disorders.

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