

Understanding Immune Tolerance: A Balancing Act for Health

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Abstract

Immune tolerance is a pivotal aspect of the immune system's functionality, ensuring a delicate equilibrium between defending the body against external threats and avoiding attacks on its own tissues. This abstract provides a concise overview of the mechanisms and significance of immune tolerance in health and disease.

The concept of immune tolerance involves intricate processes, including central tolerance during immune cell development and peripheral tolerance mediated by regulatory T cells (Tregs). Central tolerance eliminates auto reactive cells in the thymus and bone marrow, while peripheral tolerance employs various mechanisms to suppress excessive immune responses and maintain tolerance to self-antigens.

In the context of transplantation, immune tolerance plays a critical role in preventing graft rejection. Inducing tolerance in transplant recipients offers the potential for sustained graft survival without the need for prolonged immunosuppressive therapies.

Disruptions in immune tolerance contribute to the development of autoimmune diseases and allergies. Rheumatoid arthritis, lupus, type 1 diabetes, and allergic reactions exemplify conditions resulting from a breakdown in immune tolerance.

The therapeutic implications of understanding immune tolerance are significant. Tolerogenic therapies aim to

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