

Cell Types and Organization

- The eye lacks lymph vessels
- The eye contains macrophages, dendritic cells, and mast cells
- To compensate for a separation from the rest of the immune system, the eye is hypervascularized
- Most of the immune cells reside in the uvea
- The cornea serves as a physical barrier against the exposure of foreign particles
- Relative isolation from the rest of the immune system results in a more difficult time mounting an immune defense

Immune Response

Due to not containing lymphoid cells and other common defense mechanisms found throughout the rest of the body, the eye keeps the immune cells it does have at a relative distance which creates a time delay between the introduction of a pathogen and the eye mounting an immune response. To combat this, the eye mounts other preventative measures in the form of tear secretion that serves to moisten and provide nutrients for the surface of the eye, as well as containing lysozyme, which is antibacterial in nature..

Cell functions

Langerhans Cells	determines the appropriate immune system response
epithelial cells	enables light to be transmitted into the interior of the eye and as a protective barrier for more delicate structures in the eye
keratocytes	Helps maintain collagen scaffold and extracellular matrix of the stroma
corneal nerves	releases neuromediators to elicit healing and nutritional deposits in damaged parts of the eye as well as providing protective reflexes such as tear production and blinking
interferons	serves to alert the immune system of viral infection

Innate Immune System

There are two types of immune responses the human eye is capable of; innate immune responses and acquired immune responses, both of which serve two distinct purposes from each other. The innate immune response is more broad in its protection as it defends against pathogens and other foreign particles in a non-discriminatory manner, such as the eyelid. The main advantage of this is that it typically retains its effectiveness throughout your lifetime and is present from birth. Other components of the innate immune system include tears, epithelial cells, keratocytes, corneal nerves, and interferons..

Understanding of Immune Privilege

The concept of ocular immune privilege has been around since the 1940's. Since then, further understanding of this concept has allowed for seamless foreign tissue grafting and transplants in the eye without the need for constant immunosuppressants.

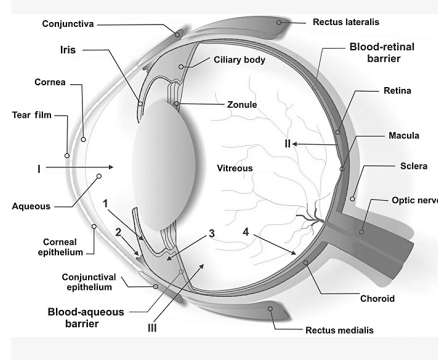
Understanding of Immune Privilege (cont)

This is due to the body trying to preserve vision by limiting inflammatory and immune responses to vulnerable or vital areas of the body. This response, or the lack thereof, is promising in that it holds the ability to teach us how to apply this immune privilege to other procedures that typically require someone to be on immunosuppressants for the rest of their lives such as organ transplants..

Acquire Immune Response

The other form of immune response the eye is capable of is referred to as the acquired immune response. This response is pathogen-specific and is cell mediated. These responses are thought to be controlled by Langerhans cells found in the cornea. Langerhans cells are antigen-presenting cells that take a sample of the pathogen in order to elicit an immune response. However, this has its downsides, being which it can cause damage to surrounding tissue that may result in vision loss.

Basic Anatomy



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Acquire Immune Response (cont)

This response is more efficient and slow acting than the innate immune response..

Citations

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