

A.

I have selected an education website because I feel that I can adequately and easily explain scientific principles. Through this teaching, I can improve my ability to condense information and present it in an organized fashion while establishing a foundation in web development principles. The goal of this website is to educate and inform about the fundamental principles of biomedical immunology. This will be accomplished by assuring quality content and accuracy while fostering curiosity about immunological findings and their real-world applications. The intended audience will be individuals seeking to understand immunology at an entry-level. It will be assumed that the audience has previous knowledge of basic biological concepts. Through this instruction, people will be able to recognize types of immunity (adaptive and innate), immune cells, immune response, and autoimmune disorders.

B.

Welcome to introductory biomedical immunology! The immune system is a complex, integral system that prevents infections and coordinates immune responses.

Having a foundation in immunological principles is essential for understanding disease prevention, immune processes, and cell function. This instruction aims to establish a foundation for immunology and encourage further exploration into immune responses and their biomedical importance. There are four primary concepts that will be explored: Immune system components and functions, innate immune system, adaptive immune system, and disorders of the immune system. Immune system components and functions further develop an understanding of fundamental principles such as “self” vs “non-self” recognition, immunology response type, and the importance of the immune system. The innate and adaptive immune systems distinguish the functions, cellular components, and biological pathways, of each system while emphasizing their connectivity. Using the previous concepts as a foundational stepping stone, you will be able to apply the basic principles of immunology and the application of their cellular processes to immune system malfunctions such as immunodeficiencies, autoimmune disorders, and cancerous growths.

C.

Welcome! My name is Sasha, and I am currently pursuing an undergraduate degree in biological sciences at the University of Missouri with an expected graduate date of Spring 2024. Through a biological sciences degree, there is an emphasis on biological processes through both wet and dry labs. In coordination with biology degree requirements, I have taken diversity courses in medical microbiology and immunology through The University of Missouri School of Medicine. This has greatly expanded my understanding of scientific processes and reinforces the interdisciplinary nature of biology. In addition to formal education through the Arts & Science College, I have professional experience in patient care positions where laboratory techniques, phlebotomy training, and medical terminology were acquired. Experience in a healthcare setting has contributed to my exceeding interest in biological principles that drive medical innovations and disease research. Furthermore, education and experience are a continuing process that I hope to pursue through a Master of Medical Sciences in Immunology.

“Learning is not attained by chance. It must be sought for with ardor and attended with diligence.” – Abigail Adams

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Immune System Components and Function

The immune system is a dynamic and complex network of cells, organs, and tissues that are responsible for protecting your body against harmful organisms by antigen identification, effect mitigation, combating disease-causing mutations, establishing prevention barriers, and healing damaged cells and tissues. An immune response is elicited when a suspected “invader” surpasses these preestablished physical or chemical barriers such as the skin and mucosa respectively (Professional, n.d.). These “invaders” are called pathogens and can take the form of bacteria, fungi, parasites, viruses, and cancer cells. The immune system is divided into two parts: the innate and adaptive immune system. Together these systems coordinate to enact the first line-defense to invaders and develop specific immunity over time.

Innate Immune System

Both the innate and adaptive immune system have cells that they recruit to the active site of an infection or suspected pathogen. However, the innate immune system is best suited for rapid, generalized responses that are seen through physical barriers, cellular components, and humoral responses. The innate immune response is associated with the first-line defense, which is activated with intrinsic mechanisms programmed within the body (*WHAT IS INNATE IMMUNITY?* | *Center for Innate Immunity and Immune Disease*, n.d.). Cellular components include phagocytes that enable digestion, natural killer (NK) cells that specialize in targeting pathogens and the complement system that enhances and directs immune responses by increasing inflammation and directing immune responses (Newman, 2023). The innate immune not only provides immediate protection but is integral in shaping subsequent adaptive immune responses.

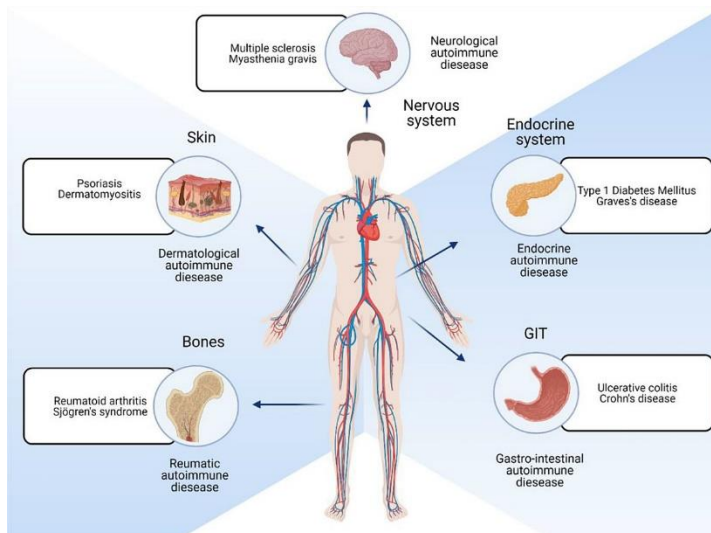
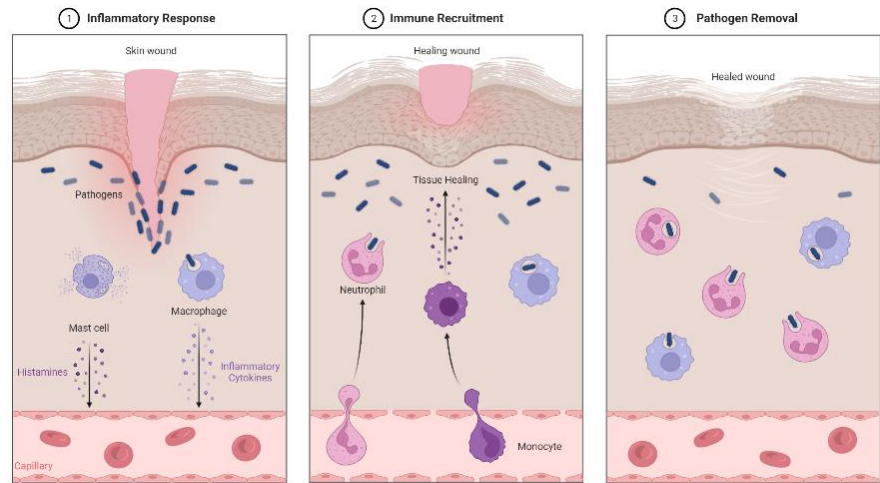
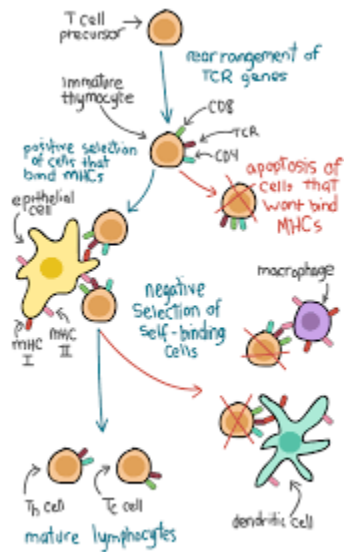
Adaptive Immune System

The adaptive immune system is defined by its ability to perform antigen-specific immune responses. Unlike the innate response, the adaptive immune system can recognize, remember, and offer defense to pathogens upon reinfection. Its immunological memory provides long-lasting protection against harmful pathogens, further establishing its importance. The primary cells that facilitate its immune response are lymphocytic B and T cells. B cells are specialized for antibody production while T cells have a diverse set of functions such as direct attacks, immune response coordination, and regulation activity. (Alberts, 2002). The specification of the adaptive immune system is a crucial component in the body’s immunological defense.

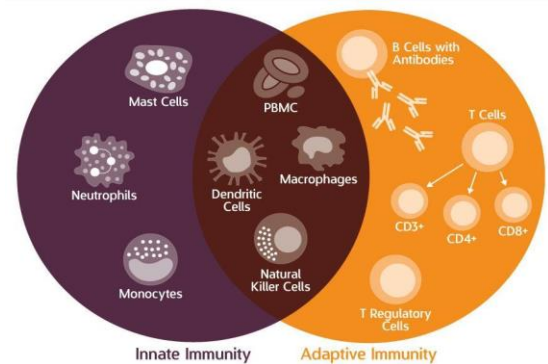
Disorders of the Immune System

The immune system utilizes a multisystem approach to ensure that harmful pathogens that enter the body are unable to infiltrate biological processes. However, in instances where the immune system is unable to facilitate proper coordination, there is an increased susceptibility to immunodeficiency disorders, autoimmune disorders, allergies, and the emergence of cancerous cells. Malfunctions can arise due to genetic factors, medical conditions, and environmental effects (Disorders of the Immune System, 2023). Depending on the disorder, the effects can range from mild inconvenience to deleterious dysfunction of essential immune cells. By looking

at varying disorders and deficiencies such as HIV/AIDS, Lupus, and Eczema, their underlying immune response and dysfunction can be analyzed.



Cells of the Innate and Adaptive Immune Systems



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