

Lesson 5 - Main Terms

UNIT	TERM	EXPLANATION
5.1	innate immunity	The pre-existing arm of the immune system which we are born with. Innate immunity is characterized by an immediate and non-specific response to pathogens. Unlike the adaptive immune system, the innate system does not require “training” and the need to “learn” the details of the specific pathogen. Furthermore, innate immunity does not provide long lasting immunity via immunological memory.
5.1	acquired (or adaptive) immunity	The arm of the immune system mediated by B- and T-cell lymphocytes. Acquired immunity requires a learning period (about a week or so) before the protective response kicks in. The acquired (or adaptive) immune system is potent and highly specific for a given pathogen. The effect of B-cells is the production of pathogen specific antibodies. T-cells are able to detect infected cells and eliminate them.
5.1	lymph node	An ovoid organ of the lymphatic system located at points of convergence of where lymphatic vessels converge. Its primary function is to collect and filter bodily fluids that may contain antigens and pathogens so that the B and T cells present in the nodes can interact and study them.
5.1	bone marrow	Bone marrow is a spongy tissue present in some of the bones of the body. This tissue is responsible for the production of red and white blood cells.
5.1	thymus	The thymus is a primary lymphatic organ located just in front of the heart. Inside it, T cells undergo differentiation.

UNIT	TERM	EXPLANATION
5.1	spleen	<p>The spleen is the largest organ of the lymphatic system. It functions to:</p> <ol style="list-style-type: none"> 1. filter out dead or damaged red blood cells and store a reserve of blood in case of an injury. 2. it plays a vital role in interacting with B and T cells in the fight against pathogens present in blood.
5.1	skin	<p>The skin is one of the largest organs of our body. Consisting of several layers, the skin is our first line of defense against pathogens.</p>
5.1	plasma	<p>Plasma is the fluid of blood. It is a clear, yellowish liquid making up 55% of the blood's volume. Plasma contains nutrients, proteins and enzymes, hormones and antibodies. Specifically, plasma contains the enzymes responsible for blood clotting. When these proteins are removed, the plasma is then referred to as "serum".</p>
5.1	red blood cells (RBCs)	<p>Red blood cells (erythrocytes) are the most common type of blood cells found in our body. RBCs are full of hemoglobin a protein that contains iron. As a result RBC can transport oxygen from our lungs to every cell of the body. They also remove carbon dioxide.</p>
5.1	white blood cells (WBCs)	<p>White blood cells (leukocytes) are the cells of the immune systems found in our blood or within tissues. White blood cells can be divided into two categories: phagocytes and lymphocytes, both cell types function to protect us against pathogens.</p>
5.1	stem cells	<p>Stem cells are able to differentiate into specialized cell types.</p>

UNIT	TERM	EXPLANATION
5.1	hematopoietic stem cells	Hematopoietic stem cells can differentiate into RBCs and WBCs, phagocytes and lymphocytes.
5.1	differentiation	A process in which a cell, usually a stem cell, can develop from a non-committed, general cell into a highly specialized cell type. After differentiation, the fully specialized cell usually can no longer divide or revert to its original non-committed state.
5.1	phagocytes	WBCs of the immune system that specialize in ingesting harmful pathogens, foreign objects and dead cells. Macrophages and neutrophils are the major phagocytes of the innate immune system. The term is derived from the Greek phagein which means "to eat" or "devour".
5.1	lymphatic system	The lymphatic system is a network of interconnected vessels, tissues and organs that acts as the body's drainage system. By having a large concentration of lymphocytes, the lymphatic system plays a pivotal role in defending the body against infections.
5.1	interstitial space	The spaces between the cells of our organs.
5.2	dermis	The inner layer of the skin, rich in blood vessels, sweat glands and hair follicles as well as lymphatic vessels.
5.2	epidermis	The outer layer of the skin, comprised of multiple skin layers keratinocytes and rich in keratin. The outermost layer is made of dead keratinocytes and is continually being sloughed off and replaced by underlying keratinocytes.

UNIT	TERM	EXPLANATION
5.2	keratinocytes	The predominant cell type of the epidermis that produces the keratin protein.
5.2	keratin	A tough fibrous protein that protects epithelial cells from damage.
5.2	fibroblasts	A type of cell commonly found in connective tissues.
5.2	hair follicles	A skin organ that produces hairs.
5.2	sweat glands	Small structures of the skin that produce sweat.
5.2	sebaceous glands	Small structures of the skin that secrete oils.
5.2	collagen	A structural protein commonly found in the extracellular space of various connective tissues.
5.2	elastin	Elastin is an extracellular protein that provides resilience and elasticity to tissues and organs.
5.2	epithelium (epithelial cells)	The cellular lining of the mucosa.
5.2	mucus	A viscous protein secreted to protect the inner linings of our body.
5.2	mucosa	A layer of cells that lines various cavities in the body and surrounds internal organs.

UNIT	TERM	EXPLANATION
5.2	lysozyme	An antimicrobial enzyme produced by animals that forms part of the innate immune system. Lysozyme is secreted in saliva and tears and was discovered by Alexander Fleming. This discovery led to the discovery of penicillin.
5.2	antiseptics	Substances that kill bacteria often tolerated by otherwise healthy cells. Antiseptics are applied to wounded living tissue to reduce the chances of infection.
5.2	penicillin	The first antibiotic and was discovered by Alexander Fleming. Today, numerous commercial antibiotics - similar in structure and function to penicillin, are produced and widely used in medicine and agricultural growth of livestock.
5.3	macrophages	A type of phagocytic white blood cell found in many tissues such as skin and the mucosa.
5.3	phagosome	A membrane-bound vesicle in a phagocyte containing the engulfed pathogen/particle.
5.3	lysosome	A membrane-bound organelle found in nearly all animal cells which contain hydrolytic enzymes that can break down many kinds of molecules.
5.3	PAMPs (Pathogen Associated Molecular Patterns)	Molecules typical of pathogens that are recognized by cells of the innate immune system.
5.3	LPS (lipopolysaccharide)	Large molecules consisting of lipid and a polysaccharide components found in the outer membrane of Gram-negative bacteria, and elicit strong immune responses in animals.

UNIT	TERM	EXPLANATION
5.3	PRRs (Pattern Recognition Receptors)	Pattern recognition receptors are receptors that detect molecules typical for pathogens such as PAMPs.
5.3	flagellum (plural flagella)	A motile lash-like appendage that protrudes from the cell body of certain bacteria and enable them to swim about. A major component of flagella is the bacterial protein flagellin which is a PAMP and thus can induce an innate response when recognized by specific PRRs.
5.3	TLR (Toll Like Receptor)	Toll-like receptors are a class of receptors of the innate immune response. TLRs are found on macrophages, dendritic cells and other cell types. There are numerous TLRs and can be specific for bacterial PAMPs and viral PAMPs such as double stranded RNA. Binding of PAMPs to TLRs triggers the secretion of cytokines and other effector proteins such as interferon.
5.5	inflammation	An immune response often triggered by pathogens leading to: (i) redness, (ii) swelling, (iii) heat and (iv) pain. This response is often associated with the innate response to infections. Inflammation can also be mounted in situations not stimulated by infection. This is sometime deleterious and associated with auto-immune diseases such as arthritis.
5.5	cytokines	A family of small proteins that regulate the immune response.
5.5	chemokines	A family of cytokines that can induce directional cell movement.
5.5	neutrophils	The most abundant type of WBC. Neutrophils are effective phagocytes.

UNIT	TERM	EXPLANATION
5.5	pus	A viscous, yellowish-white fluid formed in infected tissue, consisting of white blood cells, cellular debris, and dead bacteria.
5.5B	interferon	A cytokine made and released by host cells in response to the presence of viruses.
5.6	microbiome	The collection of billions and billions of bacteria that live in us, on us and with us. The vast majority of these bacteria are harmless and are actually beneficial.
5.6	FMT (Fecal Microbiota Transplant)	Fecal Microbiota Transplant is a relatively new therapeutic treatment of gut disease caused by pathogenic bacteria that have displaced beneficial bacteria of our microbiome.
5.7	lymphocytes	A subtype of WBCs that include T-cells and B-cells. These cells belong to the adaptive immune system and are characterized by a highly specific response towards a pathogen.
5.7	antigen	Any substance, recognized by the immune system. Typically proteins are strong antigens.
5.7	antibody	Proteins produced by B-cells that specifically bind antigens. Antibodies are made of two heavy chain bound to two light chains.
5.7	dendritic cell	A type of cell of the immune system that "captures" pathogens and transports them to lymph nodes to allow T and B cells to study them.