

Terms for First Class (15 most important terms in **bold**)
Immunotherapy of Cancer, OLLI, Fall, 2020
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adaptive immunity

The adaptive system is B cells and T cells; the response adapts to specific features of the pathogen.

affinity

The strength of binding of one molecule to another at a single site.

antibody

A protein that binds specifically to a particular substance—called its antigen. Each antibody molecule has a unique structure that enables it to bind specifically to its corresponding antigen, but all antibodies have the same overall structure and are known collectively as immunoglobulins. Antibodies are produced by differentiated B cells (plasma cells) in response to infection or immunization, and bind to and neutralize pathogens or prepare them for uptake and destruction by phagocytes.

antigen

Any molecule that can bind specifically to an antibody or a T-cell receptor.

antitoxin

An antibody to a bacterial toxin (historical term).

B cell

One of the two types of antigen-specific lymphocytes responsible for adaptive immune responses, the other being the T cells. The function of B cells is to produce antibodies. B cells have highly diverse antigen receptors and are generated in the bone marrow throughout life, emerging to populate the blood and lymphoid tissues.

binding

non-covalent close interaction of molecules

bone marrow

The tissue where all the cellular elements of the blood—red blood cells, white blood cells, and platelets—are initially generated from hematopoietic stem cells. The bone marrow is also the site of further B-cell development in mammals and the source of stem cells that give rise to T cells on migration to the thymus. Thus, bone marrow transplantation can restore all the cellular elements of the blood, including the cells required for adaptive immune responses.

chemokines

Small chemoattractant protein that stimulates the migration and activation of cells, especially phagocytic cells and lymphocytes. Chemokines have a central role in inflammatory responses.

ciliated cells

Cells with tiny hair-like projections that sweep substances.

cytokines

Proteins made by a cell that affect the behavior of other cells, particularly immune cells. Cytokines made by lymphocytes are often called interleukins (abbreviated IL). Chemokines are a type of cytokine.

effector mechanisms

Those processes by which pathogens are destroyed and cleared from the body. Innate and adaptive immune responses use most of the same effector mechanisms to eliminate pathogens.

endotoxin

Toxins derived from bacterial cell walls released by damaged cells. They can potentially induce cytokine synthesis and in large amounts can cause a systemic reaction called septic shock or endotoxic shock.

erysipelas

Bacterial infection (*Streptococcus pyogenes*) of skin causing "red skin".

hematocrit

Percent of blood volume occupied by red blood cells.

hematopoietic stem cells

Type of cell in the bone marrow that can give rise to all the different blood cell types.

hormone

A chemical released into the blood to communicate with other cells.

humoral

Referring to effector proteins in the blood or body fluids, such as antibodies in adaptive immunity, or complement proteins in innate immunity/cellular

innate immunity

The various innate resistance mechanisms that are encountered first by a pathogen, before adaptive immunity is induced, such as anatomical barriers, antimicrobial peptides, the complement system, and macrophages and neutrophils carrying nonspecific pathogen-recognition receptors. Innate immunity is present in all individuals at all times, does not increase with repeated exposure to a given pathogen, and discriminates between groups of similar pathogens, rather than responding to a particular pathogen.

interferons

Several related families of cytokines originally named for their interference of viral replication.

leukocytes/white blood cells

A white blood cell. Leukocytes include lymphocytes, polymorphonuclear leukocytes, and monocytes.

lymph

The extracellular fluid that accumulates in tissues and is drained by lymphatic vessels that carry it through the lymphatic system to the thoracic duct, which returns it to the blood.

lymph nodes

A type of peripheral lymphoid organ present in many

locations throughout the body where lymphatic vessels converge.

lymphatic system

The system of lymph-carrying vessels and peripheral lymphoid tissues through which extracellular fluid from tissues passes before it is returned to the blood via the thoracic duct.

lymphocyte

A class of white blood cells that bear variable cell-surface receptors for antigen and are responsible for adaptive immune responses. There are two main types—B lymphocytes (B cells) and T lymphocytes (T cells)—which mediate humoral and cell-mediated immunity, respectively.

macrophage

Large mononuclear phagocytic cells present in most tissues that have many functions, such as scavenger cells, pathogen-recognition cells, production of pro-inflammatory cytokines. Macrophages arise both embryonically and from bone marrow precursors throughout life.

micron

A unit of distance, 1 millionth of a meter.

monocyte

Type of white blood cell with a bean-shaped nucleus; it is a precursor of tissue macrophages.

mucus

Sticky solution of proteins (mucins) secreted by goblet cells of internal epithelia, forming a protective layer on the epithelial surface.

nanometer

A unit of distance, 1 billionth of a meter, 1 thousandth of a micron.

neurotransmitter

A chemical messenger between neurons.

neutrophil/polymorphonuclear cell

The most numerous type of white blood cell in human peripheral blood. Neutrophils are phagocytic cells with a multilobed nucleus and granules that stain with neutral stains. They enter infected tissues and engulf and kill extracellular pathogens.

phagocyte/phagocytosis

The internalization of particulate matter by cells by a process of engulfment, in which the cell membrane surrounds the material, eventually forming an intracellular vesicle (phagosome) containing the ingested material.

receptor

A protein molecule that recognizes (binds to) another molecule and transmits a signal.

recognition

Specific binding of one molecule to another molecule

recombination activating genes (rag)

A pair of genes whose protein products prompt rearrangement of part of the genes of B cells and T cells to allow generation of a large variety of antibodies and T cell receptors.

red blood cells

Non-nucleated cells in the blood that carry oxygen.

repertoire

The diverse collection of antibodies and T cell receptors that recognize a broad range of antigens.

sarcoma

A metastatic cancer of connective tissue or other non-epithelial tissue.

spleen

An organ in the upper left side of the peritoneal cavity containing a red pulp, involved in removing senescent blood cells, and a white pulp of lymphoid cells that respond to antigens delivered to the spleen by the blood.

T cell

One of the two types of antigen-specific lymphocytes responsible for adaptive immune responses, the other being the B cells. T cells are responsible for the cell-mediated adaptive immune reactions. They originate in the bone marrow but undergo most of their development in the thymus. The highly variable antigen receptor on T cells is called the T-cell receptor. Effector T cells perform a variety of functions in an immune response, acting always by interacting with another cell in an antigen-specific manner. Some T cells activate macrophages, some help B cells produce antibody, and some kill cells infected with viruses and other intracellular pathogens.

T cell receptor (TCR)

The cell-surface receptor for antigen on T lymphocytes.

thymus

A central lymphoid organ, in which T cells develop, situated in the upper part of the middle of the chest, just behind the breastbone.

tolerance

The failure to respond to an antigen. Tolerance to self antigens is an essential feature of the immune system; when tolerance is lost, the immune system can destroy self tissues, as happens in autoimmune disease.