

The Immune System

By Lucy Simpson and Taylor Meyers

Two Types of Immunity

- Innate immunity- Innate immunity consists of external barriers formed by the skin and mucous membranes, plus a set of internal cellular and chemical defenses that defend against microbes that breach the external barriers.
- Acquired immunity develops only after exposure to microbes, abnormal body cells, or other foreign substances.

Innate Immunity

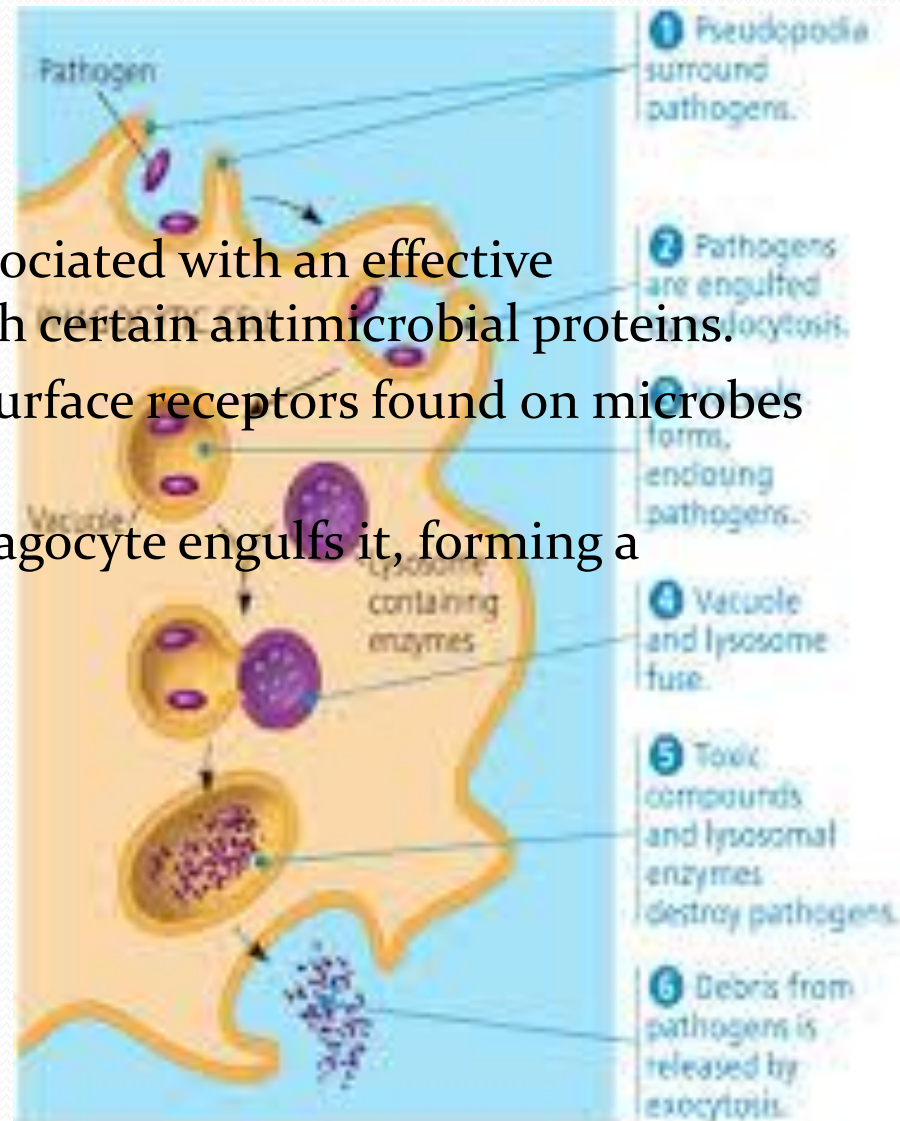
- Innate defenses are largely nonspecific, responding to a broad range of microbes.
- The internal defenses include macrophages and other phagocytic cells that ingest and destroy pathogens.
- The skin and mucous membrane provide first-line barriers to infection.
- Beyond their role as a physical barrier, the skin and mucous membranes counter pathogens with chemical defenses.
- In humans, for example, secretions from sebaceous and sweat glands give the skin a pH ranging from 3 to 5, which is acidic enough to prevent colonization by many microbes.

Adaptive/ Acquired Immunity

- only invertebrates have acquired immune system
- skin, digestive tract, stomach acid, mucus membrane, mucus are part of the Acquired Immunity
- Acquired defenses are highly specific and can distinguish one inducing agent from another.
- This recognition is achieved by white blood cells called lymphocytes, which produce two general types of immune responses which are the humoral and cell-mediated response
- In the humoral response, cells derived from B-lymphocytes secrete defensive proteins called antibodies that bind to microbes and target them for elimination.
- In the cell-mediated response, cytotoxic lymphocytes directly destroy infected body cells, cancer cells, or foreign tissue.

Phagocytes

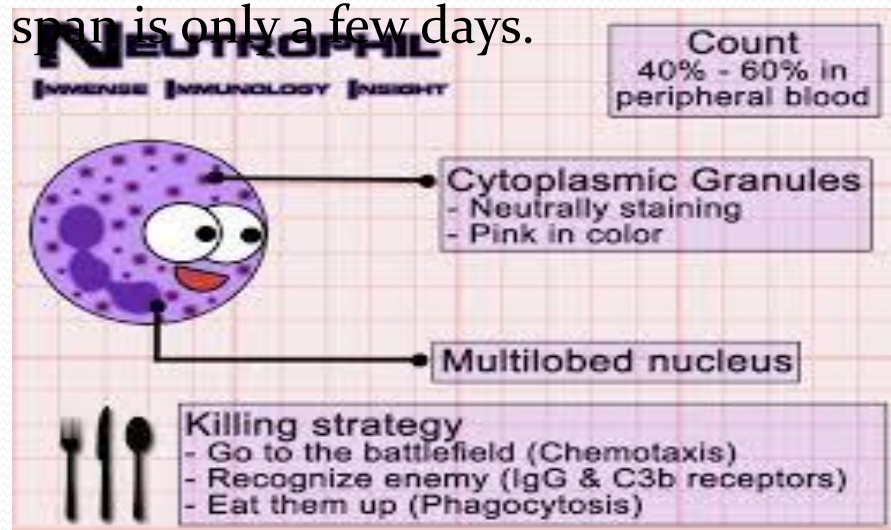
- Phagocyte function is intimately associated with an effective inflammatory response and also with certain antimicrobial proteins.
- Phagocytes attach to their prey via surface receptors found on microbes but not normal body cells.
- After attaching to the microbe, a phagocyte engulfs it, forming a vacuole that fuses with a lysosome.



▲ Figure 43.3 Phagocytosis. This schematic depicts events in the ingestion and destruction of a microbe by a typical phagocytic cell.

Neutrophils

- The phagocytic cells called neutrophils constitute about 60–70% of all white blood cells (leukocytes).
- Cells damaged by invading microbes release chemical signals that attract neutrophils from the blood.
- The neutrophils enter the infected tissue, engulfing and destroying microbes there.
- Neutrophils tend to self-destruct as they destroy foreign invaders, and their average life span is only a few days.













Eosinophils and Dendritic cells

- Eosinophils, about 1.5% of all leukocytes, contribute to defense against large parasitic invaders, such as the blood fluke, *Schistosoma mansoni*.
- Eosinophils position themselves against the external wall of a parasite and discharge destructive enzymes from cytoplasmic granules.
- Dendritic cells can ingest microbes like macrophages. However, their primary role is to stimulate the development of acquired immunity.

Antigens

- Antigens are native or foreign substances that causes the immune system to produce antibodies.
- A blood group system contains antigens controlled by a single gene
- Blood group antigens are either sugars or proteins, and they are attached to various components in the red blood cell membrane.

	Group A	Group B	Group AB	Group O
Red blood cell type				
Antibodies in Plasma	 Anti-B	 Anti-A	None	 Anti-A and Anti-B
Antigens in Red Blood Cell	 A antigen	 B antigen	 A and B antigens	None

Interferon

- Interferons are categorized as cytokines, small proteins that are involved in intercellular signaling.
- It is secreted by cells in response to stimulation by a virus or other foreign substance, but it does not directly inhibit the virus's multiplication. Instead, it stimulates the infected cells and those nearby to produce proteins that prevent the virus from replicating within them creating an end to the production.

Hepatitis

- Hepatitis is an inflammation of the liver. Which helps your body digest food, store energy, and remove poisons.
- Experience problems with excretory system, vomiting, jaundice, and loss of appetite.
- The alpha form of interferons has been approved for treating hepatitis

Mononucleosis (Kissing Disease)

- The virus that causes mono is transmitted through saliva, so you can get it through kissing, but you can also be exposed through a cough or sneeze, or by sharing a glass or food utensils with someone who has mono.
- The symptoms are basically pain, coughing, exhaustion, weakness, nausea, fever, and headaches.
- The only way to get over mono is to get as much rest as possible and to keep hydrated.

citations

- Pictures

<http://betournay.wikispaces.com/The+Immune+System>

<http://immense-immunology-insight.blogspot.com/2013/09/neutrophils-minamilitic-info.html>

- Info

AP Bio book

http://www.course-notes.org/Biology/Outlines/Chapter_43_The_Immune_System