Ch 43.1 Notes

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Vocab

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Pathogen: A bacterium, fungus, virus, or other disease-causing agent

Immune System: The body’s defenses which enables an animal to avoid or limit many infections

Innate Immunity: Includes barrier defenses, molecular recognition relies on a small set of receptor proteins that bind to molecules or structures that are absent from animal bodies but common to a group of viruses, bacteria, or other pathogens

Adaptive Immunity: Where molecular recognition relies on a vast arsenal of receptors, each of which recognizes a feature typically found only on a particular part of a particular molecule in a particular pathogen

Lysozyme: An enzyme that breaks down bacterial cell walls, further protects the insect digestive system.

Phagocytosis: Some hemocytes ingest and break down microorganisms, a process known as \_\_\_\_

Toll Like Receptor (TLR): A mammalian recognition protein similar to the Toll protein of insects

Neutrophils: Circulate in the blood, are attracted by signals from infected tissues and then engulf and destroy the infecting pathogens

Macrophages: Also known as “big eaters” are larger phagocytic cells

Dendritic Cells: Mainly populate tissues, such as skin, that contact the environment

Natural Killer Cells: Cells that circulate through the body and detect the abnormal array of surface proteins characteristic of some virus-infected and cancerous cells

Interferons: Proteins that provide innate defense by interfering with viral infections

Complement System: Consists of roughly 30 proteins in blood plasma

Inflammatory Response: A set of events triggered by signaling molecules released upon injury or infection

Histamine: Signaling molecules that are released by mast cells, immune cells found in connective tissue

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Pathogens

Disease causing agent

Makes its way past first line of defense

Innate vs Adaptive immunity

Timeline

Description automatically generatedInnate (nonspecific)- receptors common to pathogens, but absent

in animals located. Response to broad range of pathogens.

Adaptive (specific/acquired)- antibodies made and specific to receptors on pathogens

In innate immunity, recognition and response rely on traits common to groups of pathogens

Found in all plants/animals

* Invertebrates ONLY have this kind

Innate immunity of invertebrates

Physical barriers

Exoskeleton and intestine lining

* Chitin

Chemical barrier

Lysozyme

* Internal barriers

Immune cells trigger immune response

* Hemocytes- phagocytosis

Innate immunity of vertebrates

Barrier defenses

* Mucous membranes/skin
* Saliva/tears/mucus

Lysozyme

* Stomach acid= low pH
* Oil/sweat glands= low pH

Cellular innate defenses = Phagocytic cells (neutrophils/macrophages)

Both neutrophils and macrophages originate from the bone marrow.

Both are professional phagocytes, which are involved in the innate immunity by phagocytosis.

Both detect pathogens and help to initiate inflammation.

Both serve as antigen presenting cells.

Both can enhance inflammation as well as limit or suppress inflammation.

They promote tissue repair.

Neither neutrophils nor macrophages are capable of degrading or detoxifying components of animal venom.

Cellular innate defenses = Phagocytic cells (neutrophils/macrophages) differences

Macrophage

* Agranulocyte
* Large, round nucleus
* 2-8% of WBCs
* Mature in tissues
* Lifespan = weeks-months
* Monocytes from the circulation enter the peripheral tissues, becoming tissue macrophages, which engulf large particles and pathogens.

Neutrophil

* Granulocyte
* Multiple lobes in nucleus
* 50-70% of WBCs
* Mature in bone marrow
* Lifespan= several days
* Neutrophils are the first to attack bacteria at the site of infection. The action of neutrophils forms pus.

Cellular innate defenses - other cells

Dendritic cells

Eosinophils

Natural Killer cells

Inflammatory response

1. Activated macrophage secrete cytokines (signaling molecules)
2. Cytokines recruit neutrophils (phagocytic)
3. Mast cells release histamine
4. Histamine dilates nearby BV= increase blood supply
5. Increase blood= redness/increase temperature

Diagram

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