Chapter 11: Innate immunity Cheat Sheet

by sunnyeve33 via cheatography.com/196378/cs/41255/

Overview of Immune System

An immune response, coordinated by the immune system, aims to eliminate antigens through antibody generation.

The immune system consists of innate and adaptive branches with common features: Recognition of diverse pathogens Elimination of identified invaders Discrimination between self and foreign antigens

Innate immunity is non-specific and ancient, found in all eukaryotic organisms.

Adaptive immunity, unique to vertebrates, matures over time, tailors responses, and exhibits memory.

Microbiota play a crucial role in shaping and regulating immune responses.

Fever

Abnormally high body temperature induced by pyrogens.

Enhances antiviral effects, phagocyte efficiency, leukocyte production, limits pathogen growth, and promotes tissue repair.

Low-grade fever (37.5°C to 38.3°C) is protective; high fever (40.5°C) is life-threatening

Blood Components and Leukocytes

Blood Composition - Erythrocytes transport oxygen, platelets stem blood loss, leukocytes are crucial for the immune system. Leukocytes: granulocytes (visible granules) and agranulocytes (lack granules).

Leukocyte Activation Activated leukocytes release molecules for diverse functions. These molecules have diverse functions, including recruiting other leukocytes, restricting pathogen growth, triggering fever, and stimulating inflammation

Microbial Impact on Immunity

Changes in normal microbiota can confuse the immune system, linked to allergies and autoimmune diseases.

Hygiene Hypothesis suggests reduced microbial diversity hinders immune responses.

Mechanical and Chemical Barriers

Mechanical barriers (e.g., skin, tears, urine) hinder pathogen entry. Chemical barriers combat invaders (e.g., lysozyme, stomach acidity)

Antimicrobial peptides (AMPs) like defensins target pathogens by inserting into cell membranes.

The Plague

Signs and Symptoms: Fever, chills, weakness, abdominal pain, diarrhea, vomiting, bleeding, shock, tissue death.

Plague Doctors Distinctive attire: beaked mask, cane, long coat, gloves, hat. Protection against bacteria-laden secretions and aerosol droplets.

Mortality Historical impact with devastating outbreaks (Plague of Justinian, Black Plague, Great Plague of London, Third Pandemic).

Types of Leukocytes

Neutrophils: Most abundant, engage in phagocytosis. **Eosinophils**: Combat parasitic infections and allergic responses. **Basophils**: Involved in allergic responses and combat parasitic infections. **Mast Cells**: Release histamine, contribute to allergic responses and parasitic defense. **Monocytes**: Mature into macrophages, involved in chronic infections, inflammation, autoimmune disorders, and cancers. **Macrophages**: Highly phagocytic, destroy a wide range of pathogens, serve as antigen-presenting cells.

Blood and Lymphatic System

Blood delivers plasma to tissues, forming interstitial fluid

Lymphatic system collects and filters lymph (fluid), screening for pathogens in lymph nodes

Primary lymphoid tissues (thymus, bone marrow) produce and mature leukocytes.

Secondary lymphoid tissues (nodes, spleen, MALT) filter lymph

Yersinia pestis and Immune System

Infection Encounter Yersinia pestis faces non-specific immune defenses and leukocytes.

Evasion Strategies Counteracting defenses, reducing phagocytosis, producing a protective capsule, using injectosomes. Plasmids generate proteins suppressing lymphocyte chemotaxis.

Immune Evasion Strategies of Yersinia pestis

Subverts macrophages, impairs inflammatory response, targets natural killer cells, produces proteases.

Natural Killer Cells

Abundant in the liver, provide innate protection against viruses, bacteria, parasites, and tumor cells.

Treatment and Mortality of the Plague

Intravenous antibiotics (gentamicin, ciprofloxacin) recommended for Yersinia pestis.

Inflammatory Response

Inflammation is essential for innate immunity and healing.

Three phases: vascular changes, leukocyte recruitment, resolution.

Chronic inflammation exacerbates tissue injury and promotes diseases

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