Mechanisms of innate immunity

2. **Physiologic barriers:**

The physiologic barriers that contribute to innate immunity include the following:

- **Gastric acidity** is an innate physiologic barrier to infection because very few ingested microorganisms can survive the low pH of stomach contents.

- **Lysozyme, interferon, and complement** are some of the soluble mediators of innate immunity.

A. **Lysozyme** has **antibacterial** effect due to its action on the bacterial cell wall.

B. **Interferons** are secreted by cells in response to products of viral infected cells. These substances have a general **antiviral** effect by preventing the synthesis of viral structural proteins.

C. **Complement** is a group of serum-soluble substances that when activated **damage the cell membrane**.

- There are certain types of **molecules that are unique to microbes** and are never found in multicellular organisms. The ability of the host to immediately recognize and combat invaders displaying such molecules is a strong feature of innate immunity.
3. **Phagocytosis**:

- Phagocytosis is another important defense mechanism of the innate immunity. Phagocytosis is a process of **ingestion** of extracellular particulate material by **certain specialized cells**, such as blood monocytes, neutrophils, and tissue macrophages.

- It is a type of **endocytosis** in which invading microorganisms present in the environment are ingested by the phagocytic cells.

- In this process, plasma membrane of the cell expands around the particulate material, which may include whole pathogenic microorganisms to form large vesicles called **phagosomes**.
4. **Inflammatory responses:**

- **Tissue damage** caused by a wound or by an invading pathogenic microorganism induces a complex sequence of events, collectively known as the **inflammatory responses**.

- The end result of inflammation may be the activation of a specific immune response to the invasion or clearance of the invader by components of the innate immune system. The four key features of inflammatory responses are **redness**, rise in **temperature**, **pain**, and **swelling**.
Mediators of inflammatory reactions:

- **Histamine**: It is a chemical substance produced by a variety of cells in response to tissue injury. It is one of the principal mediators of the inflammatory response. It binds to receptors on nearby capillaries and venules, causing vasodilatation and increased permeability.
**Kinins:** These are other important mediators of inflammatory response. They are normally present in blood plasma in an inactive form. Tissue injury activates these small peptides, which then cause vasodilatation and increased permeability of capillaries. **Bradykinin** also stimulates pain receptors in the skin. This effect probably serves a protective role because pain normally causes an individual to protect the injured area.
**Acute-phase proteins:** These include C-reactive proteins and mannose-binding proteins (turning on [activating] the complement system) that form part of the innate immunity. These proteins are produced at an increased concentration in plasma during acute-phase reaction, as a nonspecific response to microorganisms and other forms of tissue injury.

They are synthesized in the liver in response to cytokines called proinflammatory cytokines, namely, interleukin-1 (IL-1), interleukin-6 (IL-6), and tissue necrosis factor (TNF). They are called proinflammatory cytokines because they enhance the inflammatory responses.
**Defensins**: They are another important component of the innate immunity. They are producing pores in membrane of the bacteria and thereby kill them.

These are present mainly in the lower respiratory tract and gastrointestinal tract. The -defensins also exhibit antiviral activity.
Thanks for your attention

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