

LECTURE 6

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THE ACUTE INFLAMMATORY RESPONSE

Read Chapter 15 through page 302 before proceeding.

Inflammation vs. Infection

The terms, **inflammation** and **infection**, are often mistakenly considered to mean the same thing. Such is not always the case. Infections can and do cause inflammatory reactions, but inflammation can occur without infection. Within the body, any tissue damage results in an inflammatory response characterized by **erythema** (redness) of the affected area, increased warmth, localized edema, and pain or itching. Therefore, anything that causes tissue damage can cause inflammation. And, the molecular products of damaged tissue stimulate pain receptors (nociceptors) producing pain if intense or itching if mild. Infectious microorganisms that gain access across any of the body's defense barriers (infection) can cause tissue damage and result in inflammation. But microorganisms are not always the culprits. For example, the degenerative damage to joint cartilage can cause joint inflammation (degenerative arthritis) without microbial involvement (aseptic). Steroids that mimic the effect of the adrenal corticosteroid, cortisol, are anti-inflammatory in nature and relieve the signs and symptoms of inflammation, while antibiotics are needed to alleviate infections. Non-steroidal anti-inflammatory drugs (NSAID's) and antihistamines are options in mild inflammations.

Pathophysiology of Inflammation

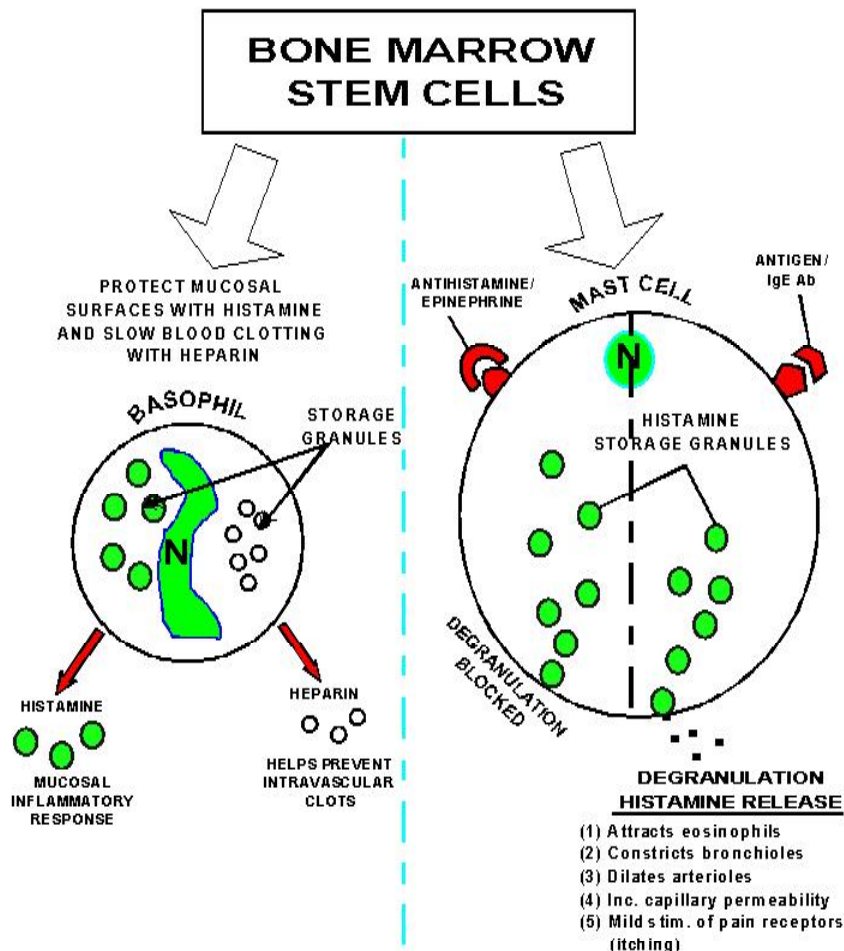
Understanding the physiological disruptions that produce the signs and symptoms of inflammation are basic to understanding the inflammatory process. Many of the signs and symptoms are the result of local changes in cardiovascular blood supply to the affected area. Erythema and increased warmth result from local vasodilation in the affected area bringing increased quantities of warm, core temperature blood into the area. Increased capillary permeability in inflamed tissues results in greater filtration and a localized edema. These cardiovascular changes can be interpreted as the body's attempt to increase blood flow to the affected area delivering more WBC's and nutrients for repair of the damage. Pain and itching result whenever nociceptors are stimulated as they definitely would be in the area of tissue damage. In the event of injury involving a defense barrier of the body, both initial tissue injury and resultant microbial contamination yielding further damage are real possibilities.

Given these signs of inflammation and the knowledge that **basophil** WBC's occur in blood while **Mast Cells** are prevalent in all tissues, some important physiological

connections can be made. Both basophils and Mast Cells store and can release a material termed **Histamine**. Interestingly, histamine is capable of producing the effects described above as **characteristic** of inflammation, as well as some others. Stored histamine is released in the initial phases of tissue damage as a protective measure by the body to speed recovery from injury. As a result of its release, the increased blood flow to the area hastens repair of the injured tissue. But in some instances, the histamine response itself can be damaging. For example, IgE antibodies that are associated with hypersensitivity allergic responses can cause **Mast Cell Degranulation** with release of histamine. Should this occur in the lungs, bronchiolar airways react differently from blood vessels. They constrict rather than dilate and restrict airflow. Such a reactive airway condition is termed **asthma** and can be induced by allergies. Contact allergies can cause itching as the released histamine stimulates pain receptors in the skin, eyes or nasal mucosa.

The roles of basophils and mast cells are summarized in the chart below:

INFLAMMATORY (HISTAMINE) RESPONSE



Review Questions:

1. Compare and contrast “inflammation” and “infection”.
2. How do the commonly used “desensitization” injections reduce the severity of allergic responses?
3. Discuss the role of “Mast Cell Degranulation” in inflammation.
4. Why are antihistamines and epinephrine useful in preventing and/or relieving an allergic asthma attack.

DISCUSSION QUESTION: (Post answer to the “Patho Discussion Group”)

1. List the common signs of inflammation and describe the physiology of their underlying causes.