inflammation

محاضرات الجراحة / الفصل الاول

المحاضرة الاولى

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Inflammation *(battle)*

Inflammation (from Latin: inflammare) is local response of living tissue to any injurious agent.

(protective response needed for survival)

BATTLE

ENEMY(injurious agent) **DEFENCE**(leukocytes, Abs)

Steps of inflammation

The phases of inflammation are: (5 Rs)

1. Recognition of the injurious agent.
2. Recruitment of inflammatory cells (leukocytes).
3. Removal of the injurious agent.
4. Regulation (control) of the inflammatory process.
5. Resolution / Repair

causes

1. Physical:

1. Burns
2. Frostbite
3. Physical injury, blunt or penetrating
4. Foreign bodies, including splinters, dirt and debris
5. Trauma
6. Ionizing radiation

2. Biological:

1)Infection by pathogens

2)Immune reactions due to hypersensitivity

3)Stress

3. *Chemical:*

1)Chemical irritants

2)Toxins

3)Alcohol

4. *Psychological:*

Excitement

Cardinal signs

1. Dolor (pain)
2. Calor (heat)
3. Rubor (redness)
4. Tumor (swelling)
5. Functio laesa (loss of function)

Types

- **Acute inflammation** is the *initial* response of the body to harmful stimuli and is achieved by the increased movement of plasma and leukocytes (especially granulocytes) from the blood into the injured tissues. A series of biochemical events propagates and matures the inflammatory response, involving the local vascular system, the immune system, and various cells within the injured tissue

Prolonged inflammation, known as **chronic inflammation**, leads to a progressive shift in the type of cells present at the site of inflammation, such as mononuclear cells, and is characterized by simultaneous destruction and healing of the tissue from the inflammatory process.

Comparison between acute and chronic inflammation:

	Acute	Chronic
1. Causative agent	Bacterial pathogens, injured tissues	Persistent acute inflammation due to non-degradable pathogens, viral infection, persistent foreign bodies, or autoimmune reactions
2. Major cells involved	neutrophils (primarily), basophils (inflammatory response), and eosinophils (response to helminth worms and parasites)	Mononuclear cells (monocytes, macrophages, lymphocytes, plasma cells), fibroblasts

3. Tissue injury	Mild, self limited	Sever, progressive
4. Onset	Rapid in min. or hrs	Slow. days
5. Signs: local & systemic	prominent	Less prominent
6. Outcomes	Resolution, abscess formation, chronic inflammation	Tissue destruction, fibrosis, necrosis

Morphologic patterns

Specific patterns of acute and chronic inflammation are seen during particular situations that arise in the body, such as when inflammation occurs on an epithelial surface, or pyogenic bacteria are involved.

1. Granulomatous inflammation: Characterized by the formation of granuloma. (tuberculosis)

2. **Fibrinous inflammation:** Inflammation resulting in a large increase in vascular permeability allows fibrin to pass through the blood vessels.

(Pseudomembranous colitis), pseudomembranous tubes can be formed.

3. Purulent inflammation:

Inflammation resulting in large amount of pus, which consists of neutrophils, dead cells, and fluid. Infection by pyogenic bacteria such as staphylococci is characteristic of this kind of inflammation. Large, localised collections of pus enclosed by surrounding tissues are called abscesses.

4. Serous inflammation:

Characterized by the copious effusion of non-viscous serous fluid, commonly produced by mesothelial cells of serous membranes, but may be derived from blood plasma. Skin blisters exemplify this pattern of inflammation.

5. Ulcerative inflammation:

Inflammation occurring near an epithelium can result in the necrotic loss of tissue from the surface, exposing lower layers. The subsequent excavation in the epithelium is known as an ulcer.

Outcomes

The outcome in a particular circumstance will be determined by the tissue in which the injury has occurred and the injurious agent that is causing it. Here are the possible outcomes to inflammation:

1. Resolution

The complete restoration of the inflamed tissue back to a normal status. Inflammatory measures such as vasodilation, chemical production, and leukocyte infiltration cease, and damaged parenchymal cells regenerate. In situations where limited or short-lived inflammation has occurred this is usually the outcome.

2. Fibrosis

Large amounts of tissue destruction, or damage in tissues unable to regenerate, cannot be regenerated completely by the body. Fibrous scarring occurs in these areas of damage, forming a scar composed primarily of collagen. The scar will not contain any specialized structures, such as parenchymal cells, hence functional impairment may occur

3. Abscess formation

A cavity is formed containing pus, an opaque liquid containing dead white blood cells and bacteria with general debris from destroyed cells.

4. **Chronic inflammation**

In acute inflammation, if the injurious agent persists then chronic inflammation will ensue. This process, marked by inflammation lasting many days, months or even years, may lead to the formation of a chronic wound. Chronic inflammation is characterized by the dominating presence of macrophages in the injured tissue.

Thank you