#DST * Inflamation * Dr. Rakan Haddad

* Inflamation *

What is it?

The response of vascularized tissue to injury (infections tissue, damage).

Not a dead body "cadavers".

How?

By the recruitment of specific cells and molecules through blood circulation to the sites in need to eliminate the "offending agent".

* Simply

Inflamation is a defense mechanism to protect vascularized tissues.

⇒ Although Inflamations can be considered a "harmful reaction", they actually act as a protective response that are essential for survival.

⇒ gets rid of the cause and the consequences.

⇝ Specific cells such as:- phagocytes, leukocytes, anti-bodies and complement proteins act as mediators that circulate the blood, where they are sequestered so they cannot damage normal tissues. (isolated)

→ Some of the cells which are involved in such responses reside in tissues to identify any possible threat.

* Simply the process of inflammation will deliver leukocytes and proteins to foreign invaders if noticed activating the defensive cells to eliminate the harmful unwanted substance.

Inflamations ← Healing wounds & damaged tissue

Inflamations → Protection :- Prevents the disease from spreading to the body

Without immunity a simple disease such as tonsilitis can be fatal

Immunodeficiency ⇝ No inflammatory response

* Steps :- The 5 R's

1. Recognition.
2. WBC's & PI. proteins are Recruited to the injury site.
3. WBC's & PI. proteins work together to Remove the enemy
4. Reaction is then controlled and terminated. (Regulation)
5. Repair of damaged tissue (regeneration & fibrosis)

Explanation:

• The offending agent which is the one that provides a stimulus, which is located in extravascular tissues, is recognized by host cells and molecules.

Your cells can screen and recognize the offending agent which causes the stimulus and in response they secrete chemical mediators through mainly macrophages and neutrophils also lymphocytes also called cytokines and then they recruit:

• Leukocytes and plasma proteins are recruited from the circulation to the site where the offending agent is located.

• The leukocytes and proteins are activated and work together to destroy and eliminate the offending substance.

-the doctor calls the neutrophils micky mouse cells because they have 3-5 nuclei also called polymorphonuclear leukocytes(scientific name).

So the recruited cells make changes some of which increased vascular permeability and vasodilation which results in swelling(edema) and the macrophages will be stimulated more to eliminate and eat the offending agent.

The macrophage cell when it is circulating in the blood vessels we call it monocyte it has a short life span if not used it will die in a short time however when it is recruited to the tissues we call it tissue macrophage it has more organelles in the cytoplasm and the cytoplasm gets larger it gets matured.

When we talk about cell differentiation (maturation) when we go from the most primitive (mother cell) to terminally differentiated cells nucleus gets smaller cytoplasm gets larger and the cell will have more organelles and nucleus to cytoplasm ratio gets smaller.

probably the last step in the response is the repair so those steps which we talked about are the major steps of the inflammatory response. And in particular in acute response.

Further explanation from the book:

When a microbe enters a tissue or the tissue is injured, the presence of the infection or damage is sensed by resident cells, including macrophages, dendritic cells, mast cells, and other cell types. These cells secrete molecules (cytokines and other mediators) that induce and regulate the subsequent inflammatory response. Inflammatory mediators are also produced from plasma proteins that react to the microbes or to products of necrotic cells. Some of these mediators promote the efflux of plasma and the recruitment of circulating leukocytes to the site where the offending agent is located. Mediators also activate the recruited leukocytes, enhancing their ability to destroy and remove the offending agent. Understanding the role of chemical mediators is important because most anti-inflammatory drugs target specific mediators. We shall discuss the mediators of inflammation in detail later, after we review the main steps in inflammatory reactions.

-know that these steps happen in sequence however there can be some overlap between these steps and in the end when the invader is eliminated you control the inflammatory response because you don't need it anymore and it could damage the tissues if not controlled.

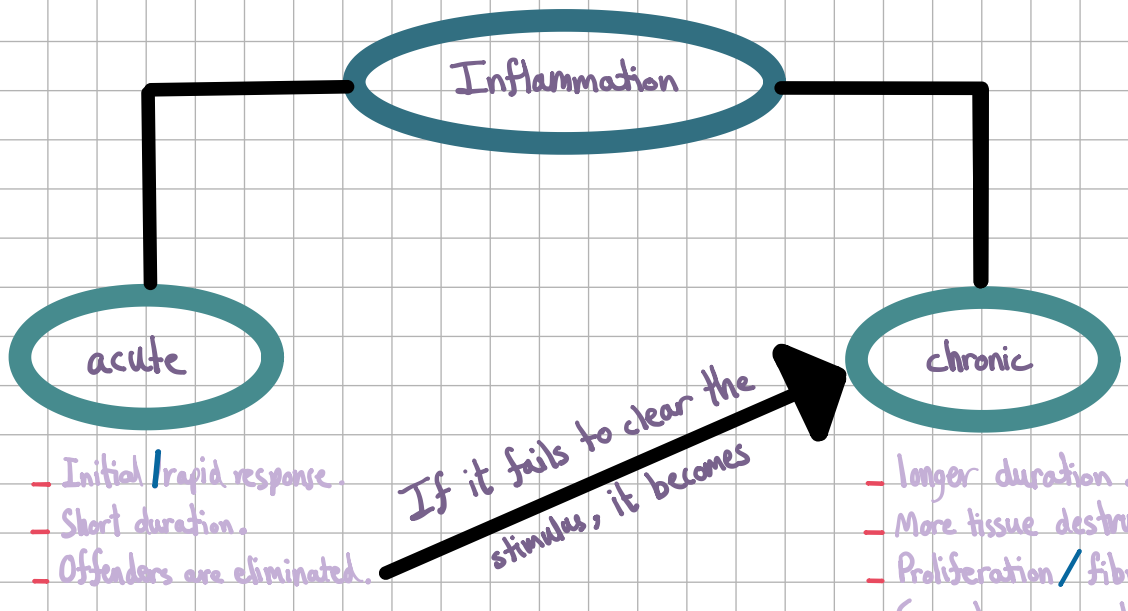

TABLE 3.1 Features of Acute and Chronic Inflammation

Feature	Acute	Chronic
Onset	Fast: minutes or hours	Slow: days
Cellular infiltrate	Mainly neutrophils	Monocytes/macrophages and lymphocytes
Tissue injury, fibrosis	Usually mild and self-limited	May be severe and progressive
Local and systemic signs	Prominent	Less / more damage

-local and systemic signs:

Sometimes the inflammation can be local such as the swelling of your appendix or Tonsils but you also suffer from fever which your whole body feels it so it is systemic and when you find -after doing a blood sample test- that the white blood cells count has increased or the Creactive protein level elevated this is systemic signs.

In acute the signs are prominent because at first there is high elevated levels of what we talked about so you will feel tired and rest in your home however chronic even though it is less prominent it causes you more damage since it acts upon you over long period of times.

For ex. The liver weighs 1.3 kg and you remain normal although 85 percent of it has been damaged because the reserve capacity of it is high so when you begin to feel sick you will be certainly in a bad state and condition the same for if you lost one of your kidneys.

-To know fibrosis refers to the healing of the wound and since you sustain more damage in chronic inflammation fibrosis will be greater.
Cellular filtrate looking at microscope after taking a section from inflamed tissue and it means what are the main cells present in this tissue.

there will be a question about it memorize it well the doctor said.

-chronic diseases are insidious.
Hepatitis B/C acute attacks with chronic inflammation
Hypertension/diabetes are chronic diseases so watch out for yourselfs
Hypertension could cause heartfailure.
The external manifestations of inflammation, often called its cardinal signs, are heat (calor in Latin), redness (rubor), swelling (tumor), pain (dolor), and loss of function (functio laesa)

Cardinal signs of inflammation:

- HEAT (calor)
- REDNESS (rubor)
- SWELLING (tumor)
- PAIN (dolor)
- LOSS OF FUNCTION (function laesa)

Can inflammation be bad?

- Too much...damage
- Too little... damage
- Misdirected inflammation...autoimmune diseases and allergies
- Chronic inflammation...chronic diseases

TABLE 3.2 Disorders Caused by Inflammatory Reactions

Disorders	Cells and Molecules Involved in Injury
Acute	
Acute respiratory distress syndrome Lungs	Neutrophils
Asthma Lungs	Eosinophils; IgE antibodies
Glomerulonephritis Kidneys	Antibodies and complement; neutrophils, monocytes
Septic shock blood	Cytokines
Chronic	
Arthritis Joints	Lymphocytes, macrophages; antibodies?
Asthma Lungs	Eosinophils; IgE antibodies
Atherosclerosis Heart	Macrophages; lymphocytes
Pulmonary fibrosis Heart	Macrophages; fibroblasts

* Inflammations can sometime cause diseases due to the tissue damage it causes, but can be repaired. The real danger occurs when it's misdirected attacking healthy tissues, aka autoimmune disease.

INFECTIONS	Bacteria, fungi, viruses, parasites And their toxins
NECROSIS	Ischemia, trauma, physical and chemical injuries, burns, frostbite, irradiation
FOREIGN BODIES	Splinters, dirt, urate crystals (gout), Cholesterol crystals (atherosclerosis)
IMMUNE REACTIONS	Allergies and autoimmune diseases

_Dr. Rakan Haddad