Doctor 022

PATHOLOGY

Sheet no. 1

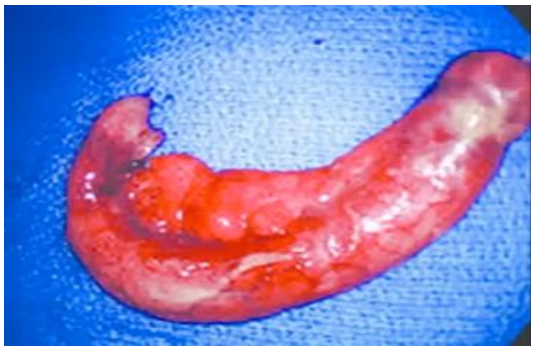
Writer : فريق طوفان الأقصى

Corrector : فريق طوفان الأقصى

Doctor :Dr.Mousa Alabbadi

Inflammation 1

In this picture we have an organ called appendix. In this case, it was removed from the patient's body because of acute appendicitis (cardinal signs are : red, enlarged, congested/swollen appendix).

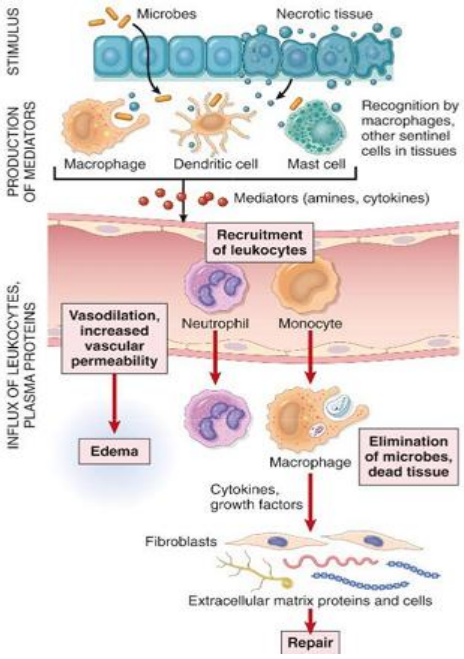


INFLAMMATION: Response of vascularized tissue to injury (infections or tissue damage).

This process is done by the recruitment of cells and molecules from circulation to the sites of need to eliminate the offending agent.

Inflammation in general is protective (though it is bothersome); With no inflammation: infections can be fatal; wounds would never heal, and injured tissue may sustain permanent damage.

This picture is a summary of the 5 inflammation steps:



- **First,** we have an offending microbe (stimulus) which will cause tissue damage.
- Our cells will recognize either the microbe or the damaged tissue.
- This stimulates many inflammatory cells (macrophages, dendritic cells and mast cells) which will secrete chemical mediators of inflammation like amines that cause vasodilation (increased vascular permeability), and the recruitment of inflammatory cells like monocytes in the tissue to eliminate the microbe.
- As soon as the monocyte leaves the blood vessel into the tissue it will be transformed into the activated form which is called tissue macrophage. There are other cells called neutrophils (micky mouse cells because they have 3 nuclei also called polymorphonuclear leukocytes (scientific name) that will secrete chemical mediators too like cytokines and growth factors.

- Then the recruitment of fibroblasts and extracellular matrix (ECM) proteins will start to initiate the **reparative** process and repair the damaged tissue (regeneration and fibrosis).

WE HAVE A LOOP CALLED THE 5 RS:

Typical inflamm. Rx. steps:

• Offending agent recognized by cells and molecules

• WBCs & Pl. proteins recruited to injury site

• WBCs and Pl. proteins work together to destroy and eliminate the enemy • Rx. Is then controlled and terminated.

• Repair of damaged tissue (regeneration & fibrosis).

TWO CATEGORIES OF INFLAMMATION

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

Acute: حادة ,Chronic : مزمنة

The fast onset means that in minutes to hours, the symptoms and signs will appear, while the slow onset of chronic takes days , weeks or months or sometimes doesn't show real symptoms till there is a severe organ damage . (it is insidious)

Cellular infiltrate: if you look to tissue sectional of appendix with acute inflammation, neutrophils are predominant (the whole prominent mark of acute inflammation). Neutrophils are white blood cells ,have 3 to 5 nuclei.

Cellular infiltrate according to chronic inflammation includes plasma cells, too.

Mild and Self-limited : taking antibiotics (supportive treatment)for example is enough to back to normal.

If the chronic inflammation is not stopped it will end up organ injuries.

Chronic inflammation has less prominent signs that makes it more dangerous.

In some situations, a chronic inflammation comes with acute attacks (chronic inflammatory disease with acute exacerbations),where you can see neutrophils on the top of macrophages, melanocytes…

CARDINAL SIGNS OF INFLAMMATION

- **HEAT (calor)**
- **REDNESS (rubor)**
- **SWELLING (tumor)**
- **PAIN (dolor)**
- **LOSS OF FUNCTION (functiolaesa)**

CAN INFLAMMATION BE BAD?

Of course, yes

5 mechanisms of bad sequences of inflammation:

- **Too much** inflammation causes**…damage**
- **Too little** inflammation causes **… damage** if don't have proper inflammatory response, your immune system not well equipped, you will exposure to multiple infections.
- **Misdirected inflammation…**eg**. autoimmune diseases** (your immune response will damage your tissue)**and allergies.**
- **Chronic inflammation…chronic diseases,** where organs are damaged.

EXAMPLES:

TABLE 3.2 Disorders Caused by Inflammatory Reactions

Disorders	Cells and Molecules Involved in Injury
Acute	
Acute respiratory distress syndrome (ARDS) Patients with many organ Failures	Neutrophils
Asthma	Eosinophils; IgE antibodies
Glomerulonephritis	Antibodies and complement; neutrophils, monocytes injuries in kidney and neurons
Septic shock (Septicemia disease) تسمم في الدم	Cytokines
Chronic	
Arthritis	Lymphocytes, macrophages; antibodies?
Asthma	Eosinophils; IgE antibodies
Atherosclerosis	Macrophages; lymphocytes , Platelets
Pulmonary fibrosis → Lungs	Macrophages; fibroblasts

Listed are selected examples of diseases in which the inflammatory response plays a significant role in tissue injury. Some, such as asthma, can present with acute inflammation or a chronic illness with repeated bouts of acute exacerbation. These diseases and their pathogenesis are discussed in relevant chapters.

CAUSES OF INFLAMMATION:

INFECTIONS	**Bacteria, fungi, viruses, parasites And their toxins**
NECROSIS Cell death	**Ischemia, trauma, physical and chemical injuries, burns, frostbite, irradiation** All of these can damage the blood vessels causing nicroses
FOREIGN BODIES	**Splinters, dirt, urate crystals (gout), Cholesterol crystals (atherosclerosis)** شظية Deposited in the big toe joint النقرص causing acute gout arthritis تصلب الشرايين
IMMUNE REACTIONS	**Allergies and autoimmune diseases**

RECOGNITION OF MICROBES AND DAMAGED CELLS:

- **First step in inflammation Response**

– Cellular receptors: Toll-like R (TLRs); on membranes and endosomes. Recognize *Pathogen* Associated Molecular Patterns (PAMPs)

Cellular receptors are normally present in membranes and endosomes . PAMPS recognize actions by viruses or microbes .

– Sensors of cell damage: recognize *Damage* Associated Molecular Patterns (DAMPs) such as uric acid, ATP, K, & DNA. Consequently, multiple cytoplasmic proteins gets activated (called inflammasomes)

– Circulating proteins: complement system, mannosebinding lectins and collectins

ACUTE INFLAMMATION

• The first phase of acute inflammation is called the vascular-cellular phase it is composed of **3 major components:**

1st phase: Blood Vessels dilatation

2nd phase: Increased Vascular permeability

where cells proteins and fluids will escape from vascular compartment to interstitial leading to edema

3rd phase: Emigration of White Blood Cells from

vascular to interstitial

نهاية الشيت

ملاحظة : الدكتور شدد على مراجعة ال summary الموجود ضمن السلايدات .