Pathology

INFLAMMATION

LECTURE (4)

As a doctor you should know what can threaten your patient's life
you should know what makes your patient suffers from pain
THAT'S WHY YOU LEARN PATHOLOGY

Definition: BLUE Examples:GREEN Important: RED Extra explanation:GRAY Disease names: **UNDERLINE**.

Lecture(4) Outlines

- Definition of chronic inflammation.
- Characteristics of chronic inflammation.
- Causes of chronic inflammation.
- Examples of chronic inflammation.
- Acute vs chronic inflammation.

Definition of chronic inflammation

Chronic inflammation

is a type of inflammation that is characterized by **prolonged** and **persistent** inflammation (weeks to years), in which continuing inflammation, tissue injury, and healing (often by fibrosis), happens at the same time. In contrast with acute inflammation, which is characterized by vascular changes, edema, and a predominantly neutrophilic infiltrate, chronic inflammation is characterized by a different set of reactions.

Fibrosis

a deposition of masses of collagen and fibroblasts on the site of injury, which will help in maintaining the structure of the tissue.
(will be explained in the last lecture of inflammation)

Amyloid

It is a protein secreted by the **liver**. It is secreted in large amounts when there is **chronic inflammation**. It accumulates in the blood vessels, and kidneys causing problems it's not seen in acute Inflammation. Note that this process requires long periods of time.

Characteristics of chronic inflammation

- Persistent inflammation
- Primary cells are : **Macrophages**, **Lymphocytes** and **Plasma cells**
- Tissue destruction, because of the products of inflammatory cells.
- Repair, by fibrosis and angiogenesis

Important note: although neutrophils are the primary cells for acute inflammation, they can be seen in huge numbers in many forms of chronic inflammation, as a result of either persistent microbes or necrotic cells.

Angiogenesis is the formation of new small blood vessels from old blood vessels, this process can be seen in connective tissue, it helps by **increasing** the blood supply coming to the inflamed area and help in the healing process and they are mediated by some chemical mediators (**vascular proliferation factor** / **vascular derived proliferation factor**) (**VPF/VDPF**).

Causes of chronic inflammation

Persistent infectious microbes

By microbes that are difficult to eradicate. These include:
- Mycobacterium TB
- Treponema pallidum
- certain viruses/fungi

all of which cause persistent infection and elicit a delayed-type hypersensitivity

Immune-mediated inflammatory diseases
(Hypersensitivity disease)

When immune reactions develop against the affected person's own tissues, in such diseases autoantigens evoke an immune reaction that results in tissue damage and persistent inflammation.

Prolonged exposure to potentially toxic agents

Nondegradable exogenous materials:
- Particulate silica that may induce a chronic inflammatory response in lung

Endogenous agents:
- such as cholesterol crystals that may contribute to atherosclerosis

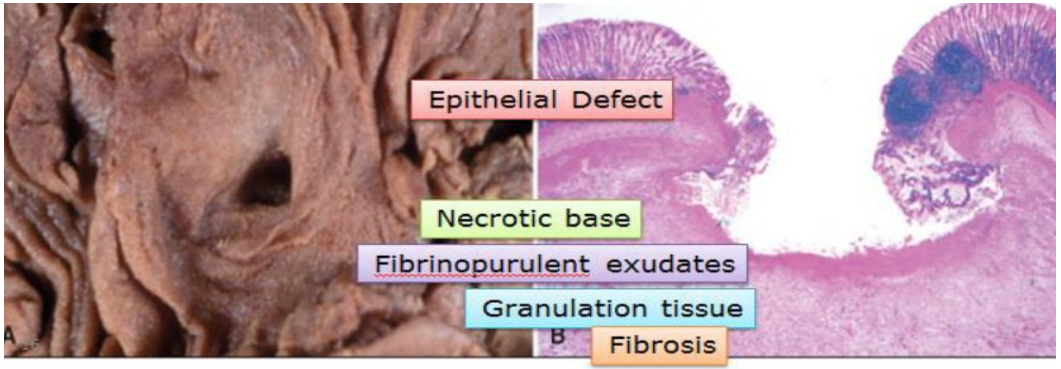
Mild forms of chronic inflammation

Imp. in the pathogenesis of many diseases like neurodegenerative disorders, alzheimer disease, atherosclerosis metabolic syndromes , type 2 diabetes and cancer in which inflammatory reaction promote tumor development.

Examples of chronic inflammation

1) Ulcer:

A focal loss of the mucosal layer in a part of the GIT (Gastrointestinal Tract), usually in the **duodenum** or **stomach**.



- **Note**: ulcers have acute and chronic inflammation at the same time; they coexist(يتعايشوا سوى).
- **Microscopically:** we find epithelial necrosis fibrin and some acute inflammatory cells on the surface and under it, a layer of inflammatory vascular granulation tissue.
- it is vascular because chronic inflammation is associated with **angiogenesis*** (formation of new blood vessels) so it has a vascular growth factor.

- **Angiogenesis*:** تكوّن أوعية دموية جديدة

Examples of chronic inflammation

2) Sinus:

- inflammatory tract **with one opening** (**e.g. pilonidal sinus in the lower back**).
- It contains pus **+** ingrown hairs (foreign body) ⇨ chronic inflammatory reaction (very common)

3) Fistula: ناسور شرجي

- chronic inflammatory tract that **has two openings** between two various epithelia (usually starts from the colon and open in the skin (حكة وافرازات تلوث الملابس) (common) (nonspecific)
- **Note:** Parasitic infections may be lead to chronic inflammation.
- **eg: schistosomiasis*** (associated with a lot of eosinophils)

Schistosomiasis*: بلهارسيا

Acute Vs. Chronic inflammation

Feature	Acute	Chronic
Onset	Fast, minutes or hours	Slow, days
Cellular infiltrate (migration of cells)	Mainly neutrophils	Monocytes/macrophages and lymphocytes
Tissue injury, fibrosis	Usually mild and self-limited	Often severe and progressive
Local and systemic signs	Prominent	Less prominent, maybe subtle
Events	Vascular changes Neutrophils recruitment Mediators	Angiogenesis Mononuclear Fibrosis (scar)

Acute Vs. Chronic inflammation

Feature	Acute	Chronic
Caused by	Infarction Bacterial infections Toxins Trauma	Viral infections Chronic infections Persistent injury Autoimmune diseases
Duration	Days to weeks	Months to years
Inflammatory cells	**always**: Neutrophils **sometimes:** eosinophils & macrophages.	-Lymphocytes & plasma cells -may or not contain eosinophils -may or not contain macrophages
increased cells can characterizes :	Neutrophils	Lymphocytes

Remember:

- Macrophages are found in both acute and chronic, but are increased at the end of acute inflammation
- Neutrophils are the most important cell in acute inflammation, and it may have an increase in number during acute inflammation.
- Granuloma characterizes chronic inflammation (specific)

What is a **granulation tissue** and what is a **granulomatous inflammation**?

granulation tissue

contains **new small blood vessels, fibroblasts**, and **mononuclear cells** in an edematous extracellular matrix; formation of **granulation tissue** is part of the repair response.

granulomatous inflammation

A granulomatous inflammation is a form of chronic inflammation. When we say **granuloma**, we mean the **second one.**

- **Granulation tissue*** → non specific
- **Granuloma**** → specific

Granulation tissue* النسيج الحبيبي
Granuloma** **الورم الحبيبي**

A) granulation tissue and chronic inflammation

Granulation tissue is often associated with chronic inflammation (non specific). It represents a healing phase following acute inflammation. Endothelial proliferation is prominent.

How is the granulation tissue formed?

1) At the beginning, the interstitial tissue is edematous (has edema, exudate)which has acute and chronic inflammatory cells.
2) After a while, the acute inflammatory cells go away and it is dominated by chronic inflammatory cells.
3) Finally, fibroblasts dominate the interstitial tissue.

B) Granulomatous inflammation

Characteristic of this type of chronic inflammation are **granulomas** which form **0.5** to **2.0** mm aggregations* of epithelioid macrophages surrounded by a rim of lymphocytes. Epithelioid macrophages have an appearance suggestive of squamous epithelial cells due to their abundant** **pink** cytoplasm.

Granulomatous inflammation may be caused by:

foreign bodies , mycobacterial infection for example: Tuberculosis, leprosy, schistosomiasis, the gamma of tertiary syphilis, cat-scratch disease, lymphogranuloma venereum, tularemia.

aggregations* تجمعات
abundant** غزيرة

- **Sometimes the granuloma contains caseous necrosis as in TB.**

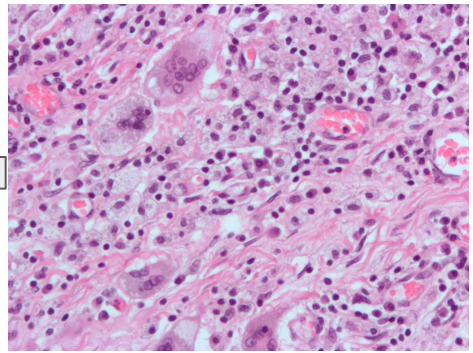
What are multinucleated giant cells?

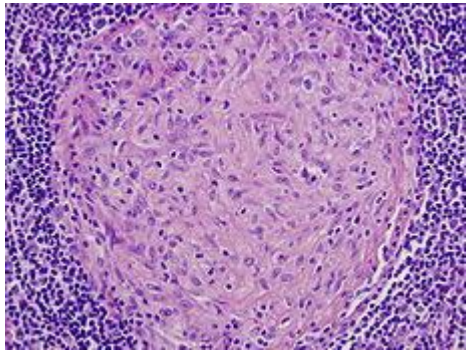
They form from the cytoplasmic fusion of macrophages.

What are langhans cells?

Langhans giant **cells** are large **cells** found in granulomatous conditions. They are formed by the fusion of epithelioid **cells** (macrophages), and contain nuclei arranged in a horseshoe-shaped pattern in the cell periphery.

Giant cell





Granuloma

The term **cellulitis** denotes a spreading acute inflammation through interstitial tissue.

Summary

- Prolonged host response to persistent stimulus
- Caused by **microbes** that resist elimination, immune responses against self and environmental antigens, and some toxic substances (e.g., silica); underlies many important diseases
- Characterized by persistent inflammation, tissue injury, attempted repair by scarring, and immune response
- Cellular infiltrate consisting of activated macrophages, lymphocytes, and plasma cells, often with prominent fibrosis
- Mediated by cytokines produced by macrophages and lymphocytes (notably T lymphocytes), with a tendency to an amplified and prolonged inflammatory response owing to bidirectional interactions between these cells

NOTES

- Some diseases, such as **hepatitis B&C**, & **tuberculosis (TB)**, start as **chronic.** There is no acute hepatitis B or C. Usually the disease starts as acute, and if not treated, it becomes chronic.
- **Staphylococcus aureus bacteria** is always associated with **acute inflammation.**
- **Viral hepatitis B** & **mycobacterium TB** are always-chronic.
- Etiological factors determine whether it is acute or chronic.

HOPEFULLY WE DID A GREAT JOB

ONLINE TEST

FOR ANY QUESTIONS AND SUGGESTIONS CONTACT US ...

PATHOLOGY435@GMAIL.COM

@PATHOLOGY435

To make sure that all students are aware of any changes, please check out this link to know if there are any additions or changes.
The same link will be used for all of our work:
(Pathology Edit)

BOYS TEAM:

- ❑ **Wael Al Oud**
- ❑ Abdulaziz AlHammad
- ❑ Mana AlMuhaideb
- ❑ Abdulaziz Redwan
- ❑ Abdullah AlGhizzi
- ❑ Abdullah Aldhibaib
- ❑ Abdulrahman Thekry
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- ❑ Anas Ali
- ❑ Faris Alwarhi
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- ❑ Rayan Almuneef

GIRLS TEAM:

- ❑ **Samar AlOtaibi**
- ❑ Ghaida Aljamili
- ❑ Nurah AlQahtani
- ❑ Nojood AlHaidri
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DIFFICULTIES IN YOUR LIFE DON'T COME TO DESTROY YOU.. BEST OF LUCK