

NEXTILLO OTOP
MARCH MONTH

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THE WONDER HAS A NAME

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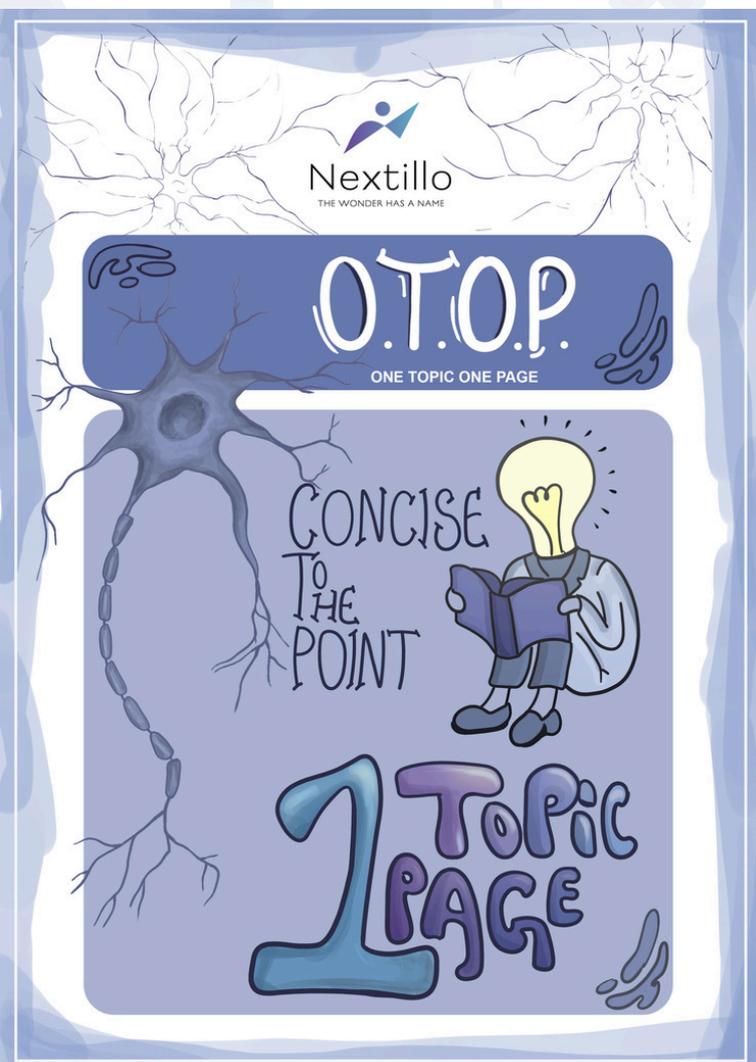
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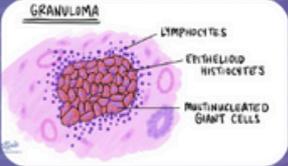


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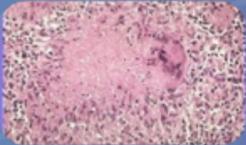
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GRANULOMA

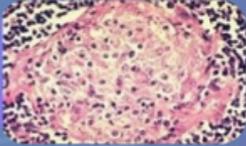
The word '**granuloma**' is derived from granule meaning circumscribed granule-like lesion. It is **collection of epithelioid cells rimed by lymphocytes**. Granuloma restricts off these organisms and prevents their further growth and spread.



Granuloma



Caseating Granuloma of TB



Non-Caseating Granuloma of Sarcoidosis

Structure :
It comprises **Epithelioid Cells, Caseous Necrosis, Giant Cells, Rim of Lymphocytes, and Fibrous Cup.**

Etiology :
Known Causes: Mildly Irritant 'Foreign' Material, Mycobacteria: Tuberculosis, Leprosy, Syphilis, Other rare infections e.g. some Fungi.
Unknown Causes: Sarcoid, Wegener's Granulomatosis, Crohn's Disease.

Types :

- **Foreign body granulomas** – form when material such as **talco, sutures, silica, or other fibers** are large enough to preclude (prevent) phagocytosis by a single macrophage.
- **Immune Granuloma** is caused by insoluble particles that are capable of inducing a cell-mediated response. It is seen in diseases like **Temporal arthritis, and Wegener's granulomatosis.**
- **Suppurative Granuloma:** These granulomas contain **neutrophils and neutrophilic debris in the center, and the peripheral portion** comprising of **lymphocytes, plasma cells, and histiocytes.**

Type of Granuloma	Seen in Case of
Foreign Body Granuloma	Talc, Sutures, Silica
Non Necrotising Granuloma (non-caseating)	Sarcoidosis, M. Leprae, SLE, Crohn's Disease
Suppurative Granuloma	Chlamydia, Trachomatis, Actinomycetes
Necrotising Granuloma (caseating)	M. Tuberculosis, T. Pallidum Histoplasma Capsulatum, Granuloma Annulare
Listeria Monocytogens, Mycosis Fungoides	Listeria Monocytogens, Mycosis Fungoides

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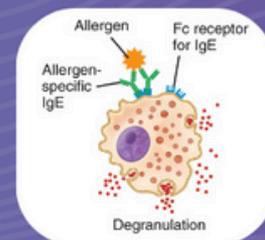
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HYPERSENSITIVITY (HS)

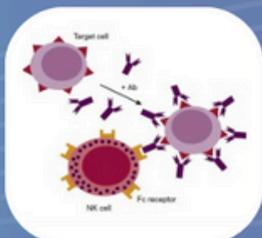
Hypersensitivity refers to **undesirable reactions** produced by the normal immune system, **including allergies and autoimmunity**. These reactions may be damaging, uncomfortable, or occasionally fatal. It is of **4 types**.

Type I hypersensitivity

- Aka **immediate or anaphylactic hypersensitivity**.
- The reaction usually takes **15 - 30 minutes** from the time of exposure to the antigen.
- Mediated by **IgE** antibody to specific antigens.
- **Atopy** is the term for the genetic trait to have a predisposition for localized anaphylaxis. Atopic individuals have higher levels of **IgE and eosinophils**.
- **Diagnostic tests** for immediate hypersensitivity include skin (prick and intradermal) tests, measurement of total IgE and specific IgE antibodies.



Type I Hypersensitivity



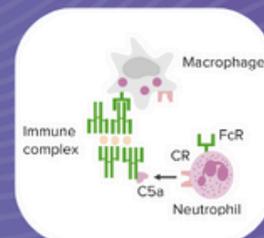
Type II Hypersensitivity

Type II hypersensitivity

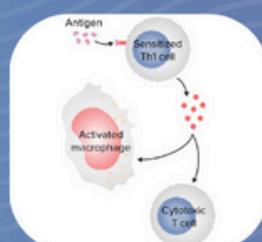
- Aka **cytotoxic hypersensitivity**.
- Drug-induced hemolytic anemia, granulocytopenia and thrombocytopenia, **Rh incompatibility** are such examples.
- The reaction time is **minutes to hours**.
- The lesion contains antibody, complement and neutrophils.
- **Diagnostic tests** detecting antibody and complement in the lesion.

Type III hypersensitivity

- It is mediated by **Antigen antibody immune complexes** and **IgG** mediated.
- Example serum sickness, systemic lupus erythematosus, Arthus reaction, involves kidneys (e.g., lupus nephritis), lungs (e.g., aspergillosis), joints (e.g., rheumatoid arthritis) or other organs.
- The reaction may take **3 - 10 hours** after exposure to the antigen.
- **Diagnosis** involves tissue biopsies for deposits of complement by immunofluorescence microscopy.



Type III Hypersensitivity



Type IV Hypersensitivity

Type IV hypersensitivity

- Reaction involves **sensitized T cells and release of its lymphokines** as mediators and amplifiers. Mediated by cells rather than antibodies. Clinical states: Contact dermatitis, Transplant rejection, Granuloma.
- **Th1 cells** release cytokines to activate macrophages causing inflammation and tissue damage.
- Response starts after **48 - 72 hrs**, Eg. Contact dermatitis 48-72 hr; edema tuberculin 48-72 hr local i granuloma 21-28 days .
- **Diagnostic tests** in vivo include delayed cutaneous reaction (e.g. Montoux test and patch test (for contact dermatitis)). In vitro tests for delayed hypersensitivity include mitogenic response, lympho- cytotoxicity and IL-2 production.



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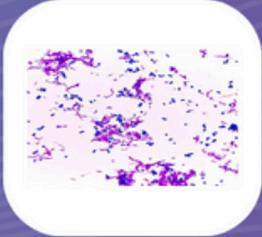
ACID FAST STAIN

The Ziehl-Neelsen stain, also known as the acid-fast stain, widely used as differential staining procedure. In this type of stain some bacteria resist decolorisation by both acid and alcohol and hence they are referred as acid- fast organisms.

This staining technique divides bacteria into two groups:

- acid fast
- non acid-fast

This procedure is extensively used in the diagnosis of tuberculosis and Leprosy



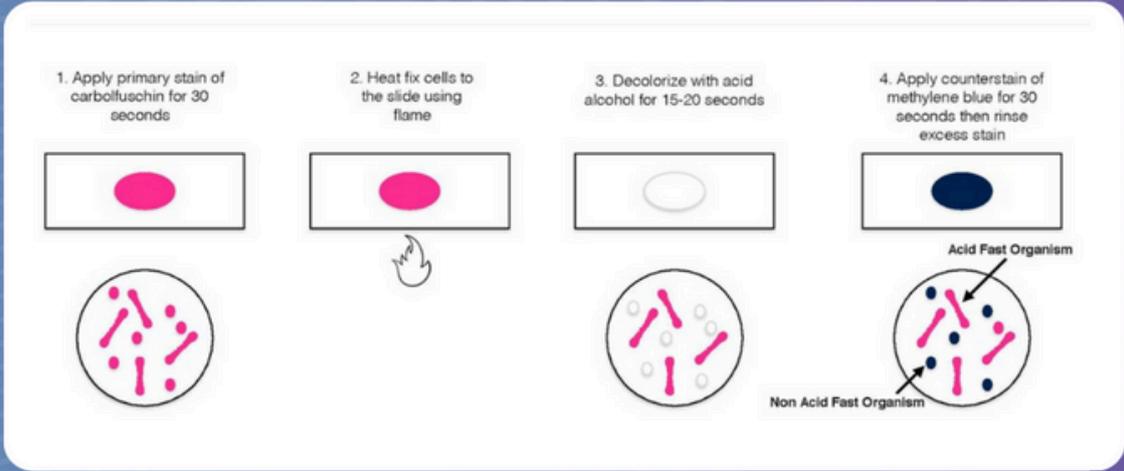
Acid Fast Rain

Technique:

- Mycobacterial cell walls contain a waxy substance composed of mycolic acids.
- These are β -hydroxy carboxylic acids with chain lengths of up to 90 carbon atoms.
- The property of acid fastness is related to the carbon chain length of the mycolic acid found in any particular species

Acid Fast Organisms

- Mycobacterium
- Nocardia
- Bacterial Spores
- Cryptococcosis Cyst
- Legionella





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ALBERT'S STAIN

ALBERT STAINING FOR C. DIPHTHERIA

- In all cases of suspected Diphtheria, proceed to do Albert staining which demonstrates the presence or absence of metachromatic granules.
- Diphtheriae are thin Gram positive bacilli, straight or slightly curved and often enlarged (clubbing) at one or both ends and are arranged at acute angles giving shapes of Chinese letters or V shape which is characteristic of these organisms.
- In the body of the bacillus there are numerous metachromatic granules which give the bacillus beaded or barred appearance.
- These granules are best demonstrated by Albert's stain.

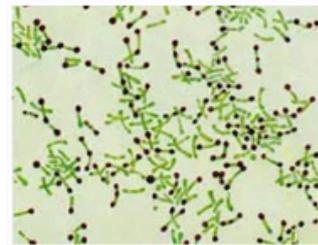
COMPOSITION OF ALBERT STAIN

ALBERT STAIN 1 -

Toluidine blue 0.15 gm
Malachite green 0.20 gm
Glacial acetic acid 1.0 ml
Alcohol(95%) 2.0 ml
Distilled water 100 ml

ALBERT STAIN 2 -

Iodine 2.0 gm
Potassium iodide 3.0 gm
Distilled water 300 ml



Albert Stain

APPEARANCE

- Main purpose of this stain is to demonstrate metachromatic granules in C.diphtheriae.
- These granules appear bluish black whereas the body of bacilli appear green or bluish green.



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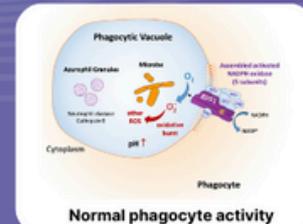
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CHRONIC GRANULOMATOUS DISEASE

X-linked recessive disease whereby phagocytes ingest microbes but cannot kill them. Leads to formation of granulomas and recurrent infections. The hallmark of (CGD) is early onset of severe recurrent bacterial and fungal infections of the skin, lungs, GI tract, lymph nodes, liver, and spleen. More males affected.

Etiology

- Mutation of **CYBA, CYBB, NCF1, NCF2 and NCF4** genes which code for subunits of **NADPH oxidase**.
- **NADPH oxidase** plays a role in immune system.
- **NADPH oxidase Hydrogen peroxide** (kills engulfed microbes).



Normal phagocyte activity

Pathophysiology

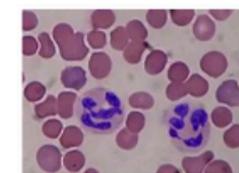
- There is non functioning **NADPH oxidase** leading to failure in killing microbes ingested by phagocytes.
- In phagocytes, this enzyme complex is activated to produce superoxide anion and other secondarily derived ROS (reactive oxygen species) like **H₂O₂ (peroxide)** which kills microbes.
- Due to this killing defect patients with CGD experience severe recurrent bacterial (catalase positive bacteria) and fungal infections.



Skin involvement

Clinical features

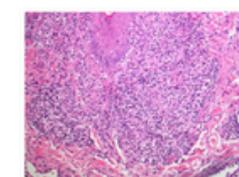
- **Pneumonia**
- **Prolonged infections – skin, liver, bone & joints, etc.**
- **Hepatomegaly & splenomegaly**
- **May develop WBC clusters**
- **Note: Most people diagnosed during early life**



Blood film of QCCGD

Diagnosis

- **Nitroblue tetrazolium test**
- **Hydrogen peroxide amount test**



Granuloma



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PATHOLOGICAL ACCUMULATION

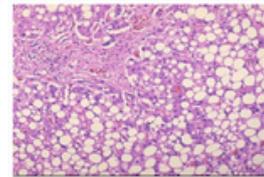
There can be accumulation of abnormal substance inside the cell in large amount causing problems to cells as well as organs. Accumulation can either be in cytoplasm or in organelles or nucleus. it will only lead to disturbance in normal homeostasis of cell, some of them are reversible changes.

The accumulating substance can be-

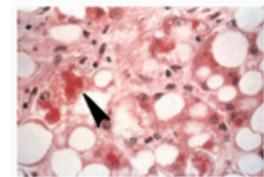
- Normal substance which normally presents. Eg. water, lipid, glycogen, protein, and carbohydrates.

Abnormal substance which are further divided into-

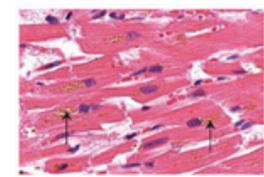
- Exogenous - from outside the body like mineral, bacterial component.
- Endogenous- from inside body like abnormal synthesis products.
- Pigments- can be exogenous or endogenous.



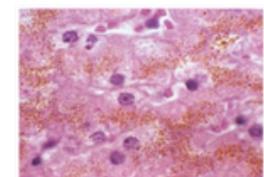
Lipid accumulation in liver



Mallory body



Lipofuscin in cardiac tissue



Hemosiderin deposition

Normal substance accumulation

Lipids

- Abnormal accumulation of triglycerides within parenchymal cells.
- Site - liver, most common site but it may also occur in heart, skeletal muscle, kidney, and other organs.
- Causes - Toxins (most importantly: Alcohol abuse), diabetes mellitus, Protein malnutrition (starvation), Obesity, Anoxia.
- Eg. Steatosis, xanthomas, atherosclerosis, cholesterosis.

Protein- They may occur because excesses are presented to the cells or because the cells synthesize excessive amounts. Eg. Nephrotic syndrome

- Mallory body, or "alcoholic hyalin," is an eosinophilic cytoplasmic inclusion in liver cells that is highly characteristic of alcoholic liver disease but can also be seen in Primary biliary cirrhosis, Wilson's disease.

Glycogen - Associated with abnormalities in the metabolism of either glucose or glycogen.

- Eg - In poorly controlled diabetes mellitus, glycogen accumulates in renal tubular epithelium, cardiac myocytes, and β cells of the islets of Langerhans.
- Glycogen accumulates in genetic disorders collectively referred to as glycogen storage diseases, or glycogenoses. Eg. Von Gierke disease, Pompe's disease, Forbes disease, Anderson's disease.



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GIANT CELL

It is a mass formed by the union of several distinct cells (usually macrophages), often forming a granuloma. It can arise in response to an infection, such as from tuberculosis, herpes, or HIV, or foreign body.

Inflammatory Giant Cells

Langhans Giant Cells - Epithelioid cells fuse to form giant cells containing 20 or more nuclei.

The nuclei are arranged peripherally and form a circle or semicircle related to shape of a horseshoe.

Langhans Giant Cell is said to be related to tuberculosis and it occurs in many types of granulomatous diseases like leprosy, syphilis.

Foreign Body Giant Cell - It is formed on exposure to a foreign substance.

Exogenous substances include talc or sutures.

Nuclei are in large numbers 50-200 and arranged in an overlapping manner.

This giant cell is often found at the site of suture, haemorrhage, atheroma.

Touton Giant Cell - It is a type of multinucleated giant cell seen in lesions with high lipid content such as fat necrosis, xanthoma, and xantho granulomas.

They are also found in dermatofibroma.



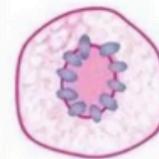
Foreign body giant cell



Langhans giant cell

Tumour Giant Cells

- Seen in epithelial and mesenchymal neoplasms
- Numerous nuclei, hyper chromatic & vary in size & shape.
- Not derived from macrophages but are formed from dividing nuclei of the neoplastic cells.



Touton giant cell

Miscellaneous Cells

Reed-Sternberg Cells

Pathognomonic of Hodgkin's lymphoma.

- Usually derived from B lymphocytes.
- Named after Dorothy Reed Mendenhall and Carl Sternberg.
- Usually multinucleated or bilobed nucleus with prominent eosinophilic nucleoli resembling "owl eye".

Warthin Finkeldey Giant Cells

- Virus induced giant cells.
- Pathognomonic for measles.
- Seen in hyperplastic lymph nodes, tonsils, appendix.
- Origin is uncertain.
- Cells has large grape like cluster of hyperchromatic nuclei.



Reed-sternberg cell