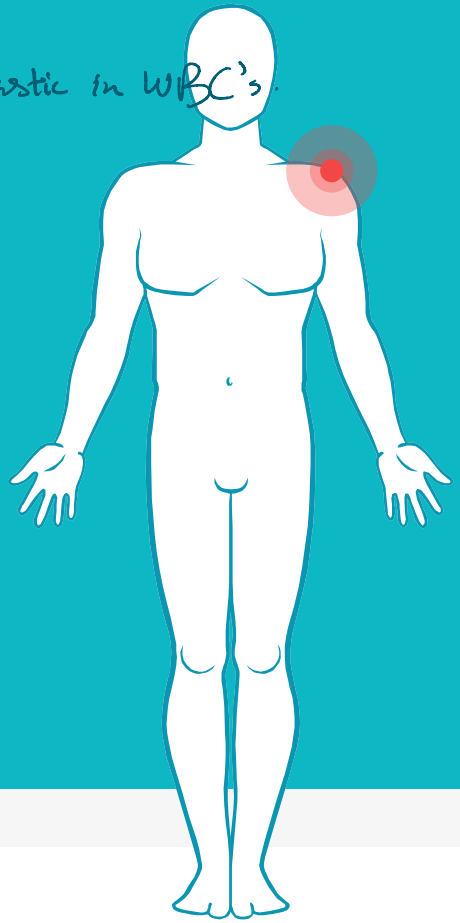
26/3/25

Most neoplastic in WBC's.

Hematopoietic & Lymphoid System

White Cell disorders



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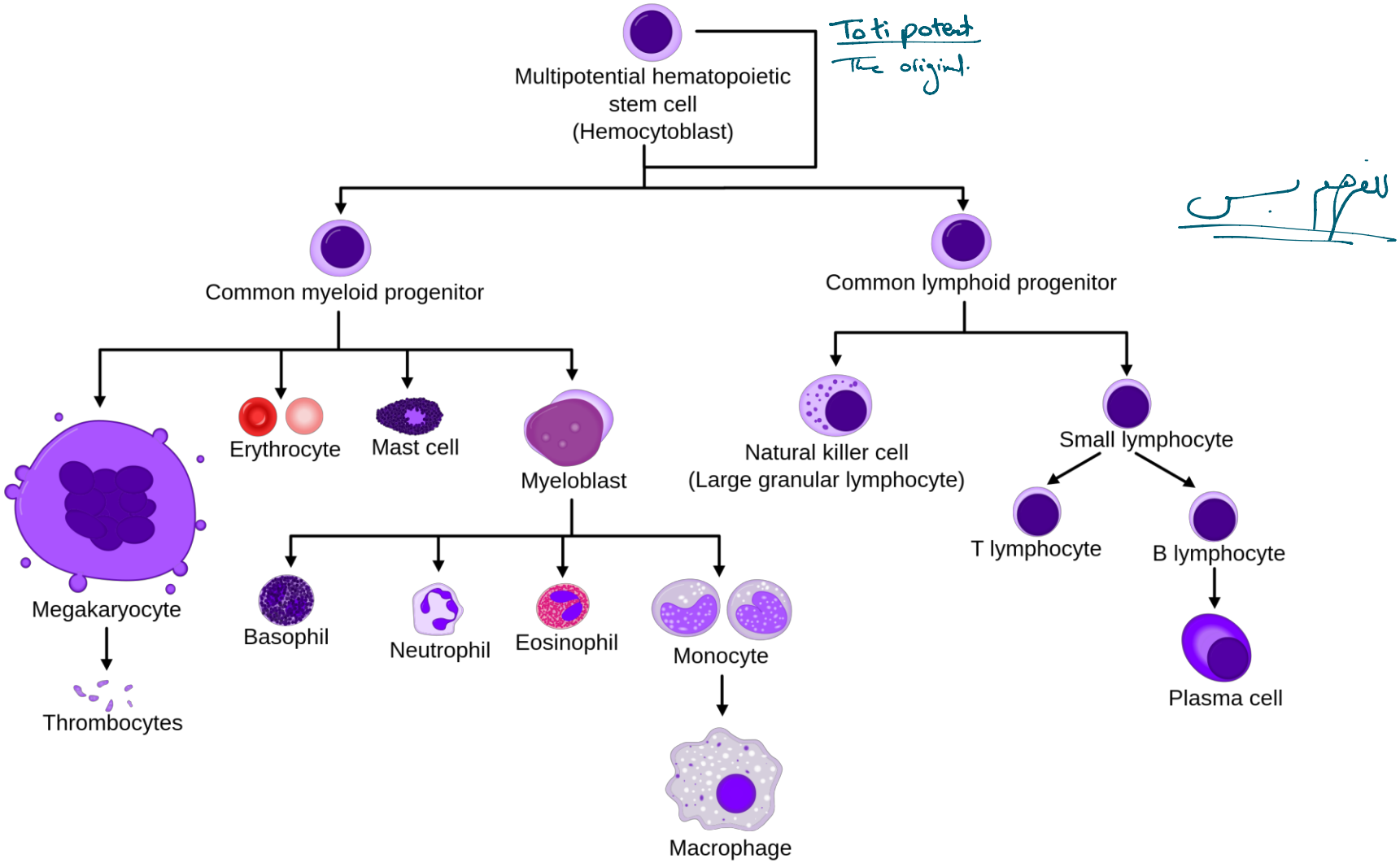
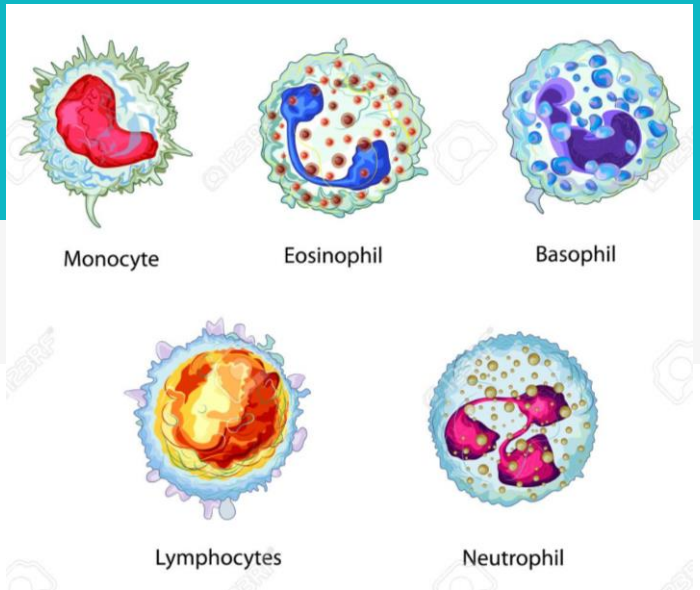

Multipotential hematopoietic stem cell (Hemocytoblast)
Toti potent
The original.
Common myeloid progenitor
Common lymphoid progenitor
Megakaryocyte
Thrombocytes
Erythrocyte
Mast cell
Myeloblast
Basophil
Neutrophil
Eosinophil
Monocyte
Macrophage
Natural killer cell (Large granular lymphocyte)
Small lymphocyte
T lymphocyte
B lymphocyte
Plasma cell

1.
Nonneoplastic disorders of white cells



Peripheral blood
موجودين بدم وليس بال BM

- Disorders include **deficiencies** (abnormally low count → leukopenias) and **proliferations** (**leukocytosis**), which may be reactive or neoplastic.

Decrease.

زايدين
Increased.

Cell Type	
White cells ($\times 10^3/\mu L$)	4.8-10.8
Granulocytes (%)	40-70
Neutrophils ($\times 10^3/\mu L$)	1.4-6.5 $\times 10^3$
Lymphocytes ($\times 10^3/\mu L$) T/B/Natural killers.	1.2-3.4
Monocytes ($\times 10^3/\mu L$)	0.1-0.6
Eosinophils ($\times 10^3/\mu L$)	0-0.5
Basophils ($\times 10^3/\mu L$)	0-0.2
Red cells ($\times 10^3/\mu L$)	4.3-5, men; 3.5-5, women
Platelets ($\times 10^3/\mu L$)	150-450

في ضروري الرقم الايعتان بس ضروري للحياة

5 major types of WBCs

- Neutrophils
- Lymphocytes
- Monocytes
- Eosinophils
- Basophils

Neutropenia/Agranulocytosis

- Neutropenia: a reduction in the number of granulocytes in blood, when severe, agranulocytosis. (<500)
- Most common Leukopenia.
- Neutropenic persons are susceptible to severe, potentially fatal bacterial and fungal infections.
- Two major mechanisms:
  - Decrease production
  - Increase peripheral destruction of neutrophils

Neutropenia/Agranulocytosis

Decrease production

- Marrow hypoplasia in patients who receive chemotherapy or radiation therapy
- Leukemia or other tumors replacing the marrow
- Medications
- Certain types of neoplastic lymphocytic proliferations involving marrow.

Neutropenia/Agranulocytosis

Increased peripheral destruction/consumption:

- Autoimmune destruction
- Overwhelming bacterial, fungal or rickettsial infection (peripheral use)
- Splenomegaly (sequestration & accelerated removal of neutrophils.)

Neutropenia/Agranulocytosis

Clinical features:

- **Infections** لإنه مافي عنده immunity
- Fever, chills, malaise.
- Mucocutaneous necrotizing ulcers
- High risk of sepsis عشان بينقلو بالدم

Tx: broadspectrum antibiotics (bacterial and fungal), granulocyte colony-stimulating factor (G-CSF).

Lymphopenia

- Much less common.
- Associated with rare congenital immunodeficiency diseases, advanced human immunodeficiency virus (HIV) infection, & high doses of corticosteroids Tx.
  Adverse effect because in moderate high
- Certain acute viral infections → stems from lymphocyte redistribution (to lymph nodes & increased adherence to endothelial cells)rather than a decrease in the number.

Leukocytosis

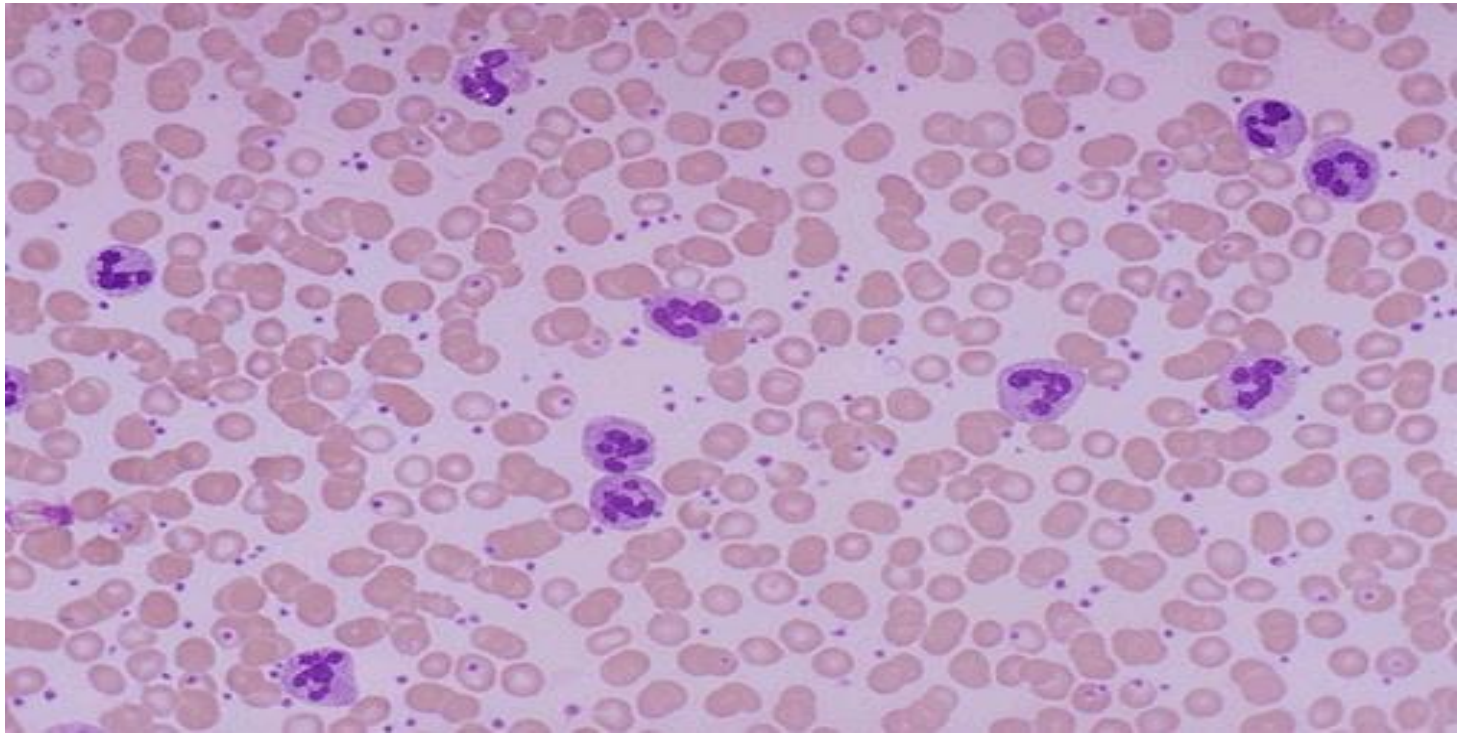
Case/All of the Following

- Increase in the number of white cells in the blood.
- A common reaction to a variety of inflammatory states.
- Leukocytoses are relatively nonspecific and are classified according to the particular white cell series that is affected:

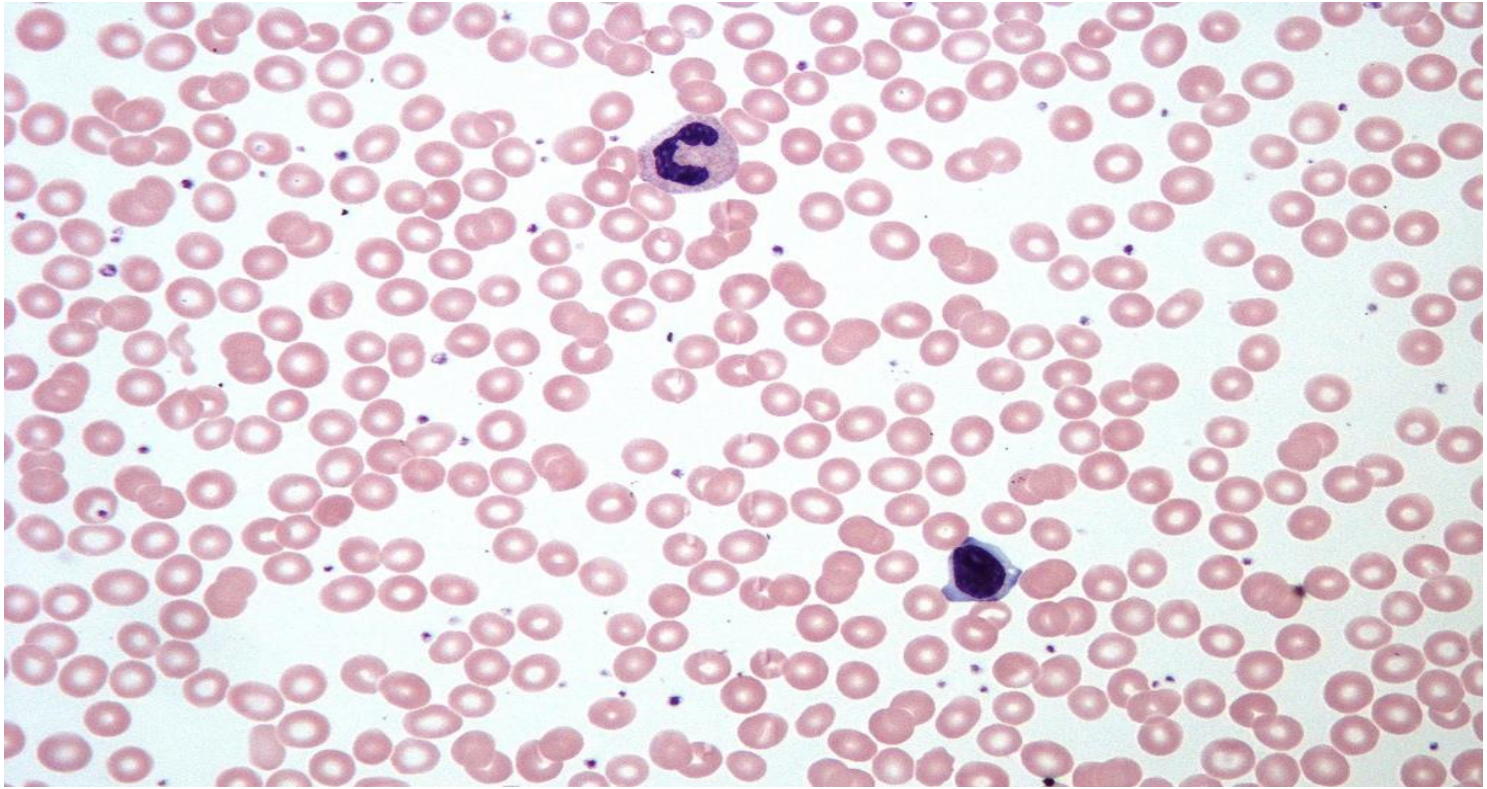
1) Neutrophilic: Acute bacterial infections, sterile inflammation caused by tissue necrosis or burn.

Leukocytosis – neutrophilia

↑ neutrophils.
"Neutrophilia".

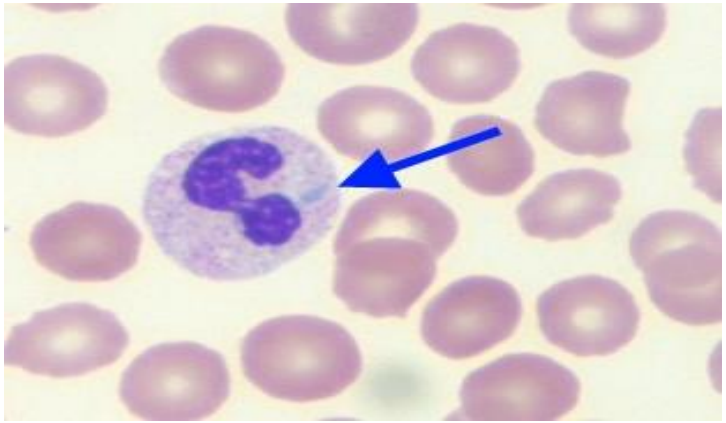


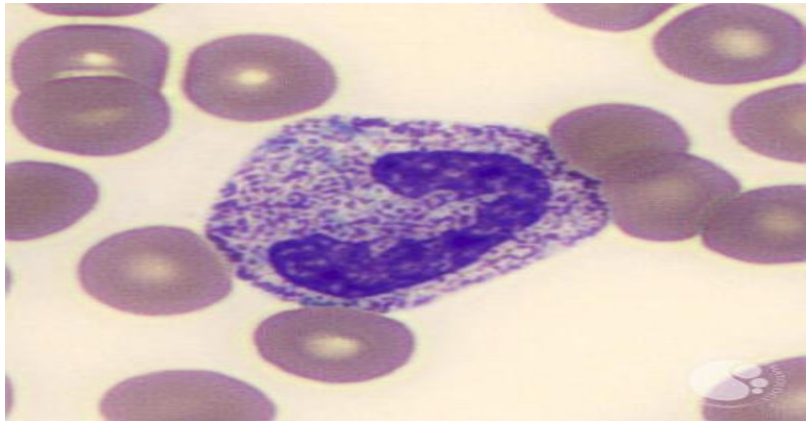
Normal Blood film



Leukocytosis – neutrophilia

In sepsis or severe inflammation neutrophilia is accompanied by morphologic changes: + cytoplasmic vacuoles
+Toxic granules, coarser & darker than normal granules
+ **Döhle bodies:** patches of dilated ER (appear → sky-blue cytoplasmic "puddles."





Leukocytosis

- Eosinophilic: (eosinophilia) Allergic disorders (e.g., asthma), parasitic infestations or drugs. للأشياء الغريبة لبعض الجسم .
- Basophilic: (basophilia) Rare, often indicative of a myeloproliferative disease.
- Monocytosis Chronic infections (e.g., tuberculosis), autoimmune disorders; inflammatory bowel diseases. ex: giant cells, granuloma.
- Lymphocytosis; chronic immunologic stimulation (e.g., tuberculosis, brucellosis); viral infections (e.g., HAV, CMV, EBV). presenting Ag to the immune system.

Leukemoid reaction

- Happens in severe infections, many immature granulocytes appear in the blood, mimicking a myeloid leukemia
- must be differentiated from true white cell malignancies. (e.g.,CML);

+Younger age,
+No BCR/ABL fusion gene
+Subsides with treatment of underlying infection

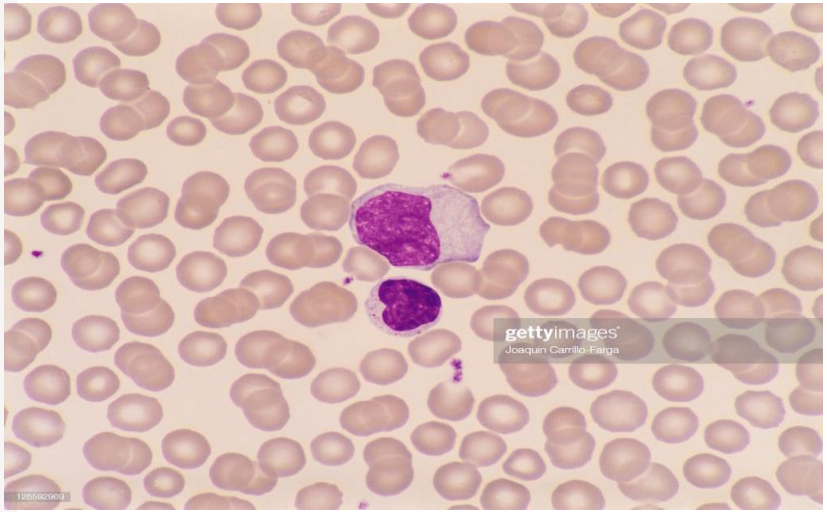
Infectious mononucleosis

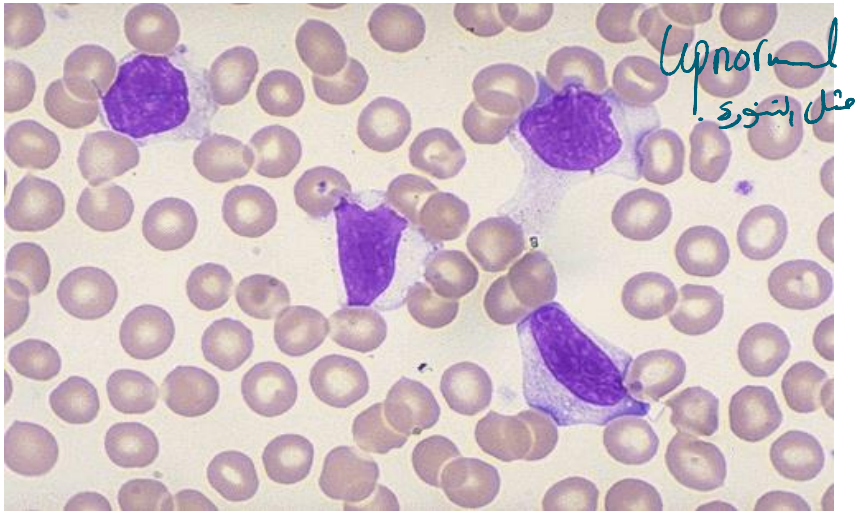
- Acute, self-limited disease of adolescents & young adults.
- Caused by Epstein-Barr virus (EBV), herpesvirus family.
- EBV invades B-cells & cause them to proliferate, cytotoxic (CD8+ T-cells) respond against B-cells.
- Usually present with:

1. Fever, sore throat, generalized lymphadenitis
2. Lymphocytosis of activated CD8+ T cells. (up to 18,000)

Infectious mononucleosis

- More than half of these cells are large **atypical lymphocytes**; with an oval, indented, or folded nucleus & abundant cytoplasm with a few azurophilic granules

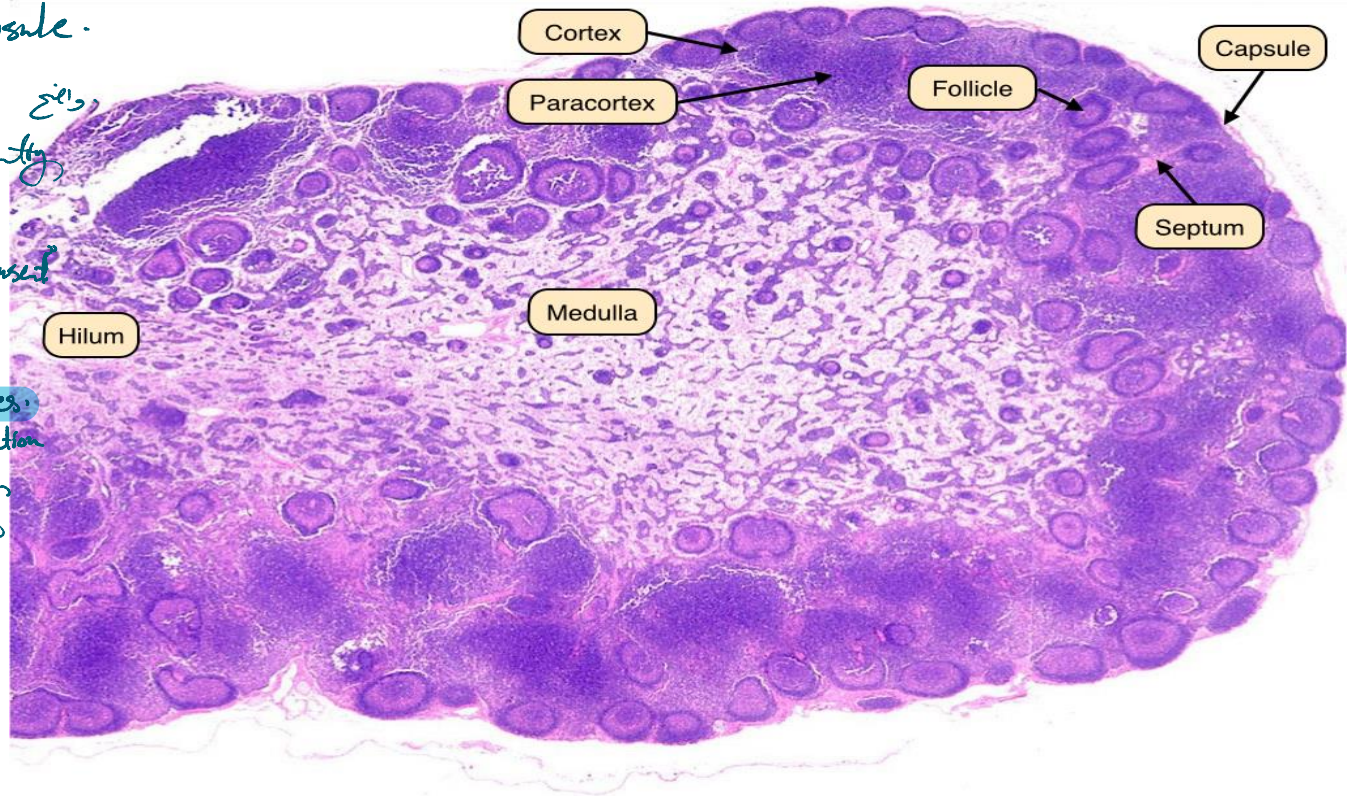




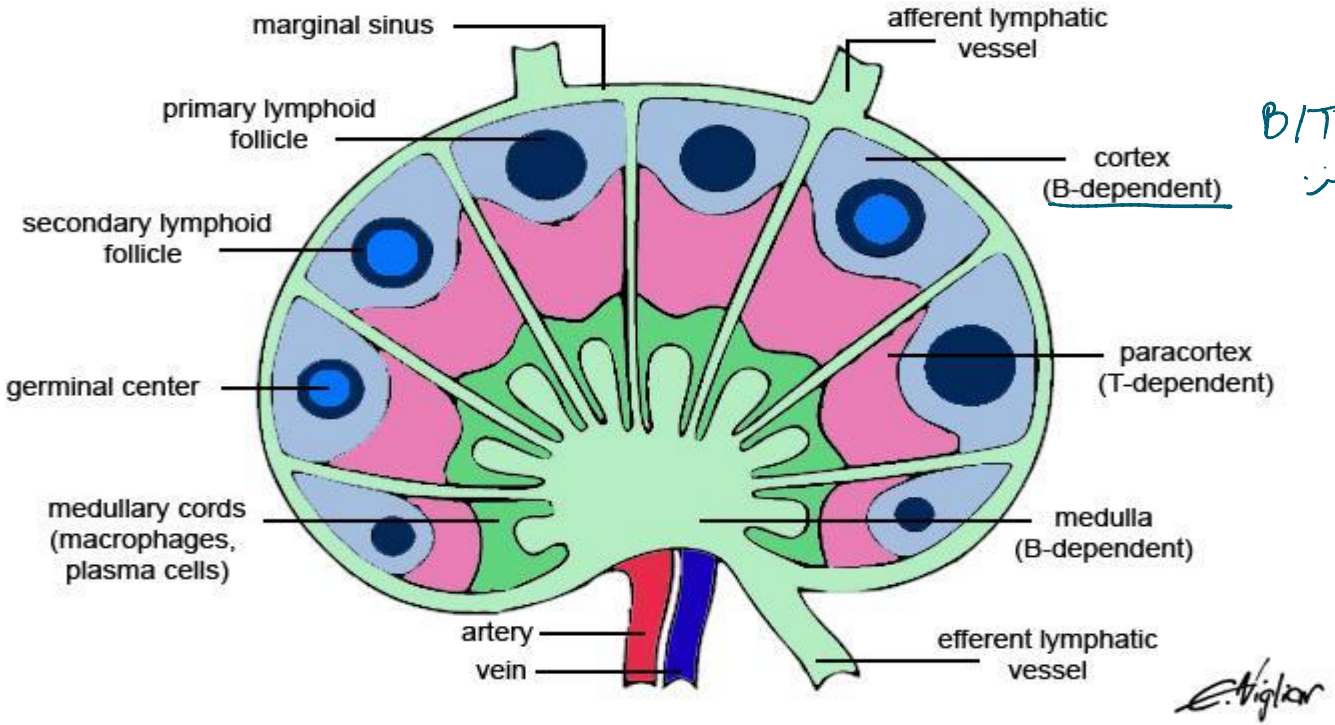
Reactive Lymphadenitis

- Architecture preserved
- Thin capsule.
- Cortex
- Ag presenting cell.
- primary "Naive" follicles.

Secondary follicles: Somatic hypermutation "Class shifting" Have also germinal center. Busy area



Reactive Lymphadenitis



مهم نعرف خلايا B/T وين بتركز

Reactive Lymphadenitis

Acute Nonspecific Lymphadenitis

- Can be:
  - Localized → draining a local infection.
  - Generalized → systemic infectious & inflammatory conditions
- Inflamed nodes are swollen & tender.
- With infection control lymph nodes may revert to a normal appearance or, if damaged, undergo scarring.

Reactive Lymphadenitis

In Biogenic infection
↓
neutrophils يكون فيها
& pus

Histologic morphology:

- Large follicles with germinal center formation
- Frequent GC mitoses & macrophages (هيبيي لإنه بأماكنه الحرة.)
- Sinus enlargement with histiocytes
- Parafollicular neutrophils, necrosis and possible pus formation (If pyogenic microbes)

Reactive Lymphadenitis

Chronic Nonspecific Lymphadenitis

- Depending on the causative agent, chronic nonspecific lymphadenitis can assume one of three patterns:

1) Follicular hyperplasia. B-cells
2) Paracortical hyperplasia. T-cells
3) Sinus histiocytosis. Macrophages

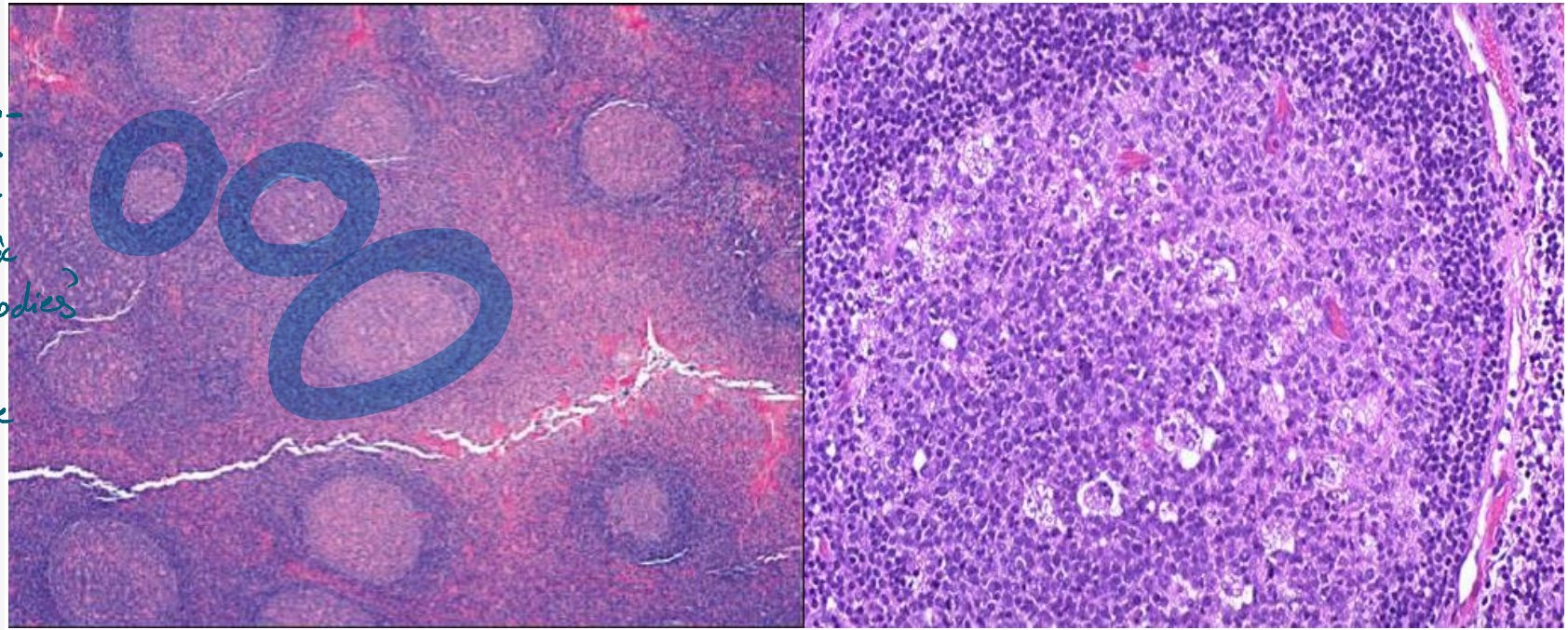
Reactive Lymphadenitis

Chronic Nonspecific Lymphadenitis - Follicular hyperplasia.

- Stimuli that activate humoral immune responses.
- defined by the presence of large germinal centers (secondary follicles), With tingible-body macrophages
- Causes include rheumatoid arthritis, toxoplasmosis, & early stages of infection with HIV

Reactive Lymphadenitis

Chronic Nonspecific Lymphadenitis - Follicular hyperplasia.



- كل واحد حجمه شكل
- Apoptotic cells 'bodies'
- T cell elements them -

Reactive Lymphadenitis

Chronic Nonspecific Lymphadenitis - Follicular hyperplasia.

This form of hyperplasia is morphologically similar to follicular lymphoma, Features favoring a reactive (nonneoplastic) hyperplasia include:

(1) preservation of the lymph node architecture.

(2) Variation in the shape and size of the follicles.

(3) Frequent GC mitotic figures & phagocytic macrophages, & recognizable light and dark zones. (absent in neoplastic follicles)

Reactive Lymphadenitis

Chronic Nonspecific Lymphadenitis - Paracortical hyperplasia

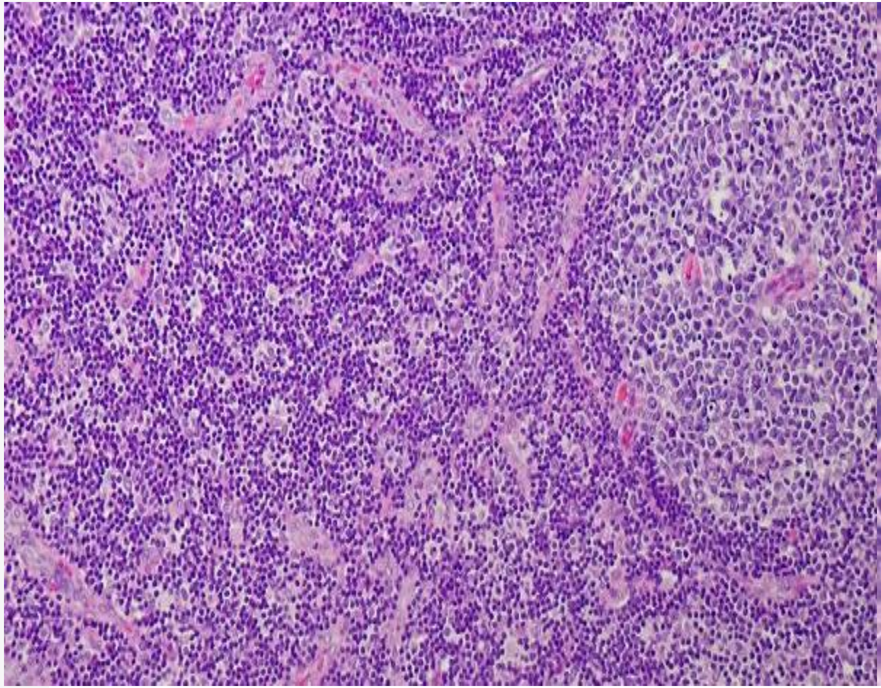
- Caused by immune reactions involving the T cell regions.
- Activated parafollicular T cells transform into large proliferating immunoblasts → that efface B cell follicles.
- Encountered in:

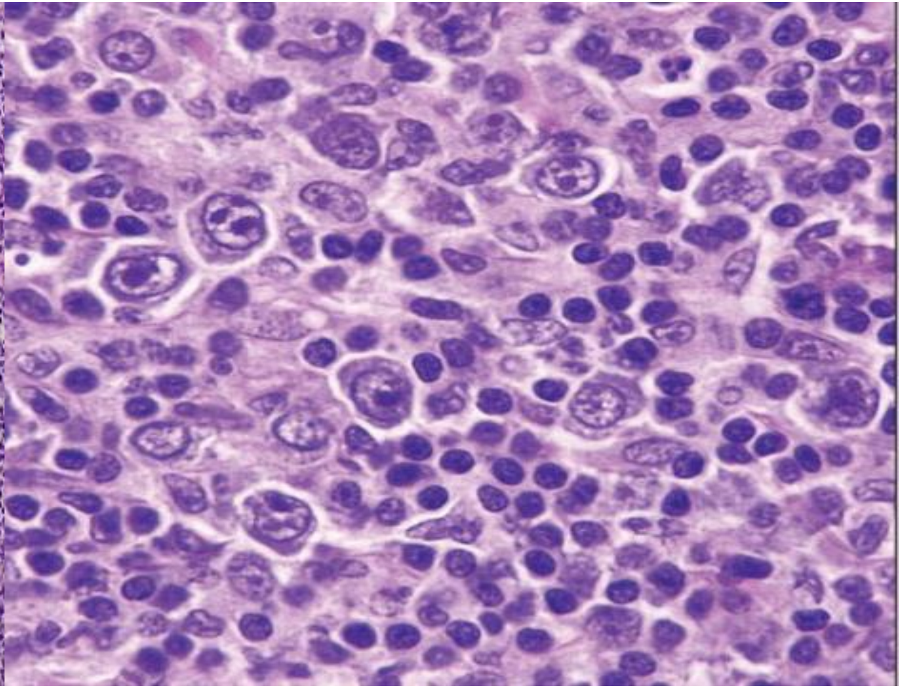
1) viral infections → activate Paracortex.
2) vaccinations (e.g., smallpox).
3) Drugs induced immune reactions (phenytoin)

Reactive Lymphadenitis

follicles not changed → بس يتم إزاحتهم.
بس المنطقة بيتم expand

Chronic Nonspecific Lymphadenitis - Paracortical hyperplasia





Reactive Lymphadenitis

Specialised in BV.

Chronic Nonspecific Lymphadenitis - Sinus Histiocytosis

- Distention and prominence of the lymphatic sinusoids, due to:

1) Marked hypertrophy of lining endothelial cells.
2) An infiltrate of macrophages (histiocytes).

- In lymph nodes draining cancers. Product of cancer Sinus expansion بتنشر
- Represent an immune response to the tumor or its products.

↳ foreign material like tattoo.

Reactive Lymphadenitis

Chronic Nonspecific Lymphadenitis - Sinus Histiocytosis