
“Hematopoietic And Lymphoid System”
Pathology Lab “2”

Dr. Ola Abu Al Karsaneh

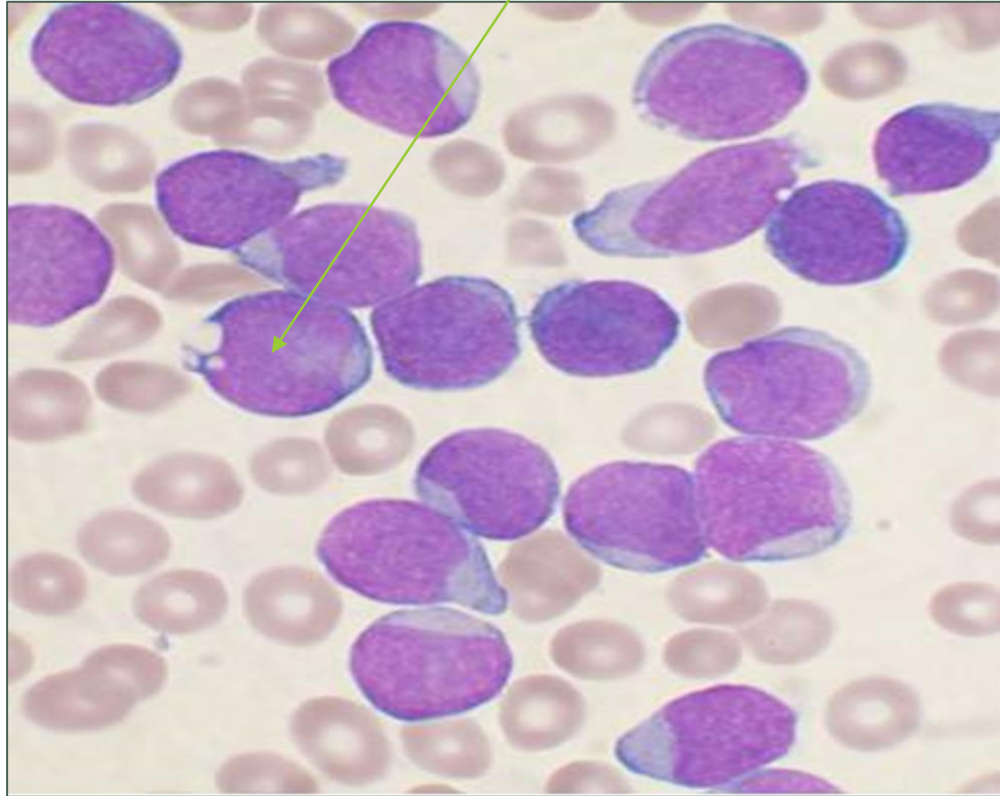
Acute Leukemia

Acute Lymphoblastic Leukemia/Lymphoma (ALL)

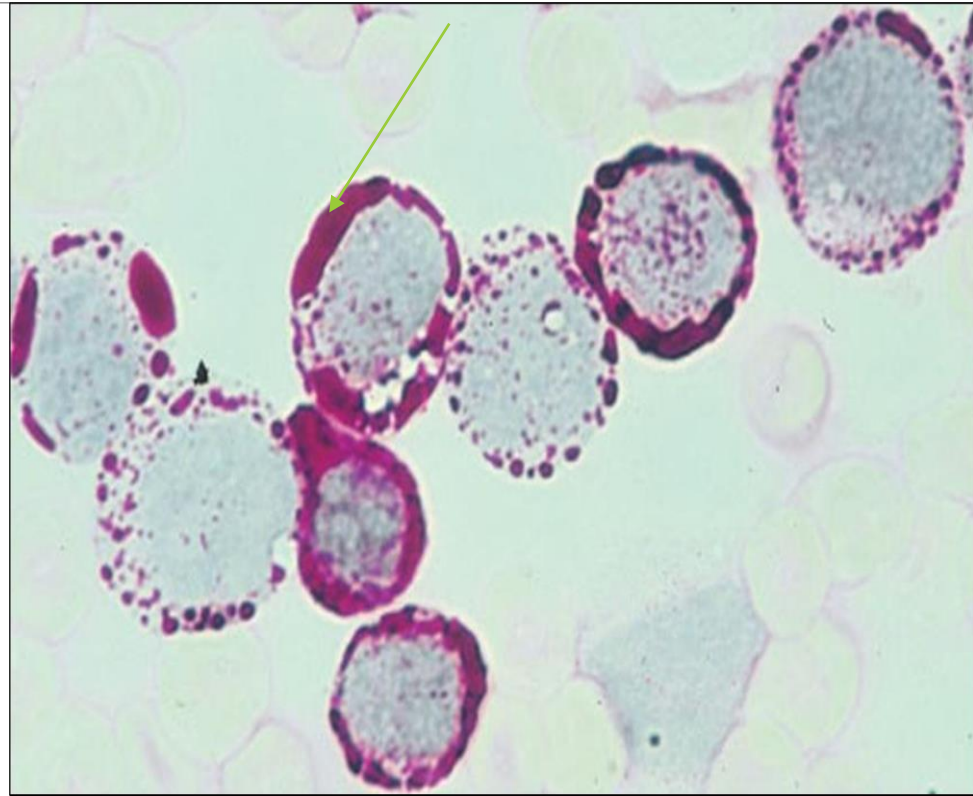
Bone marrow aspirate: B-ALL shows **lymphoblasts** with a high N/C ratio, fine chromatin (curved arrow), small nucleoli (solid white arrow), and basophilic cytoplasm.



ALL (lymphoblasts)

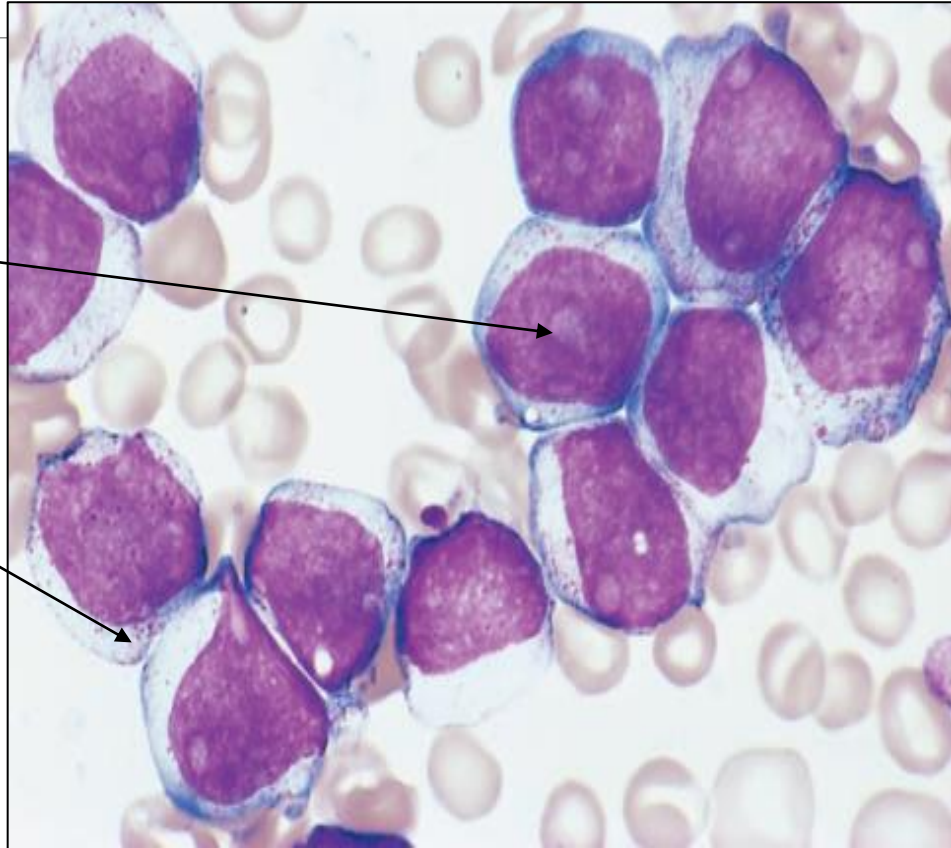


Lymphoblasts: Positive PAS cytoplasmic stain



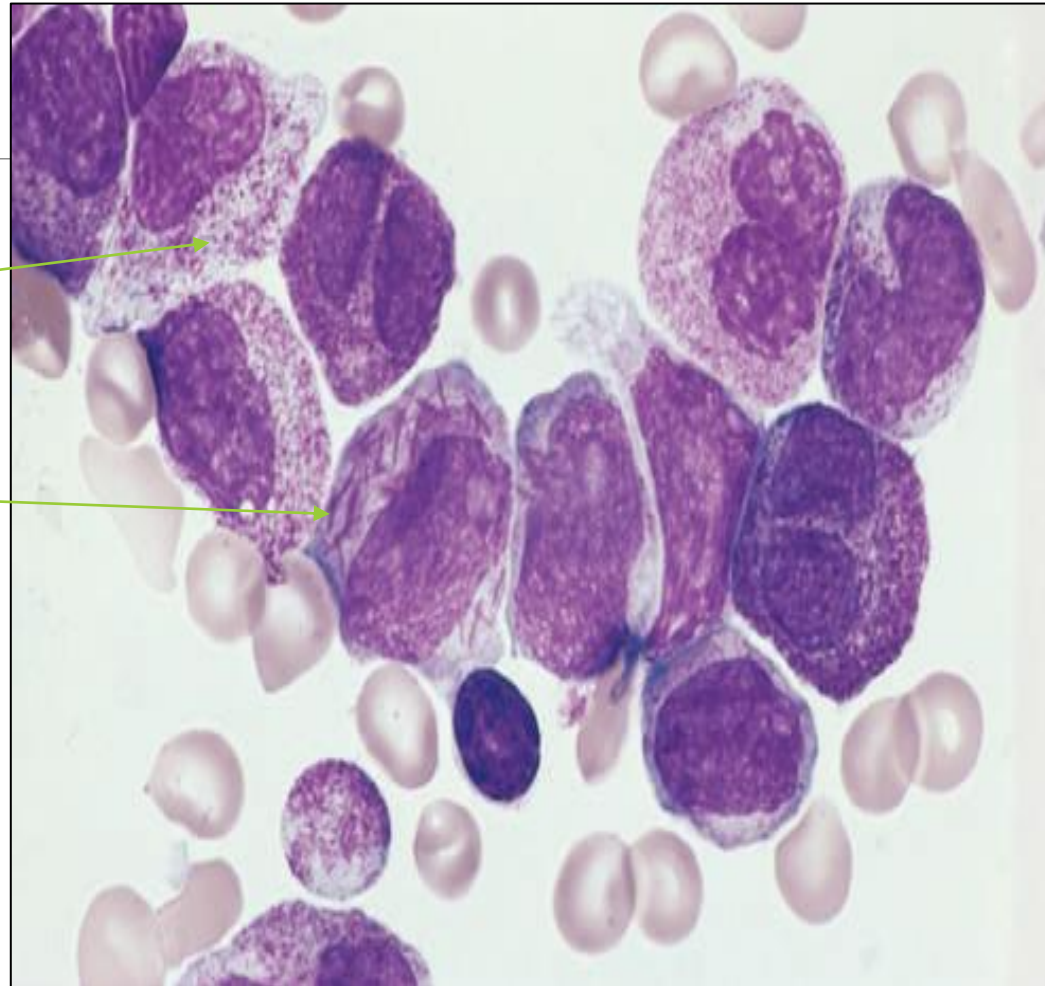
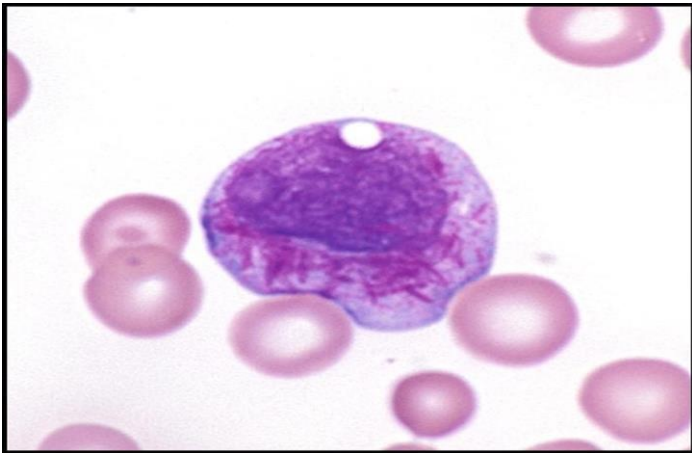
AML (Acute Myeloid Leukemia)

Myeloblasts with delicate nuclear chromatin, prominent nucleoli, and fine azurophilic cytoplasmic granules.

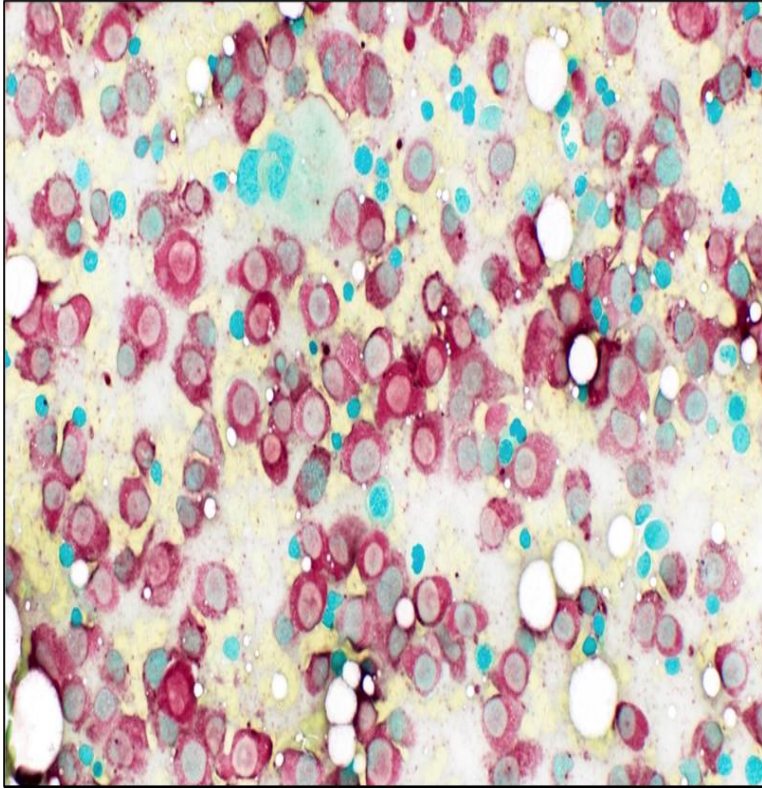


AML-Acute promyelocytic leukemia—bone marrow aspirate

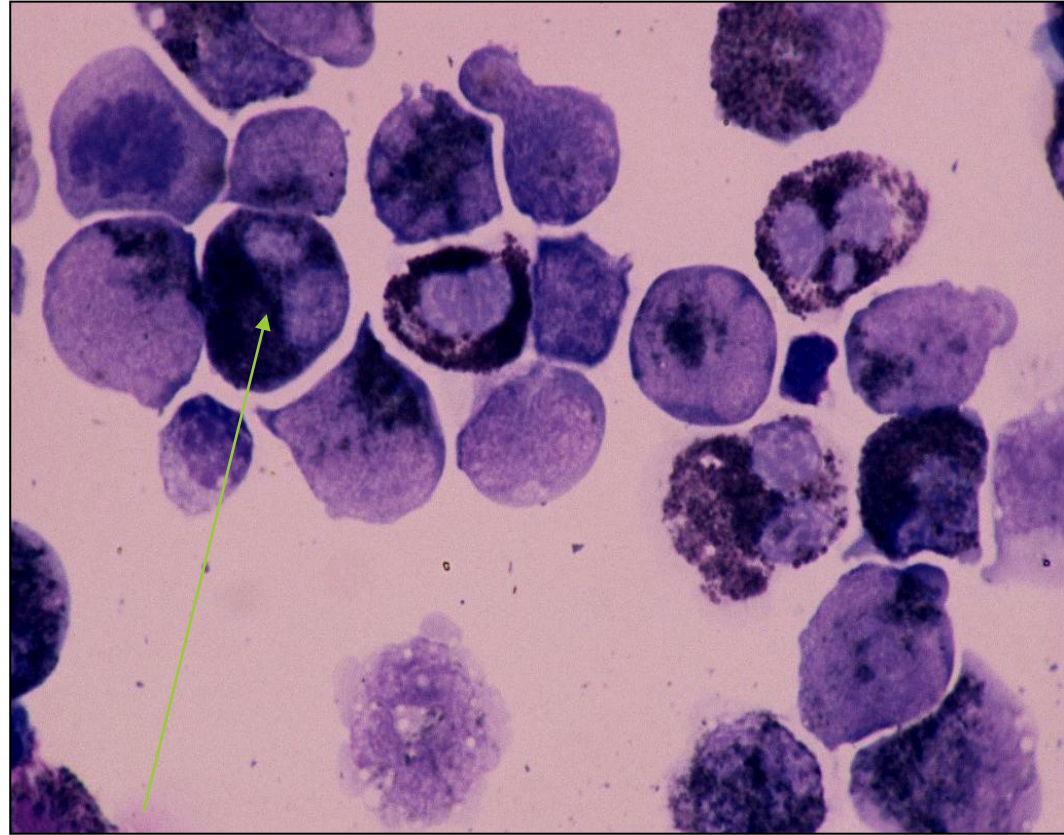
- The neoplastic promyelocytes have abnormally coarse and numerous azurophilic granules.
- Other characteristic findings include a cell in the center of the field with multiple needlelike **Auer rods**.



NSE highlights blasts of monocytic origin



AML, MPO

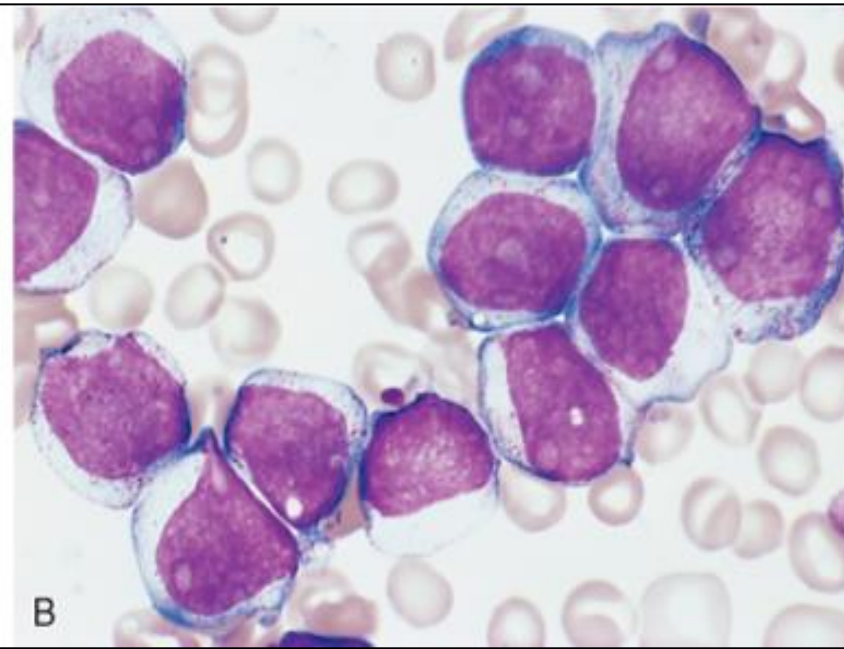
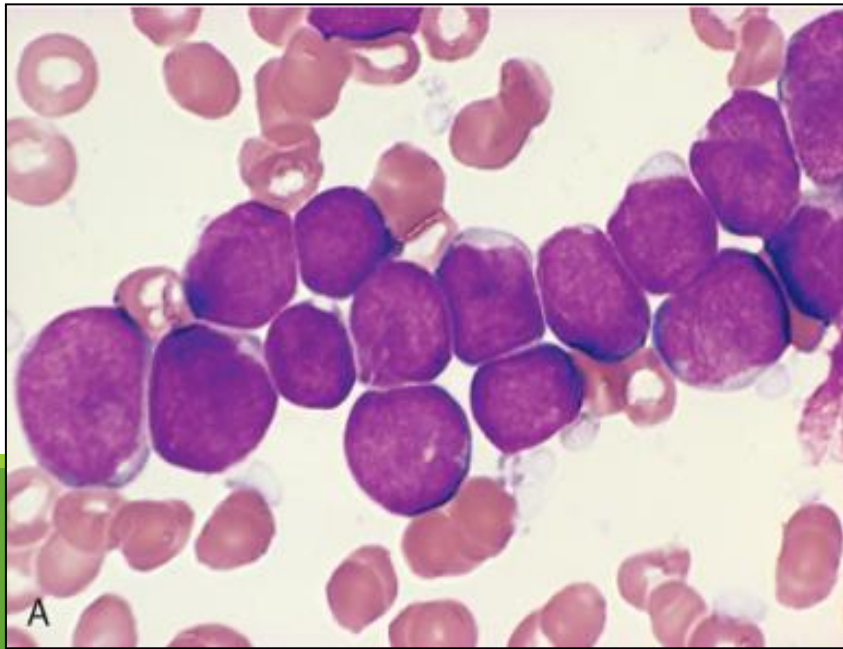


MPO

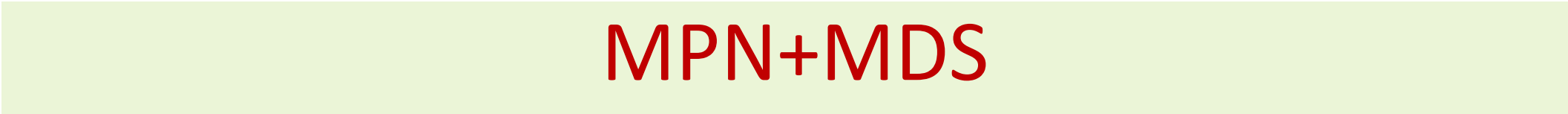
Morphologic comparison of lymphoblasts and myeloblasts.

A. ALL: Lymphoblasts have fewer nucleoli than do myeloblasts, and the nuclear chromatin is more condensed. Cytoplasmic granules are absent.

B. AML: Myeloblasts have delicate nuclear chromatin, prominent nucleoli, and fine azurophilic granules in the cytoplasm

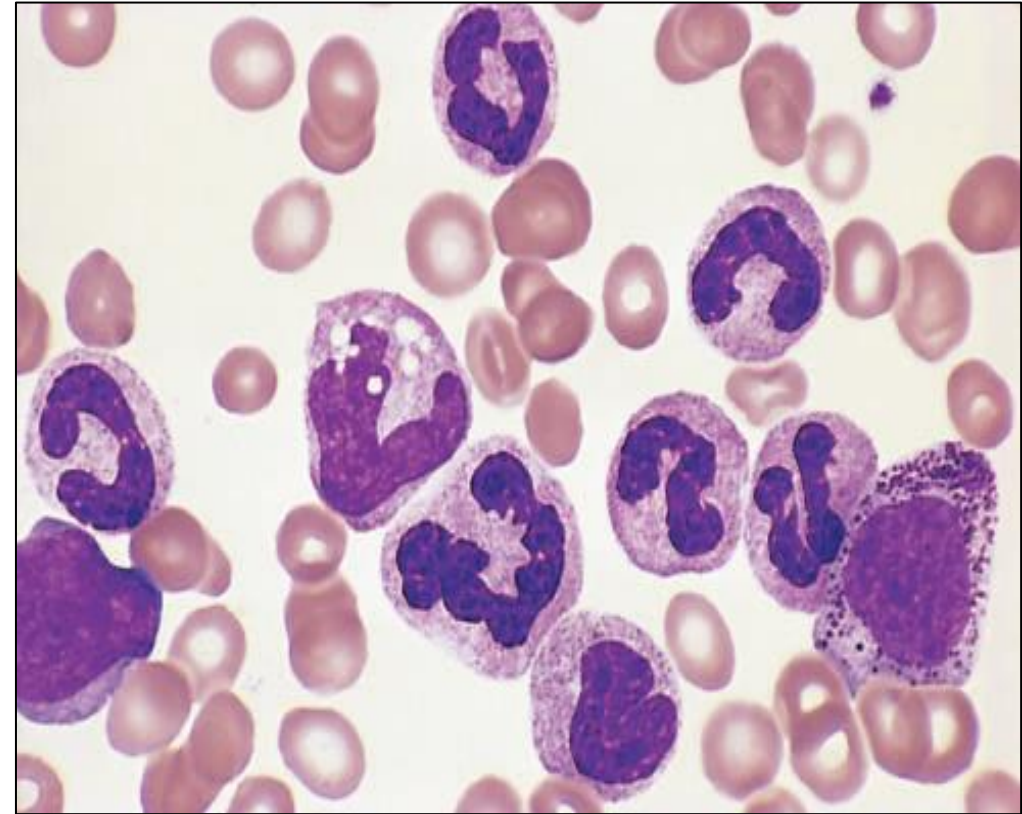
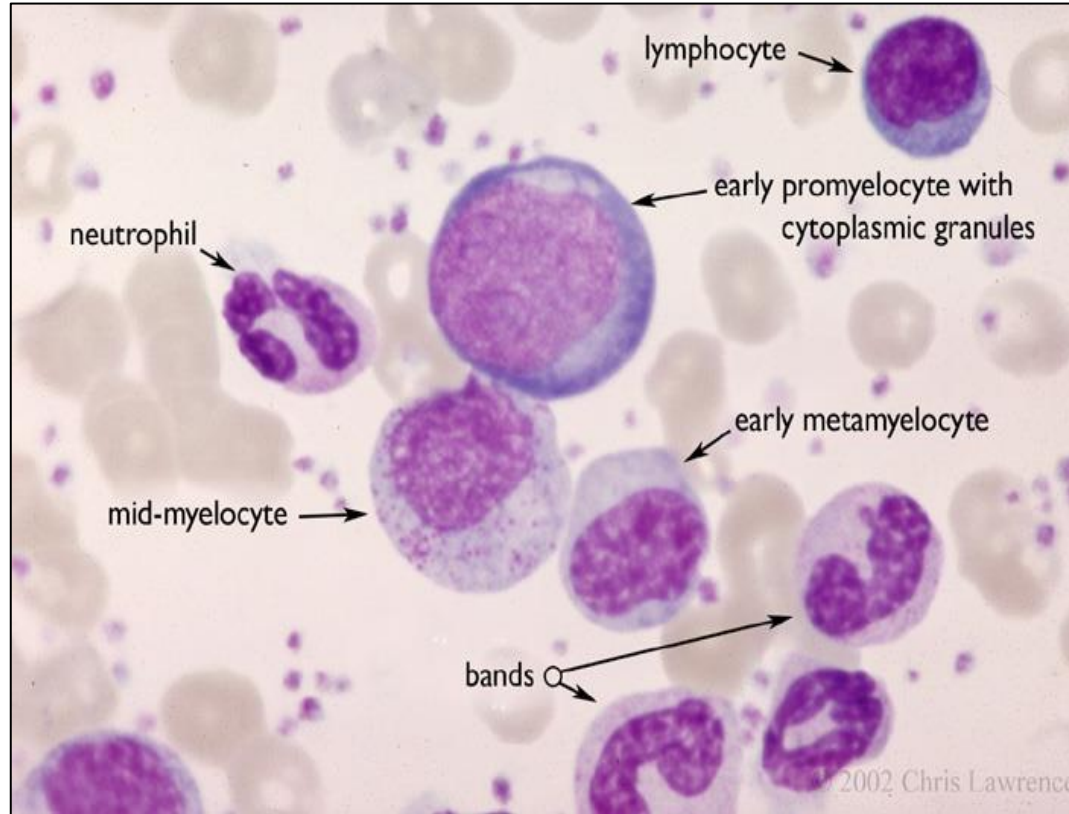


MPN+MDS



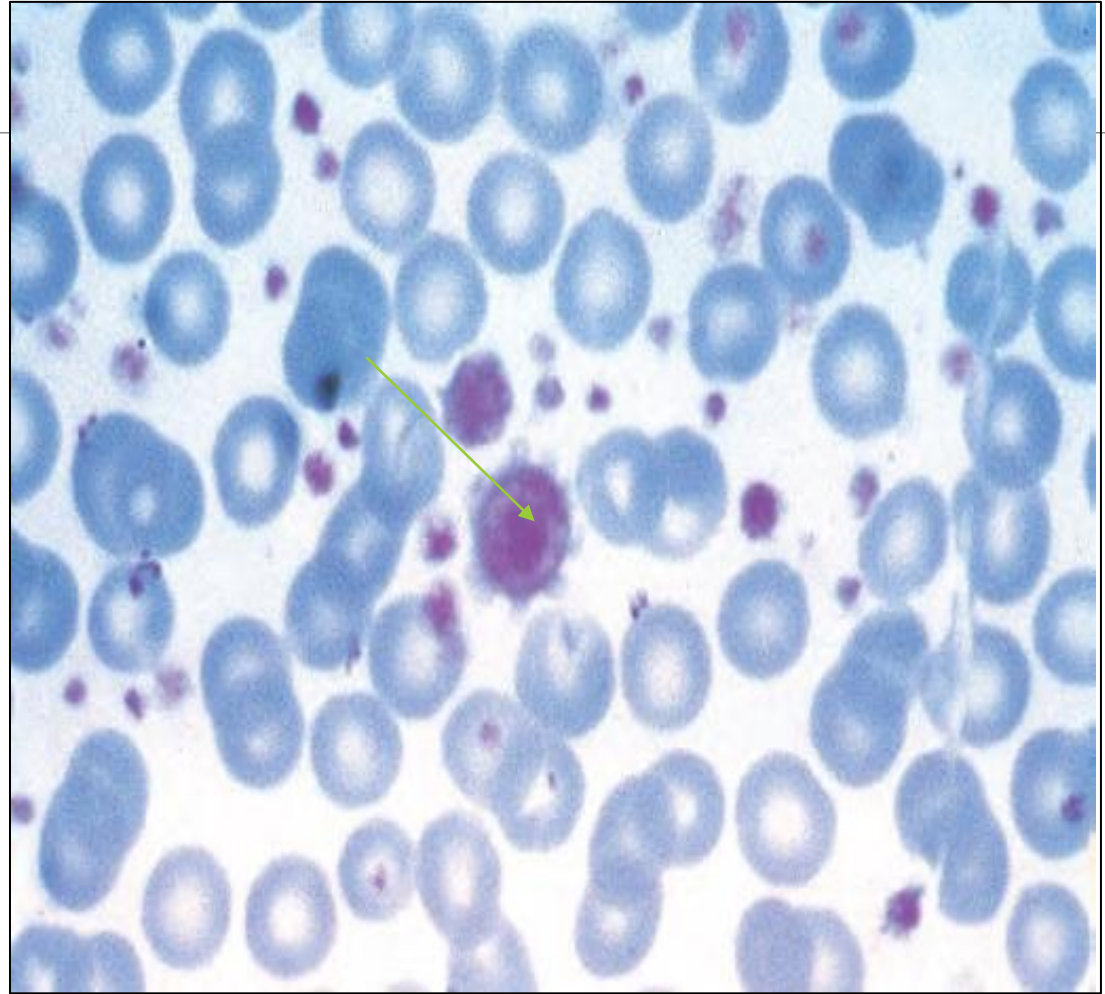
CML (Chronic Myeloid Leukemia)

Peripheral blood smear: Granulocytic forms at various stages of differentiation are present

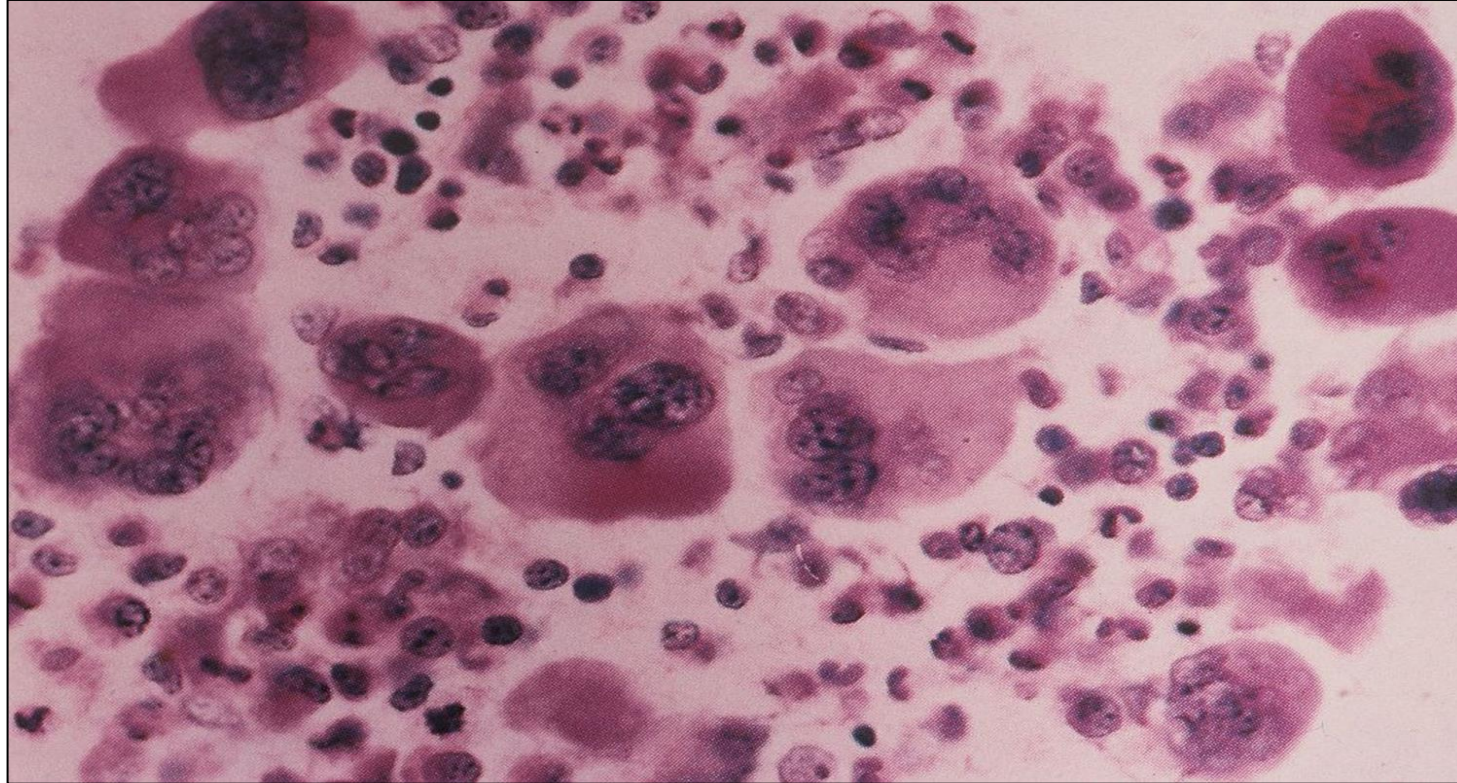


Essential Thrombocythemia (ET)

- Peripheral blood smear shows marked thrombocytosis, including **giant platelets** approximating the size of surrounding red cells.

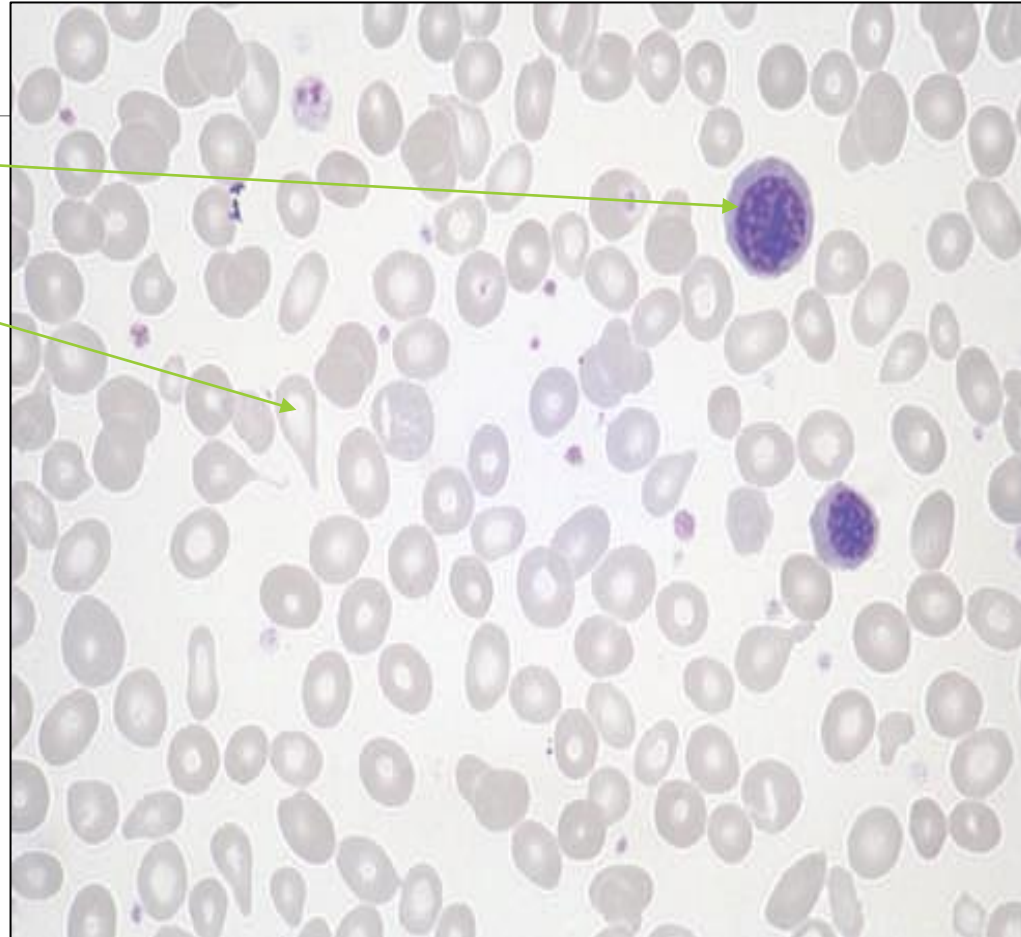
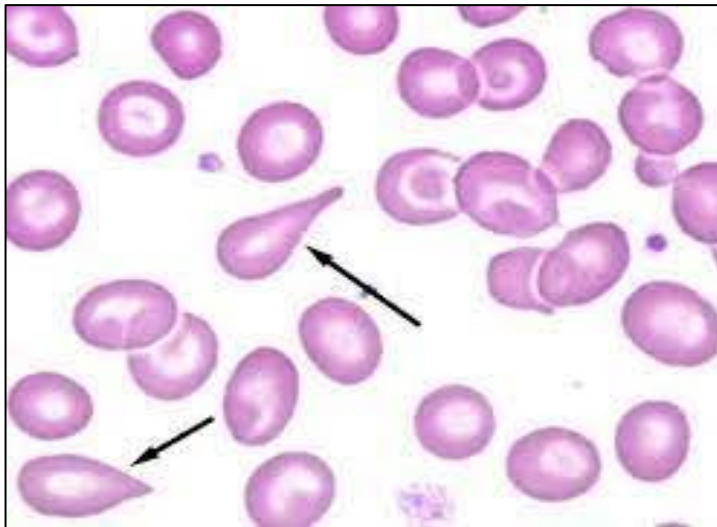


Essential Thrombocythemia (ET)



Primary myelofibrosis— peripheral blood smear.

-Two nucleated erythroid precursors and several teardrop-shaped red cells are evident
(Leukoerythroblastosis)



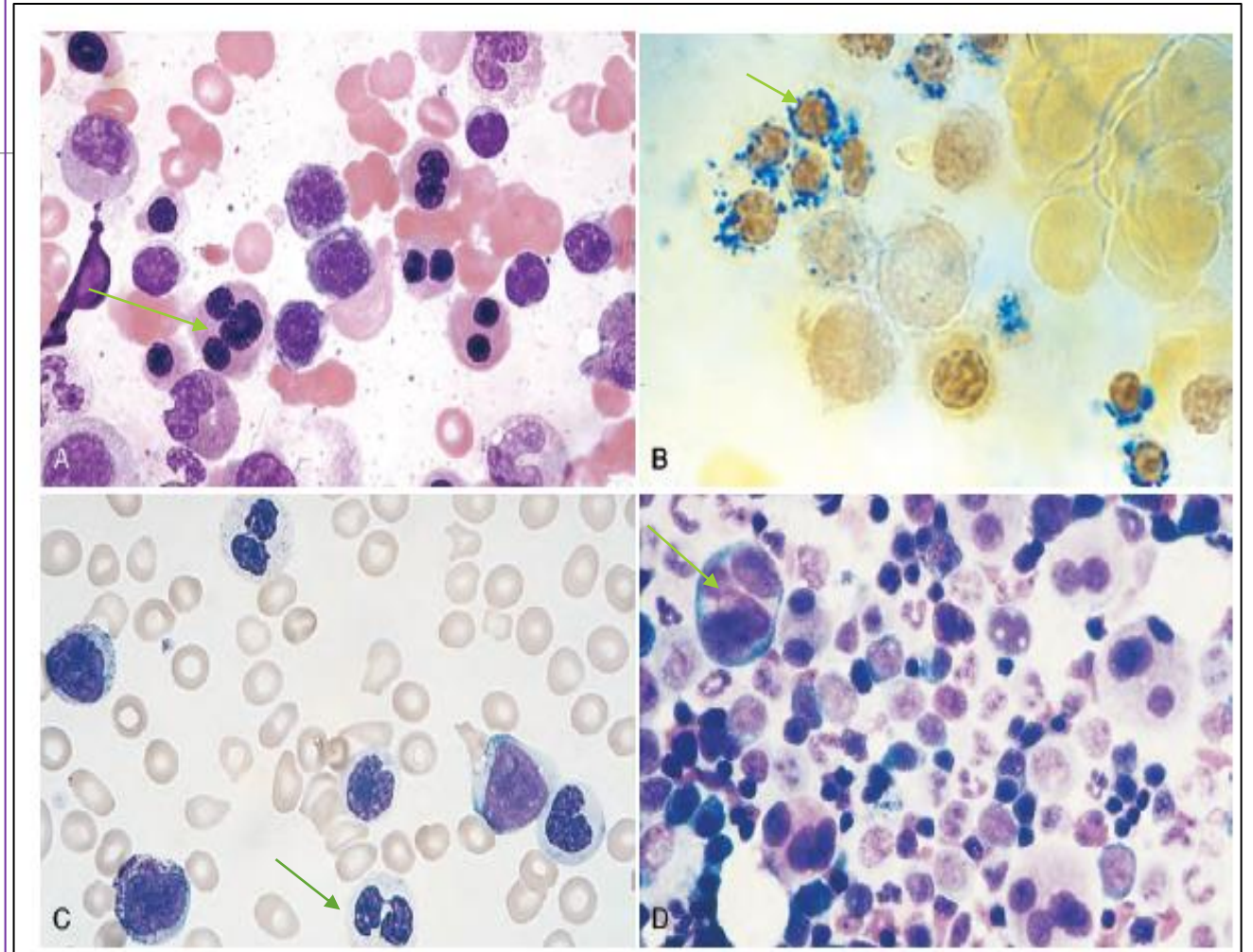
Myelodysplasia (MDS): Characteristic forms of dysplasia are shown (A, B, D, Marrow aspirates; C, peripheral blood smear.)

A, Nucleated red cell progenitors with multilobated or multiple nuclei.

B, Ringed sideroblasts, erythroid progenitors with iron-laden mitochondria seen as blue perinuclear granules (Prussian blue stain).

C, Neutrophils with only two nuclear lobes instead of the normal three to four

D, Megakaryocytes with multiple nuclei instead of the normal single multilobated nucleus.

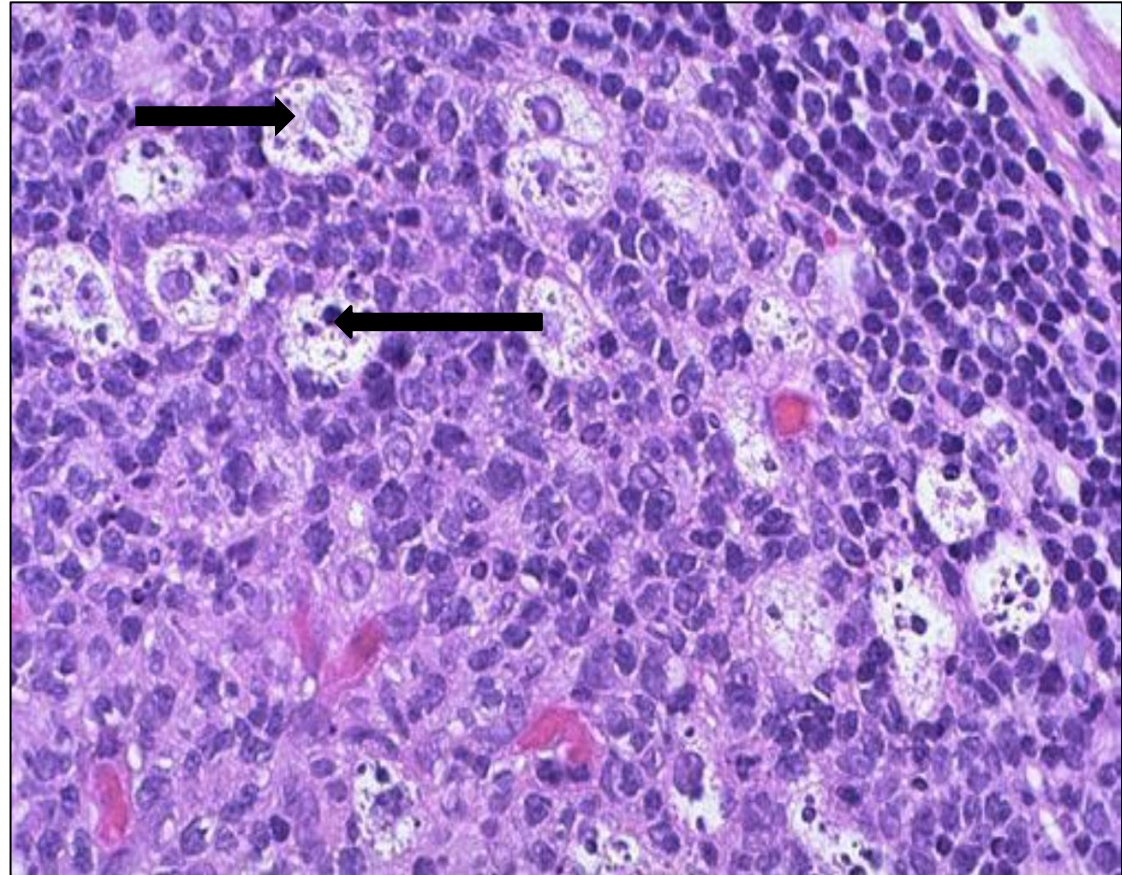


Normal Lymph Node Morphology

Reactive benign conditions

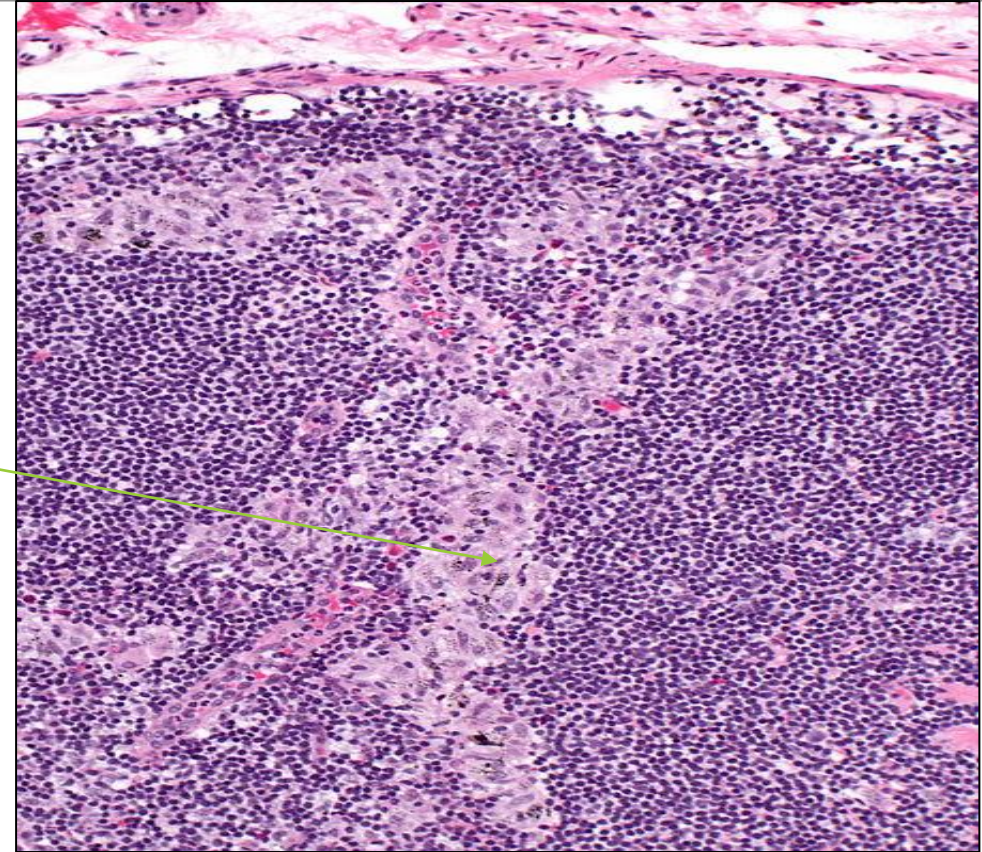
Benign reactive lymph node in
follicular hyperplasia

The germinal center in this reactive lymph node follicle has prominent macrophages with irregular cellular debris (so-called "**tingible body macrophages**" (arrows)).

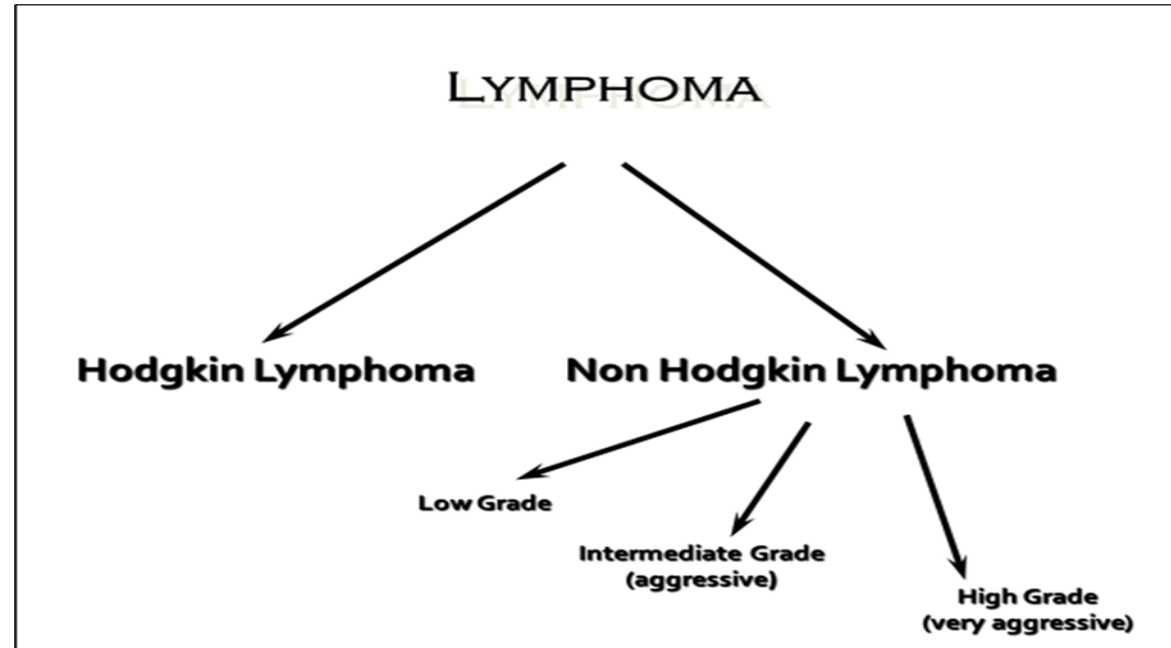


Benign reactive lymph node,
Sinus Histiocytosis

-Characterized by distention and prominence of the lymphatic sinusoids, owing to a marked **hypertrophy of lining endothelial cells** and an **infiltrate of macrophages (histiocytes)**.

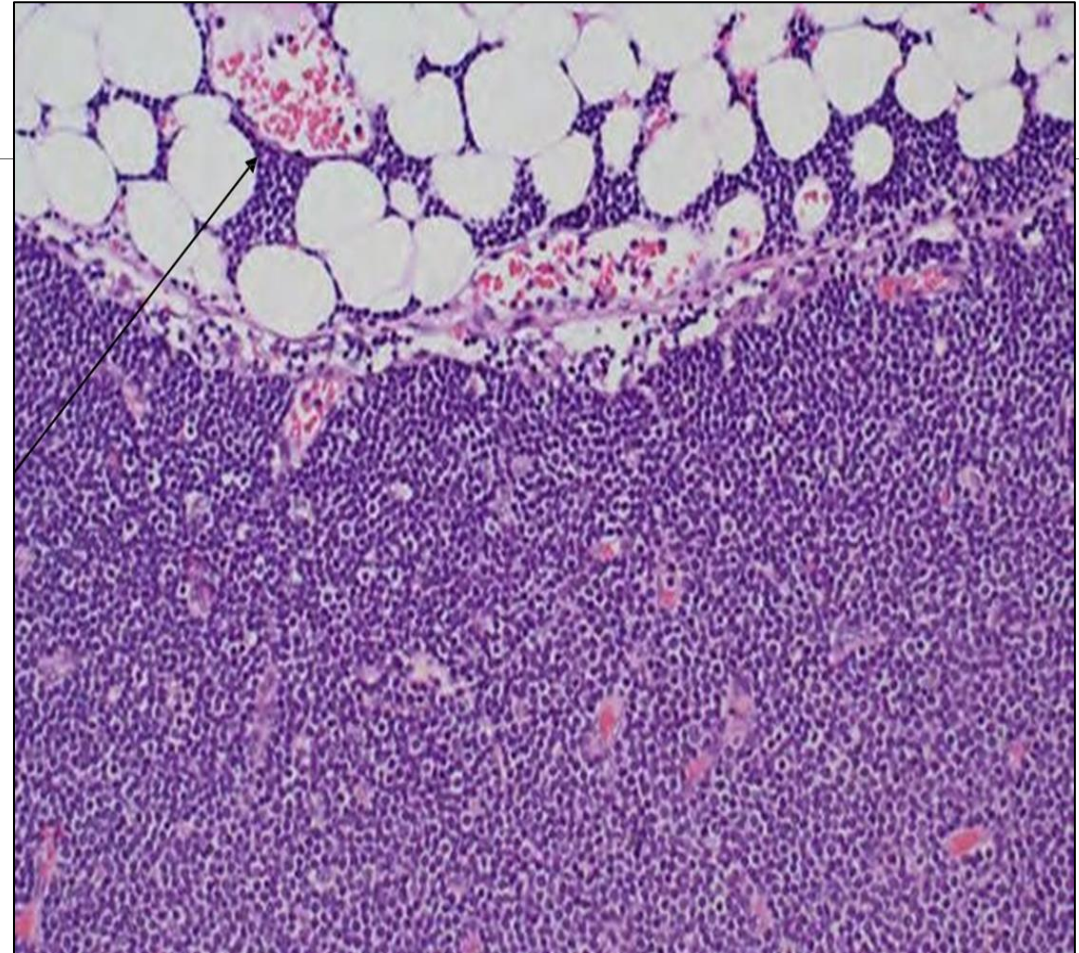


NHL



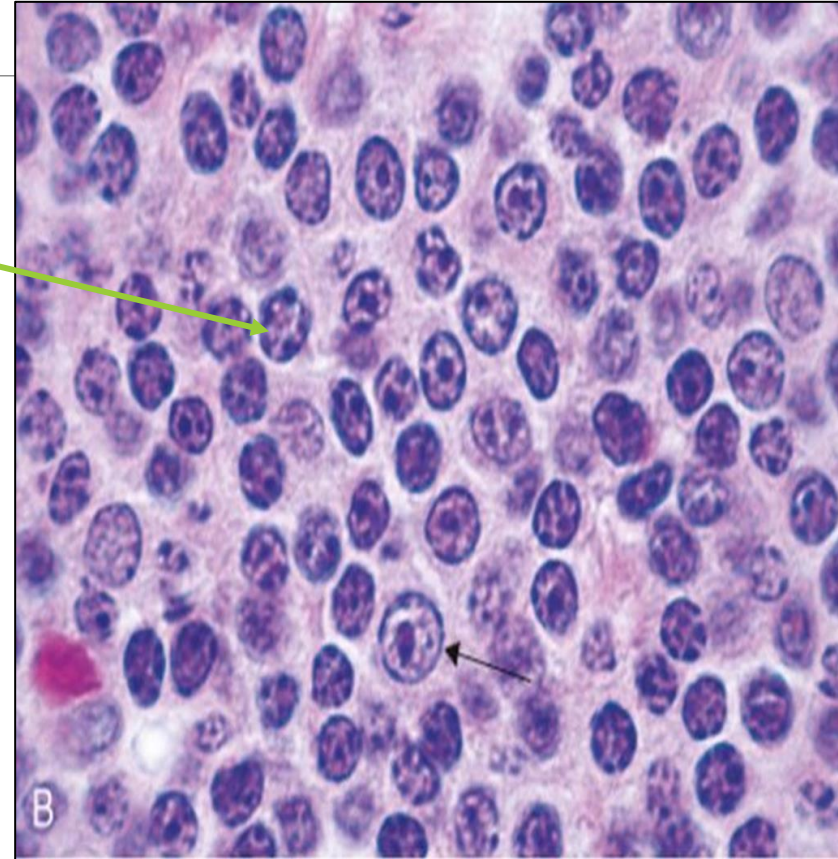
Small Lymphocytic Lymphoma, SLL

- This lymph node's normal architecture is obliterated and replaced by an infiltrate of small (mature-appearing) neoplastic lymphocytes.
- The infiltrate extends through the capsule into the surrounding fat.



SLL

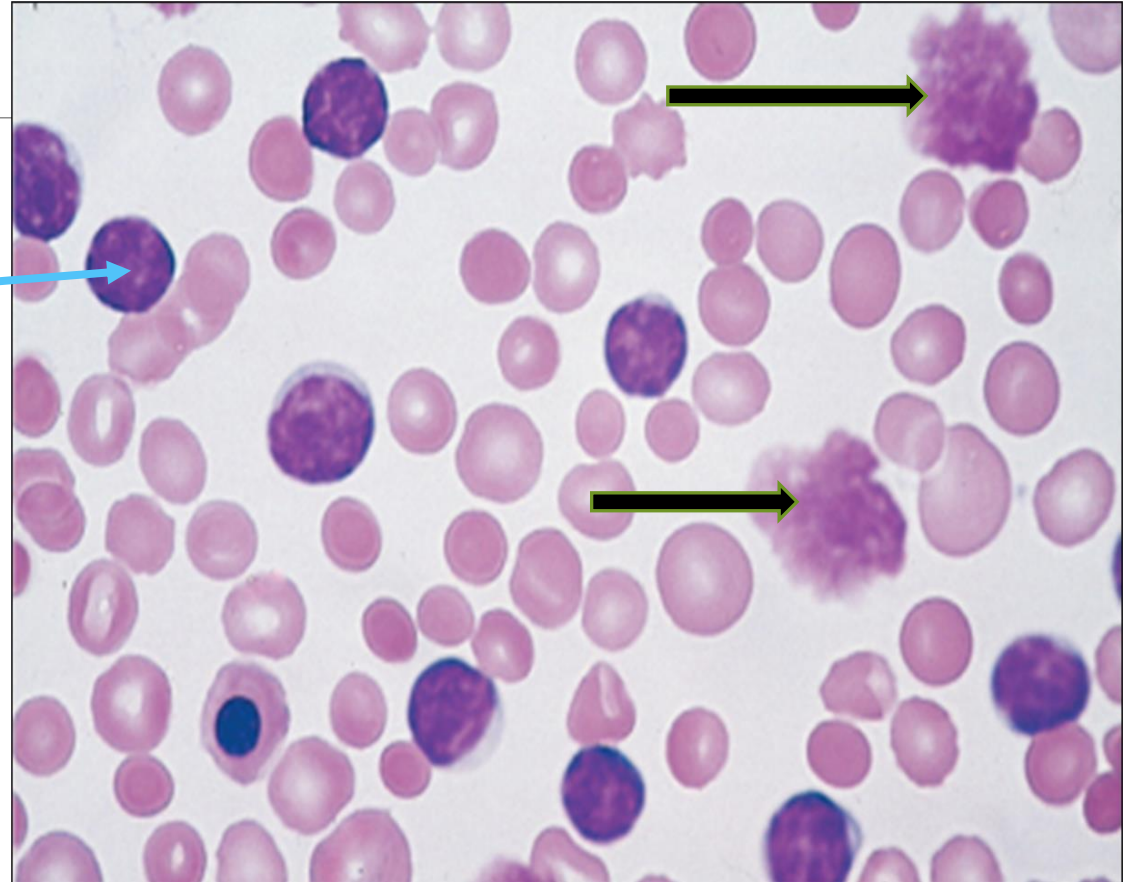
- At high power, most of the tumor cells have the appearance of small, round lymphocytes.
- A “prolymphocyte,” a larger cell with a centrally placed nucleolus also is present in this field (arrow).



SLL, Peripheral Smear

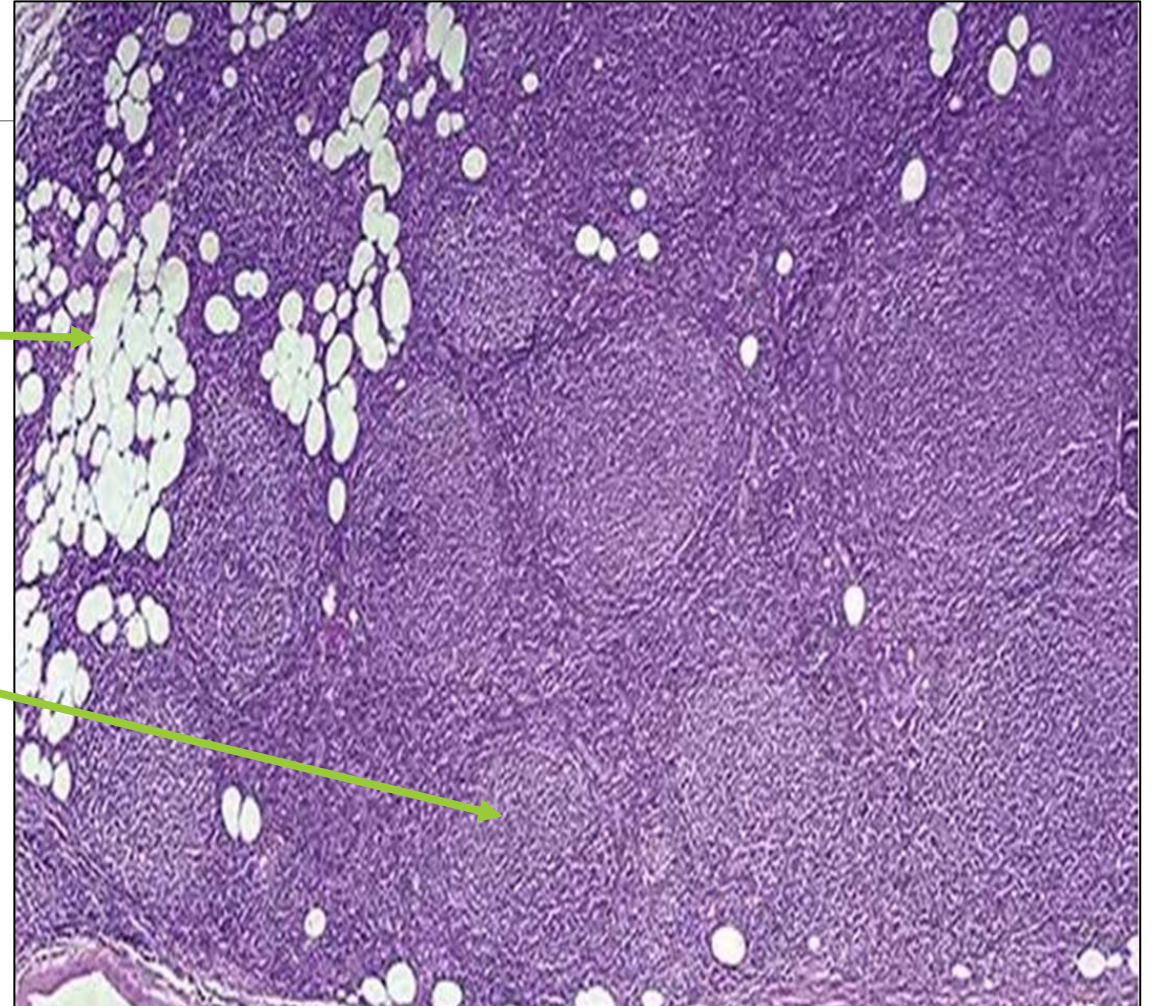
This peripheral blood smear is flooded with small lymphocytes with condensed chromatin and scant cytoplasm.

A characteristic finding is the presence of **Smudge cells**, two of which are present in this smear (black arrows).



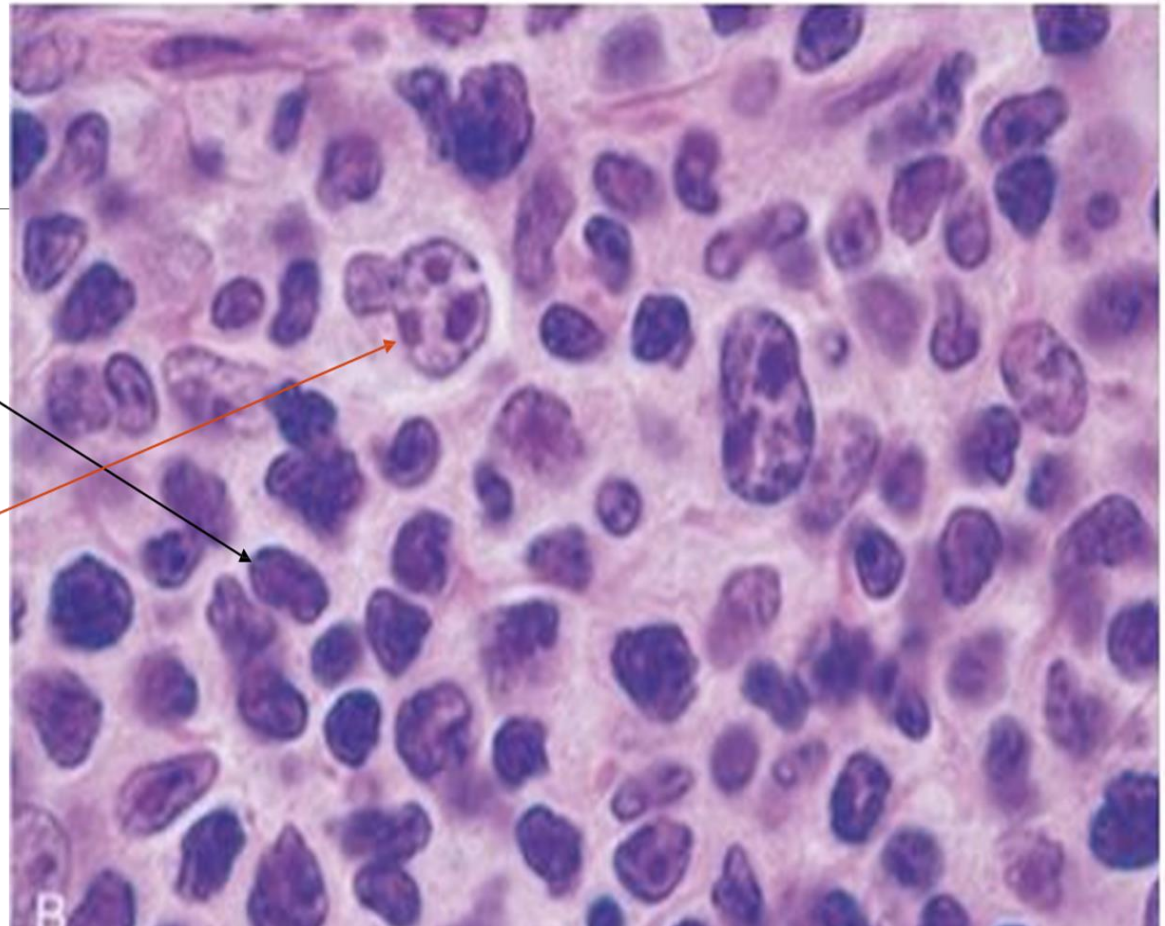
Follicular Lymphoma

- The capsule of this lymph node has been invaded, and lymphoma cells extend into the surrounding fat.
- The follicles are numerous, irregularly shaped and present throughout giving the **nodular appearance**.



Follicular Lymphoma

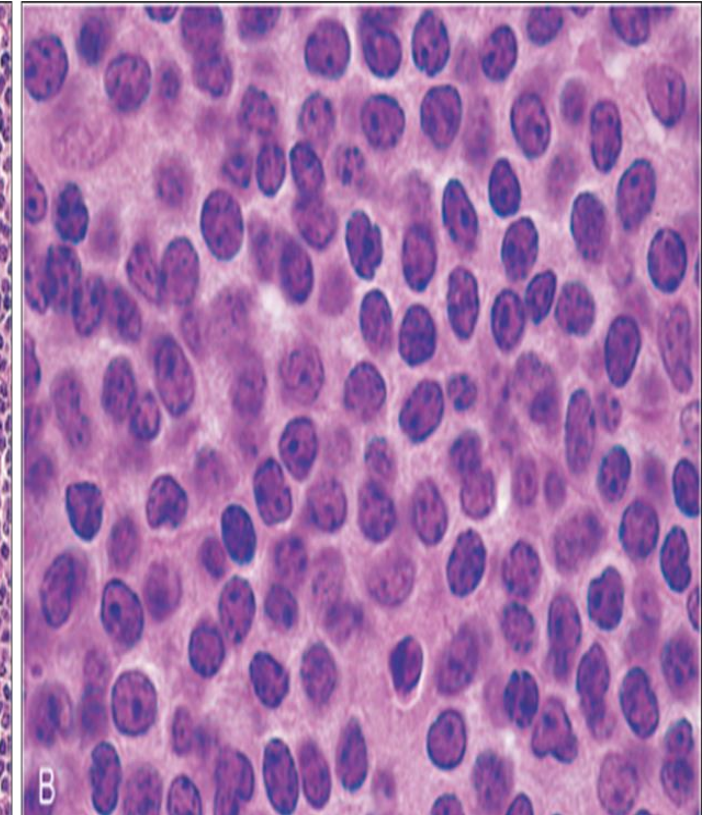
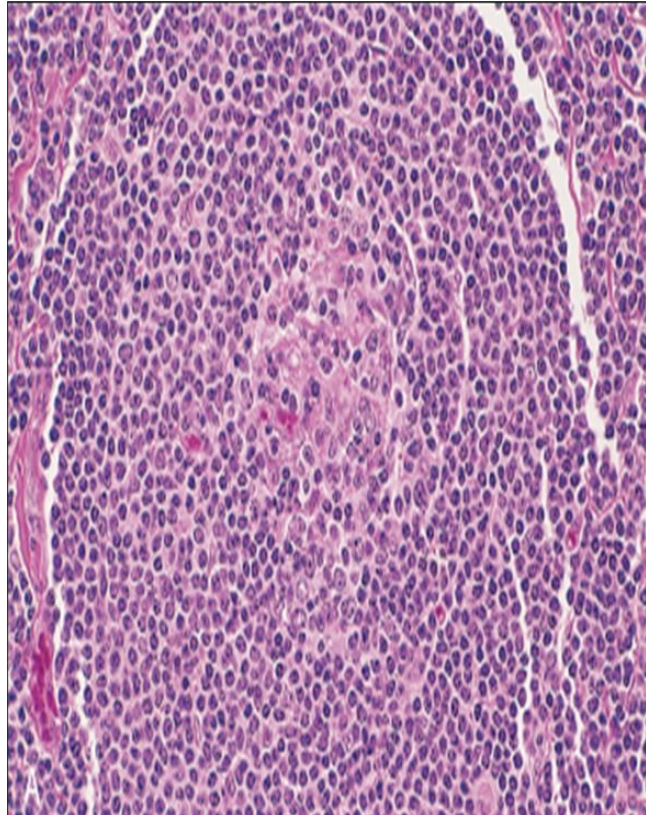
1. Centrocytes: Small and cleaved with dense chromatin.
2. Centroblasts: Large with fine chromatin and prominent nucleoli.



Mantle Cell Lymphoma

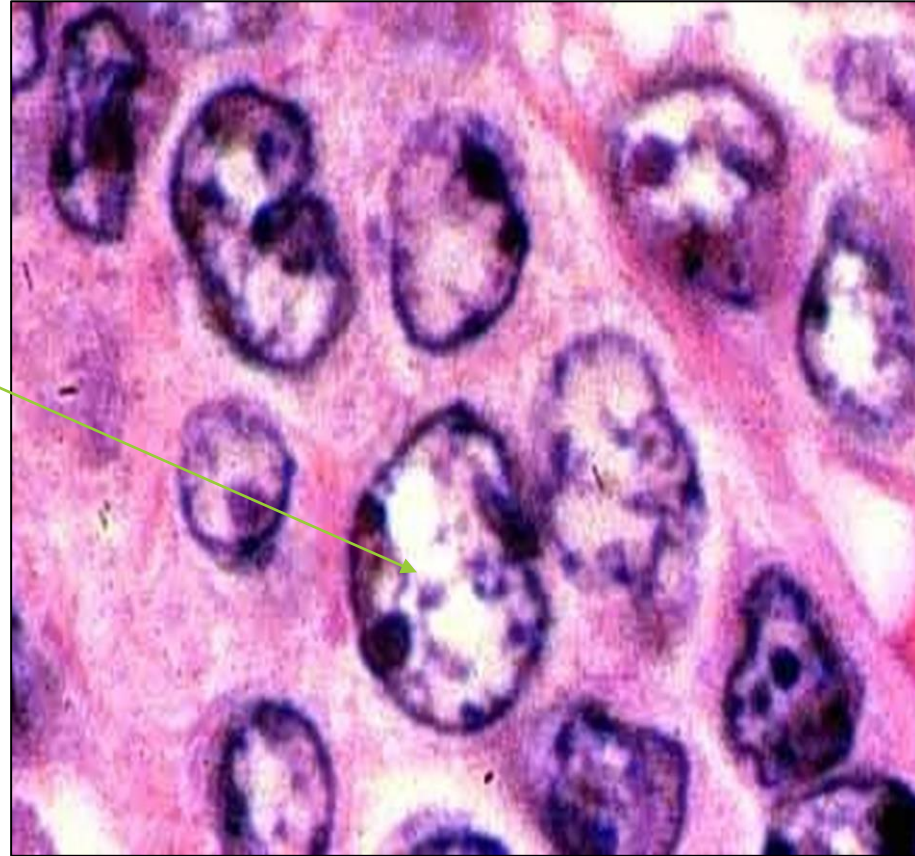
May involve lymph nodes in a **diffuse** or vaguely **nodular** pattern.

The tumor cells usually are slightly larger than normal lymphocytes and have an irregular nucleus(cleaved) inconspicuous nucleoli, and scant cytoplasm.



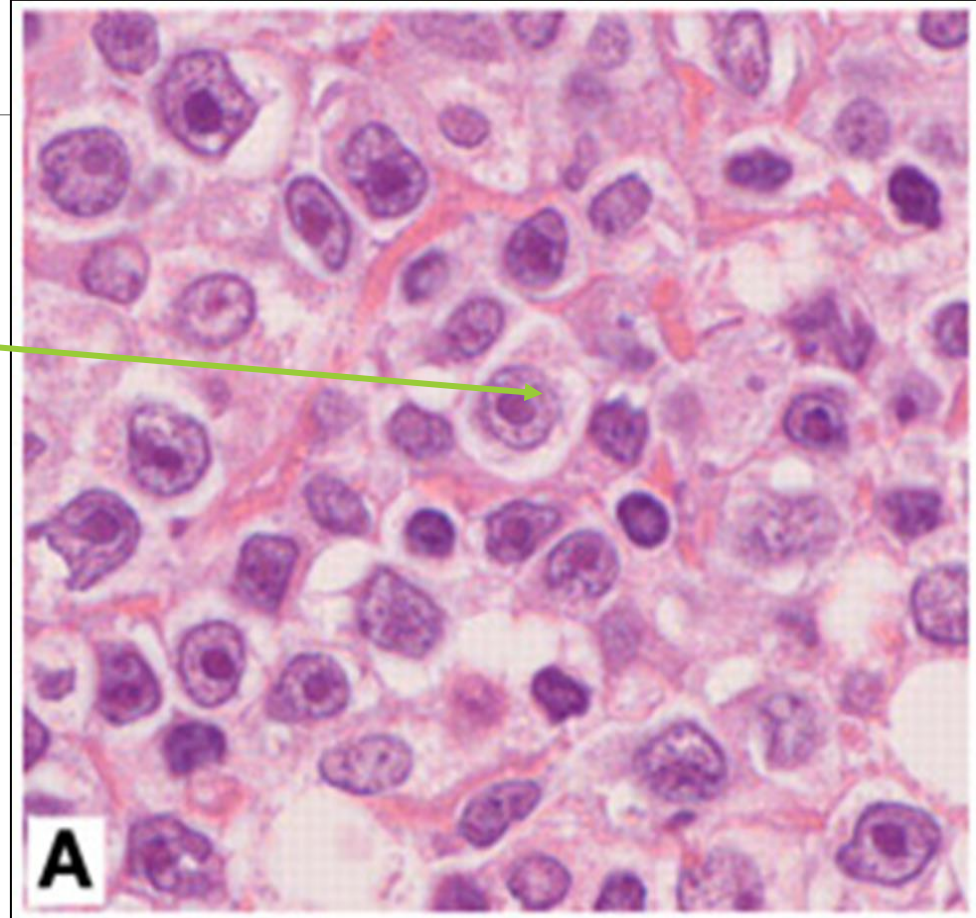
Diffuse Large B-cell Lymphoma

Lymph node biopsy:
showing large **centroblasts**
with multiple nucleoli



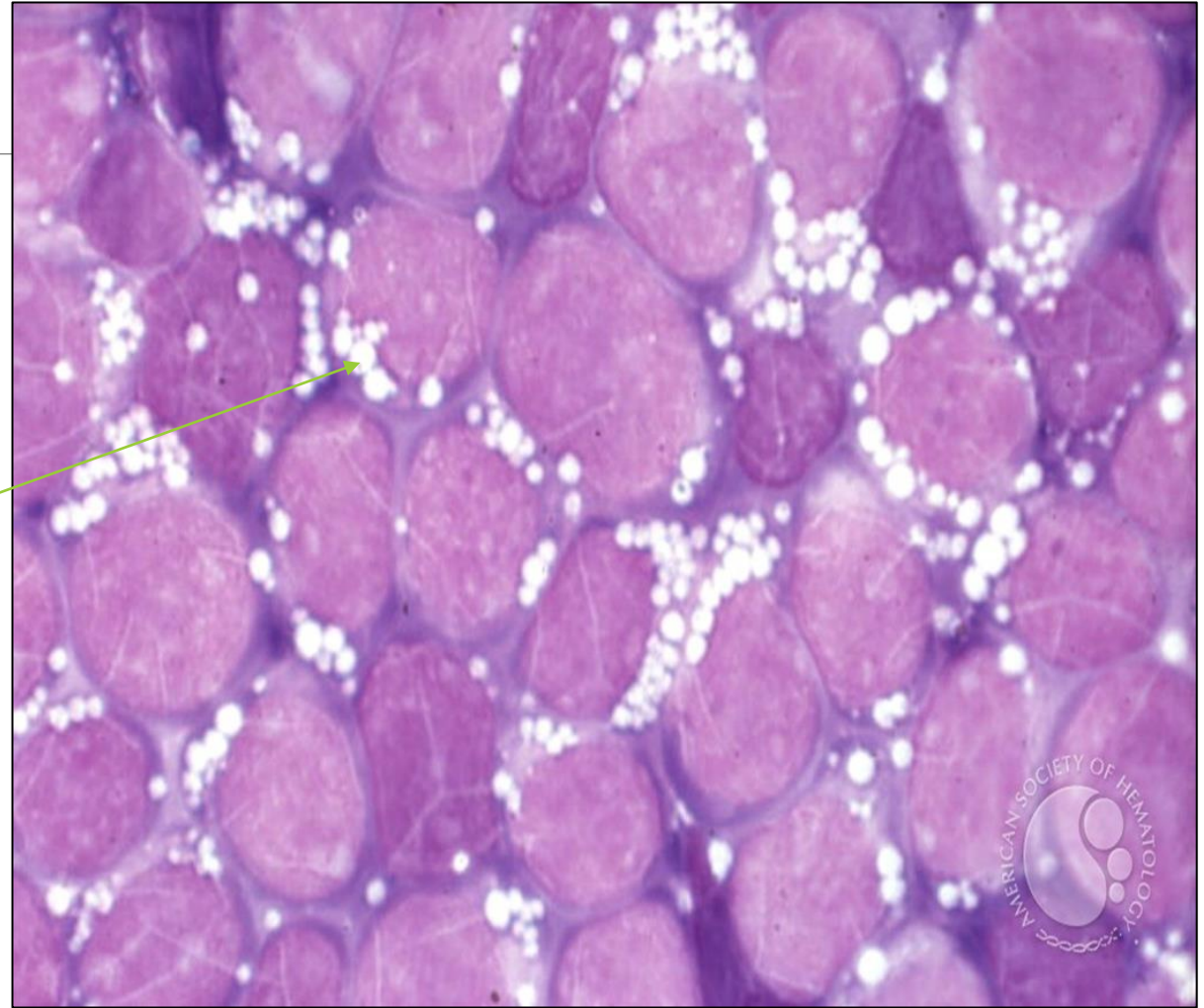
Diffuse Large B-cell Lymphoma

DLBL with **immunoblasts** with one central nucleolus.



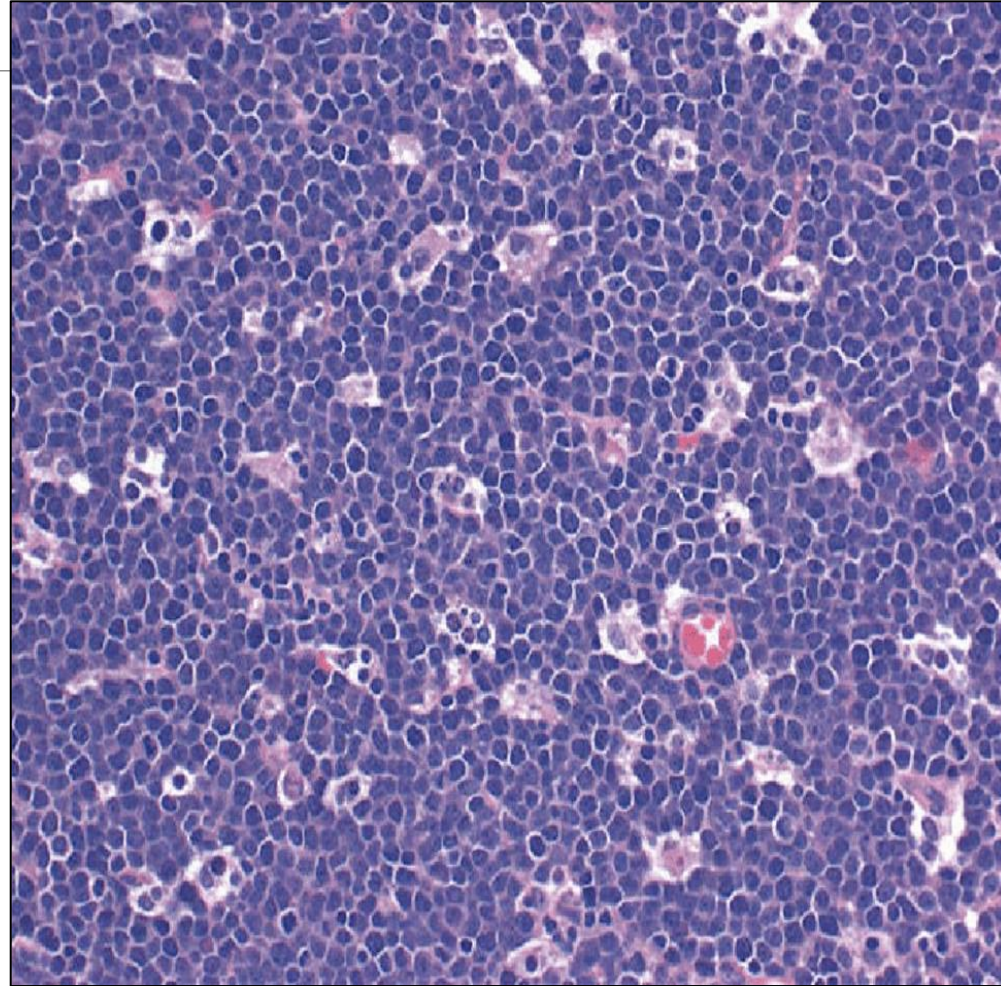
Burkitt Lymphoma, Smear

- The tumor cells are uniform and intermediate in size and typically have round or oval nuclei with 2-5 distinct nucleoli.
- There is a moderate amount of basophilic or amphophilic cytoplasm that often contains small, **lipid-filled vacuoles** (a feature appreciated on smears).



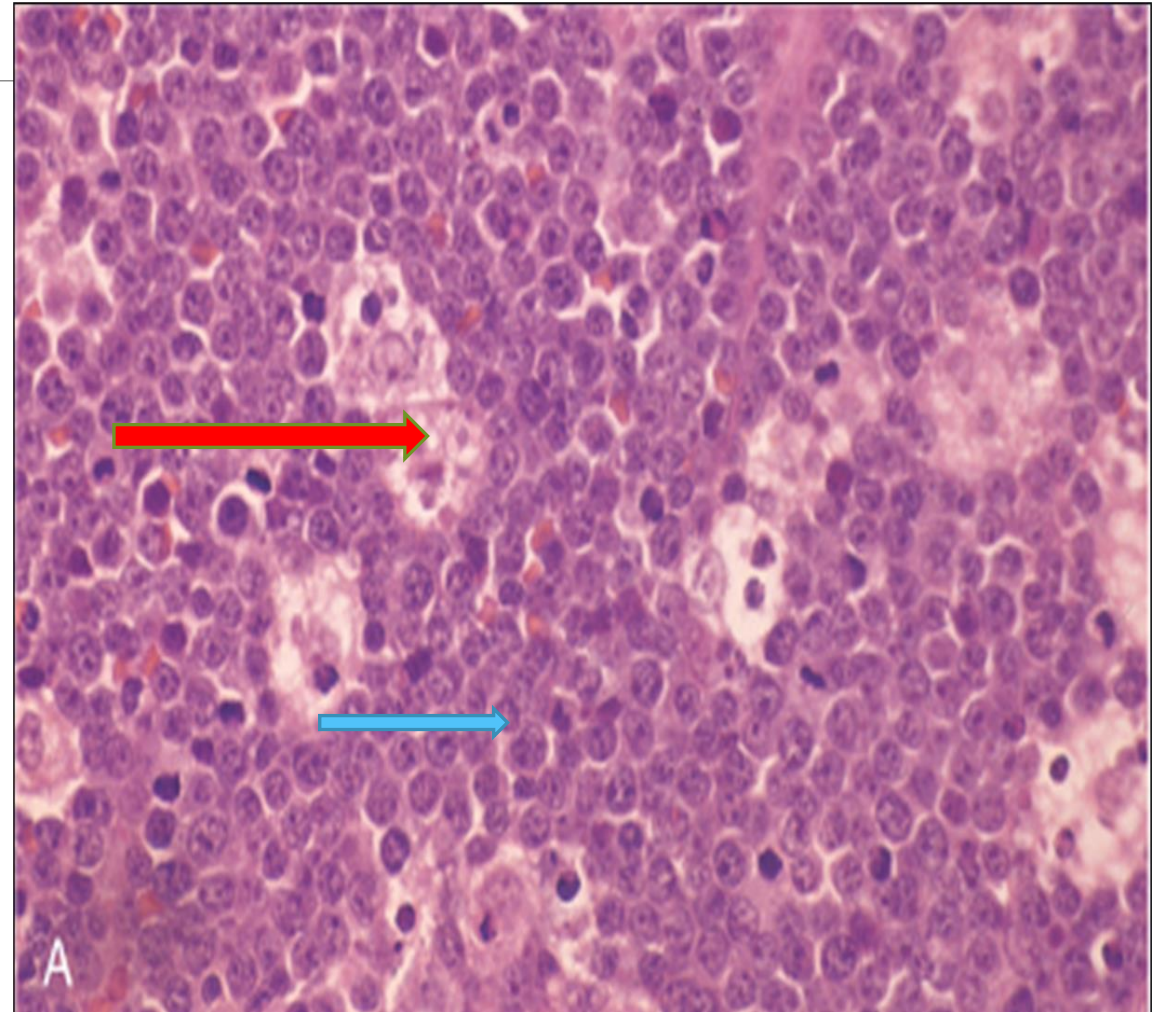
Burkitt Lymphoma

- Starry sky appearance



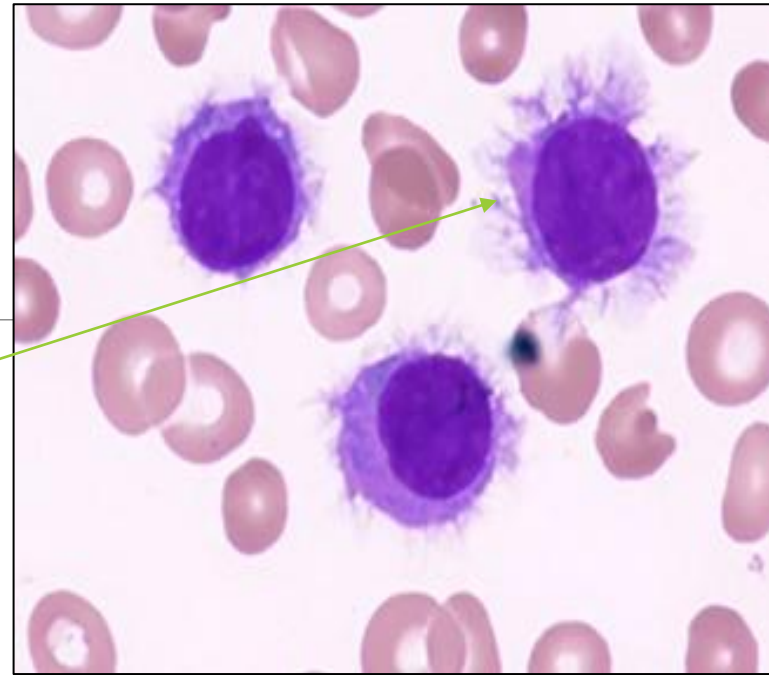
Burkitt Lymphoma

Diffuse sheets of medium-sized neoplastic Lymphocytes with **abundant mitosis** and apoptotic bodies beside **tingible body macrophages**.



Hairy Cell Leukemia

- peripheral bloodsmears shows abnormal lymphocytes with indistinct cytoplasmic borders and surface projections, giving the cells a “hairy” appearance.
- The **red** cytoplasmic staining seen at the lower right is tartrate-resistant acid phosphatase (**TRAP**) positivity

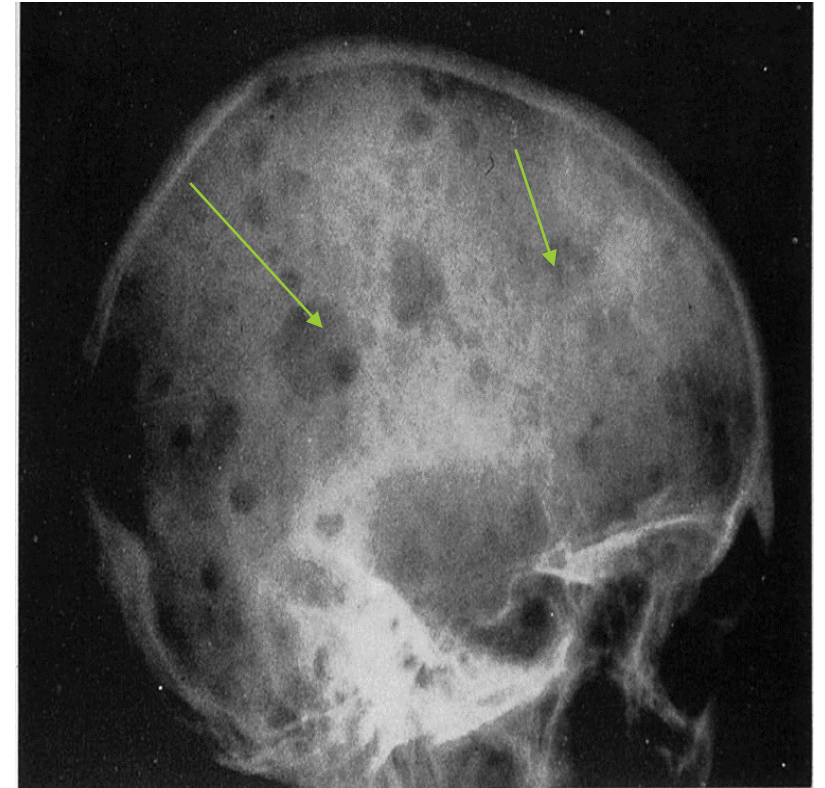
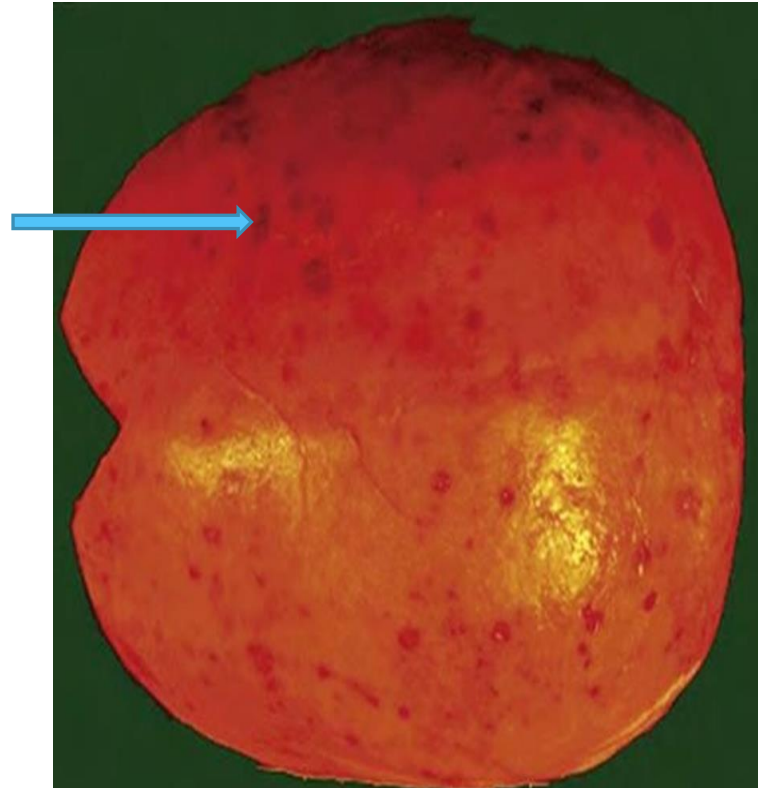


Plasma cell neoplasm

Multiple myeloma

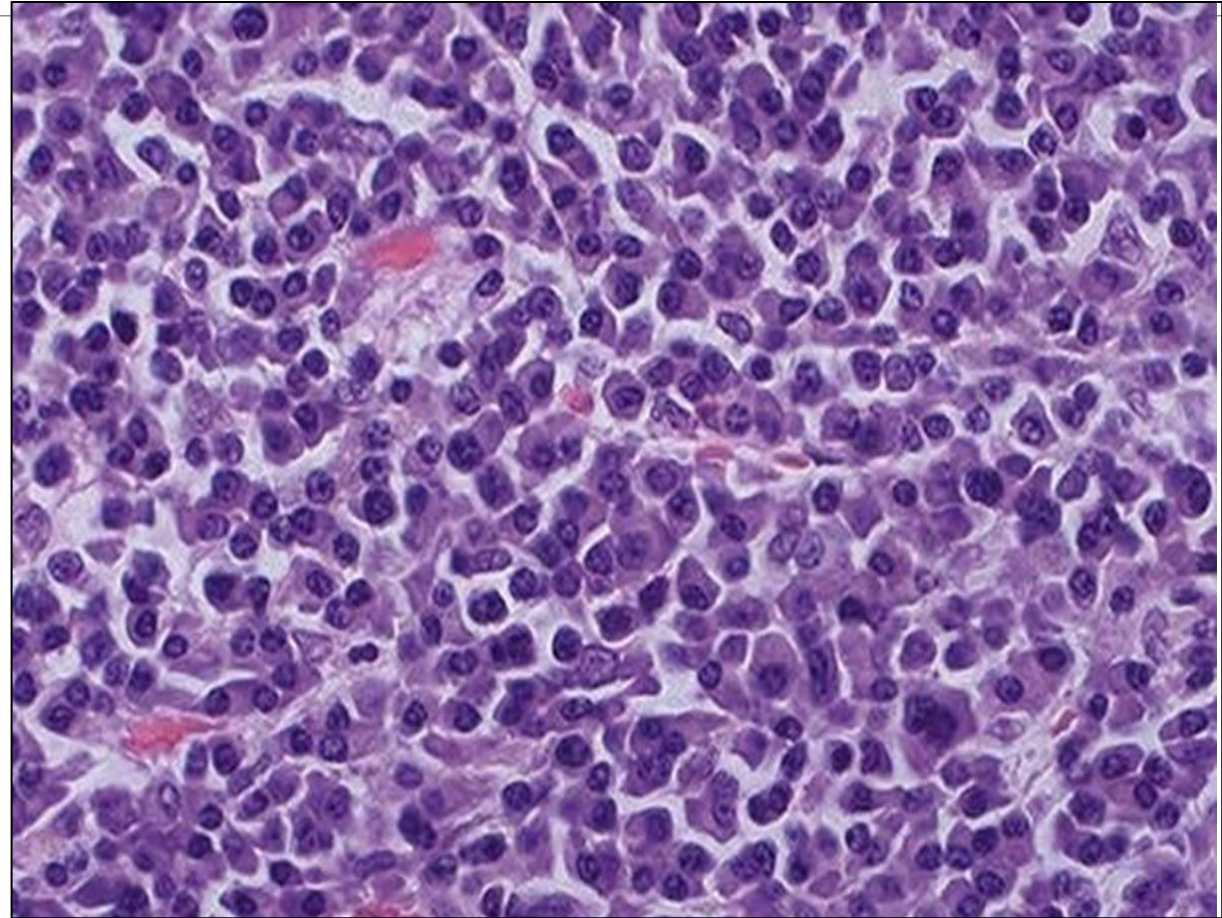
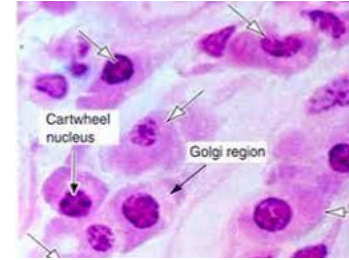
Skull X-ray showing multiple “punched out” osteolytic lesions

- This skull shows the characteristic rounded “punched-out” defects.
- The focal areas of plasma cell proliferation result in bone lysis to produce these **multiple lytic lesions**.



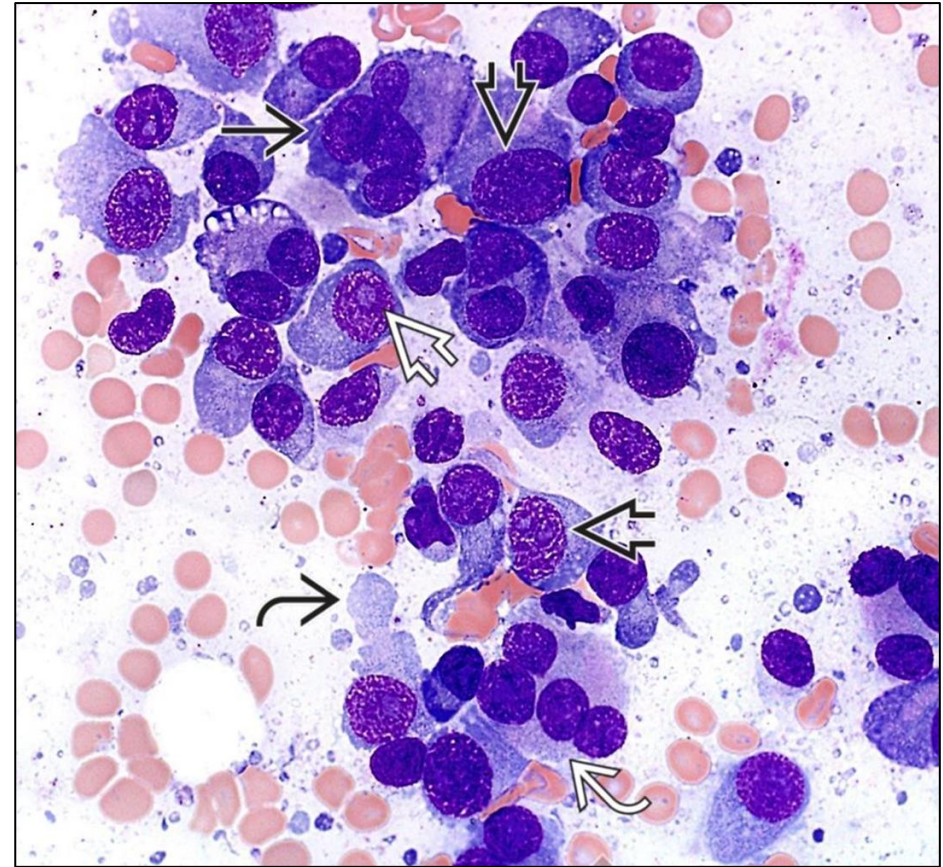
Multiple myeloma

In bone marrow biopsy section: there are **sheets of plasma cells** that are very similar to normal plasma cells, with eccentric nuclei and abundant pale purple cytoplasm resembling bike wheel.



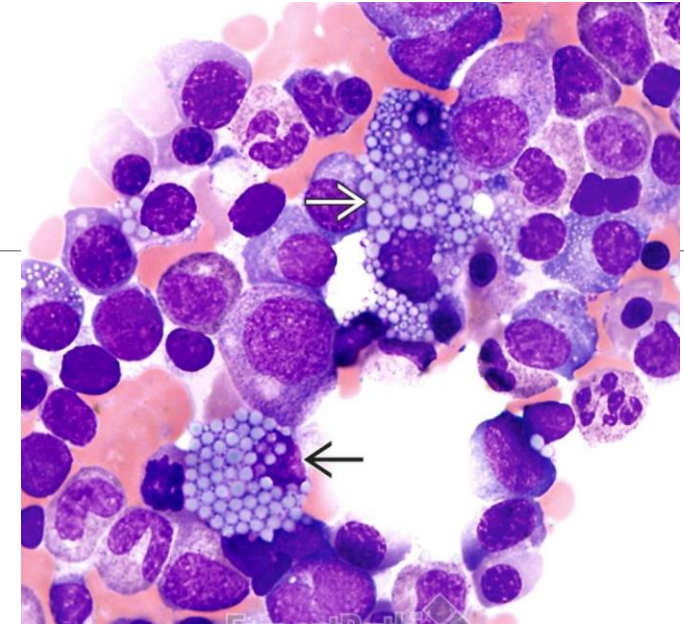
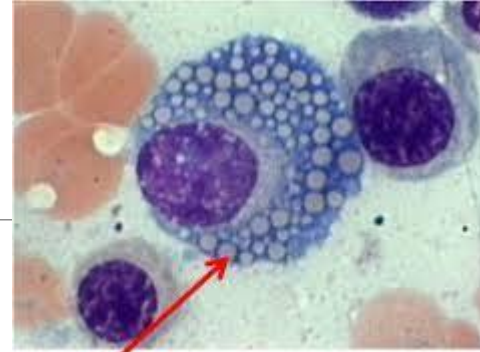
Multiple myeloma

- Features of PC atypia are illustrated in this aspirate, including:
 - Cellular and nuclear enlargement, nuclear **pleomorphism** (black solid arrow),
 - **Multinucleation** (white curved arrow),
 - **Dispersed nuclear chromatin** (black open arrow),
 - **Prominent nucleoli** (white open arrow)
 - Cytoplasmic fraying or shedding (black curved arrow).

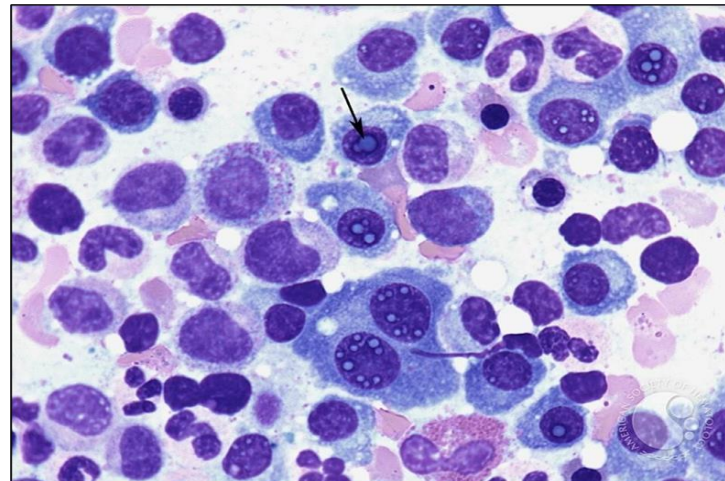


Multiple myeloma

- **Russell bodies** (white solid arrow) in the **cytoplasm**.
- When multiple Russell bodies are in the cytoplasm of cells, they are referred to as **Mott cells or morula cells, grape-like cells** (black solid arrow).

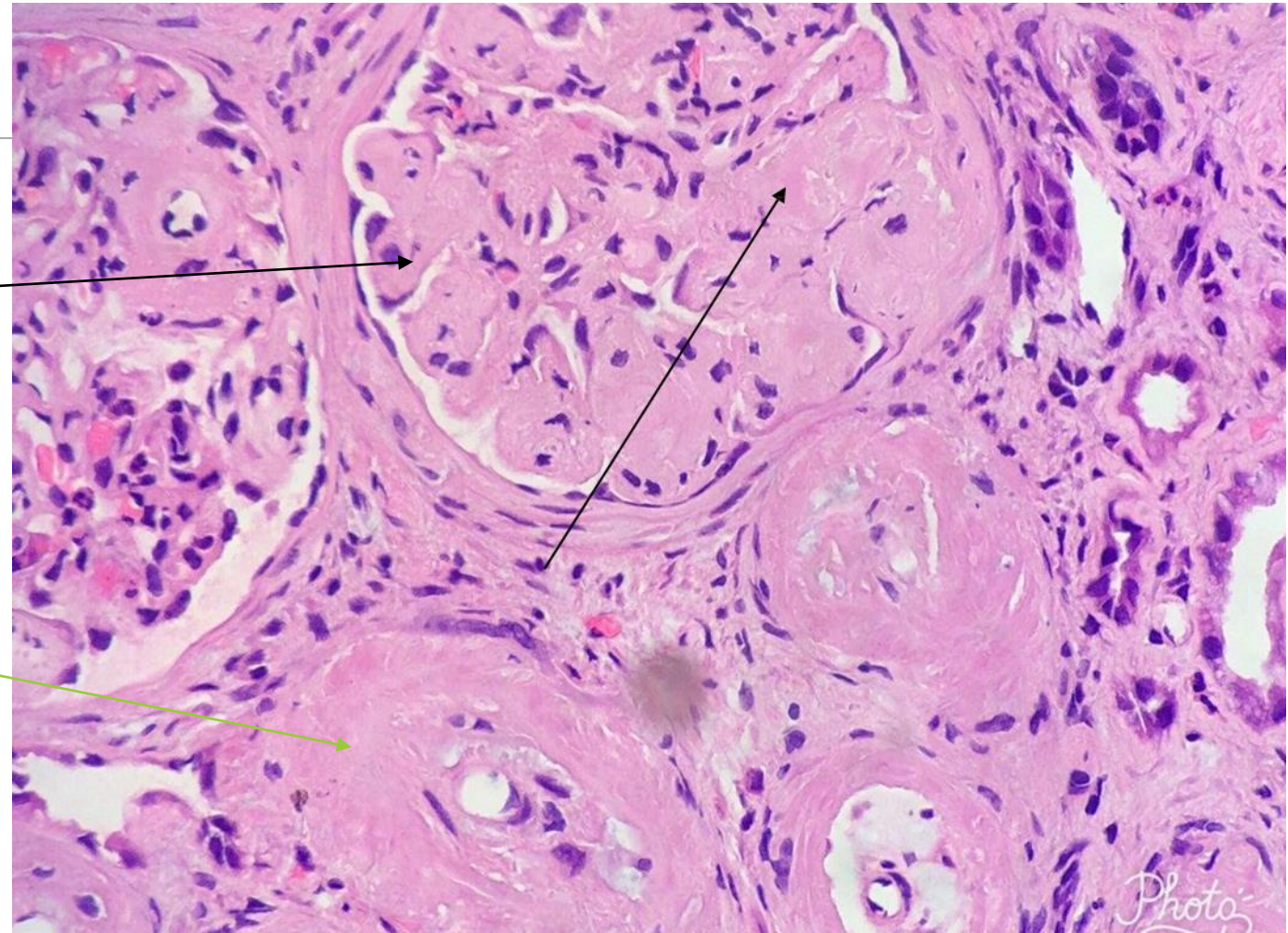


- If the inclusions are **intranuclear** they are called: **Dutcher bodies** (black arrow)



Renal Amyloidosis, Multiple Myeloma

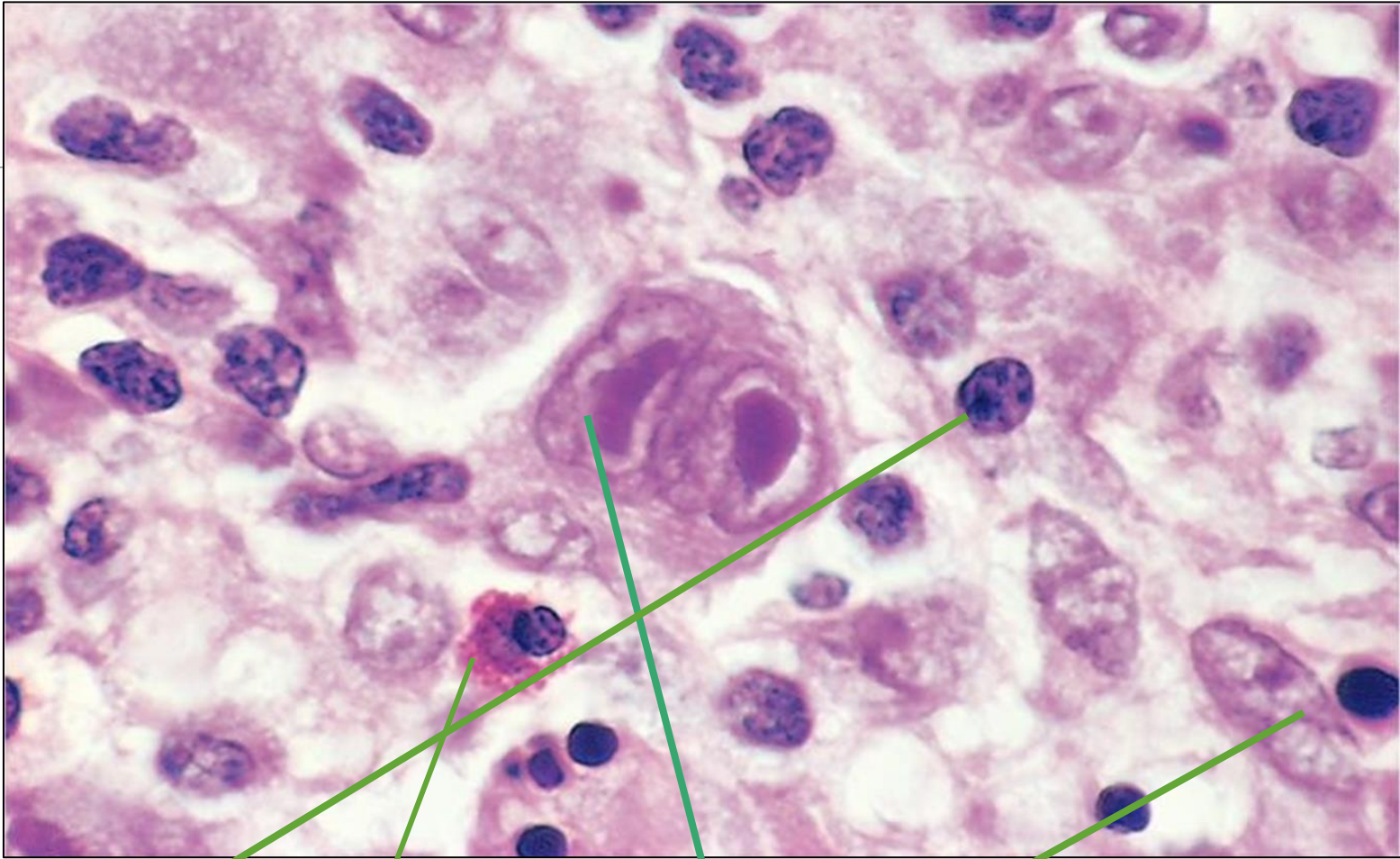
- In the renal cortex, pale pink deposits of **amyloid** are visible within glomeruli.
- The **amorphous pink deposits of amyloid** may be found in and around arteries, in interstitium, or in glomeruli.



HL

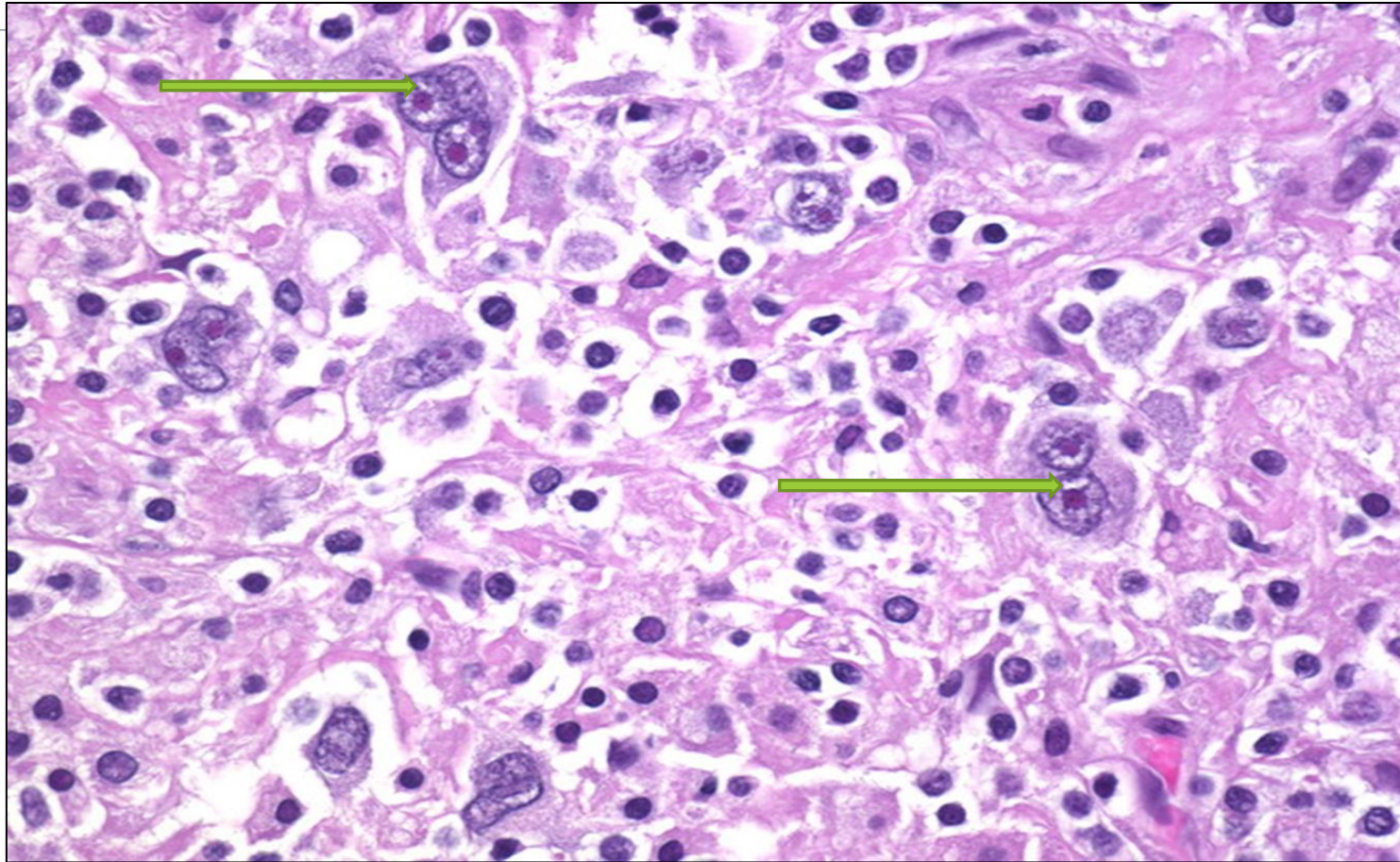


Hodgkin Lymphoma (HL)

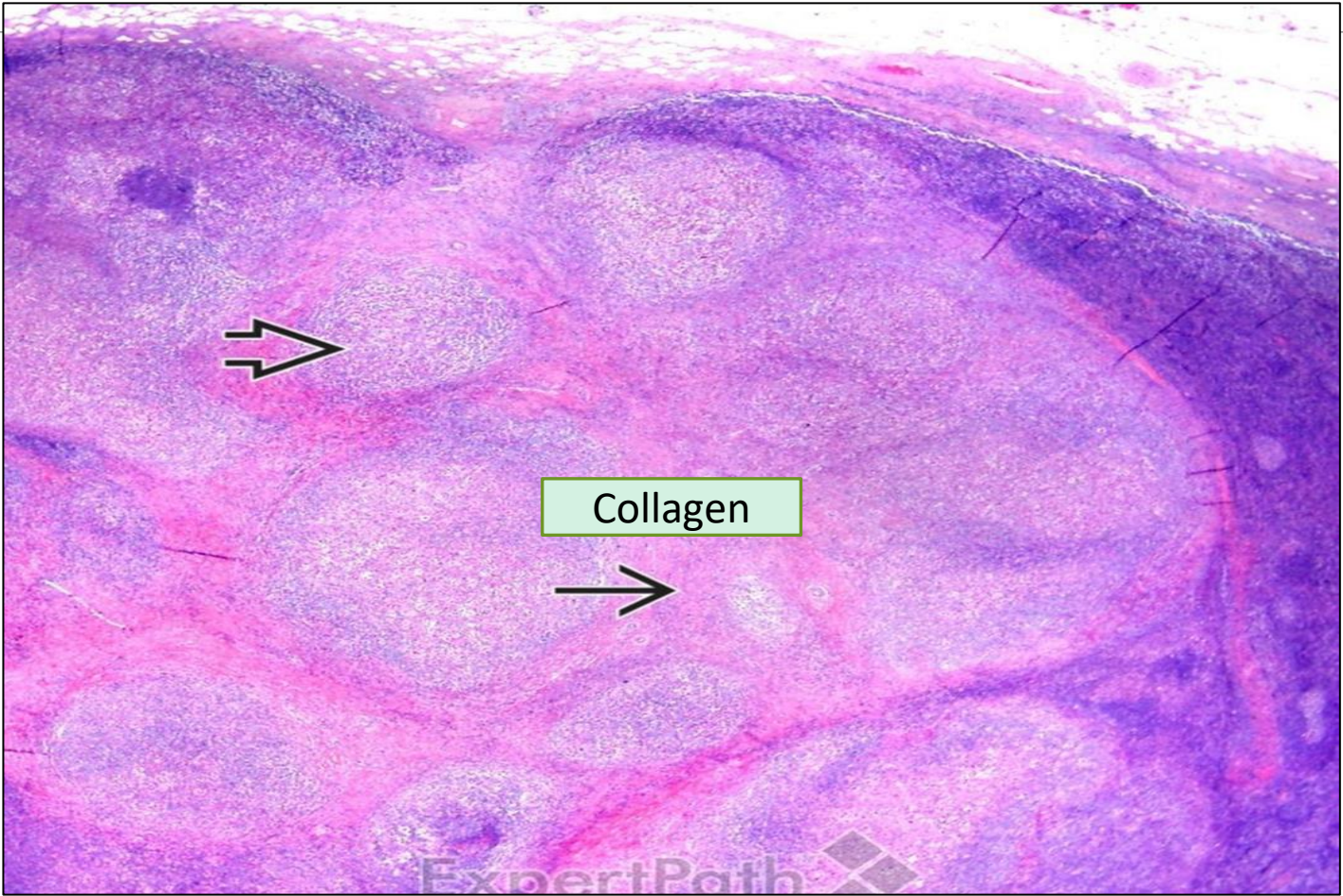


Hodgkin's Lymphoma: showing classic Reed- Sternberg cell (RS), lymphocytes, eosinophil & histiocytes

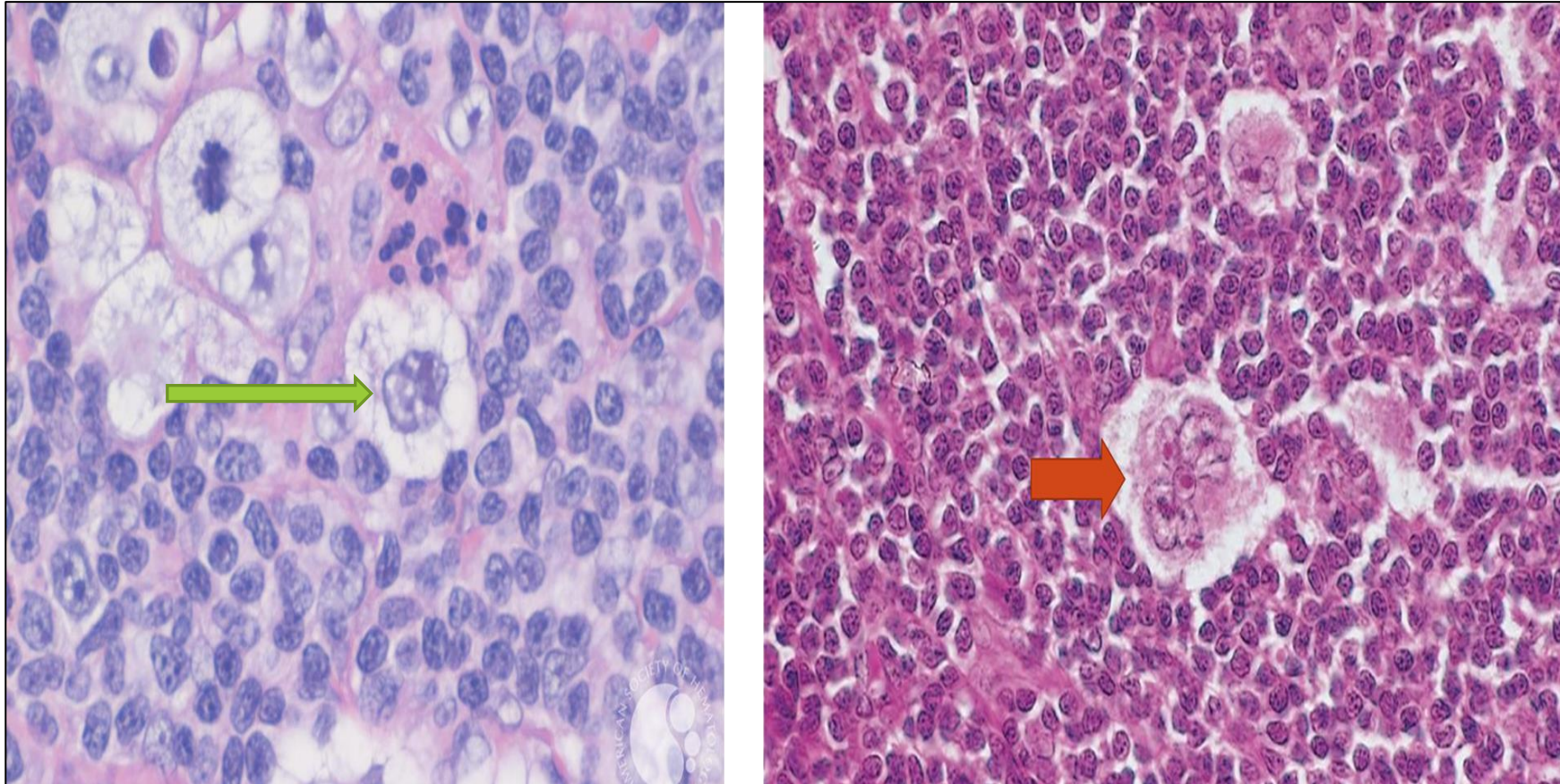
HL, RS



Nodular Sclerosis HL

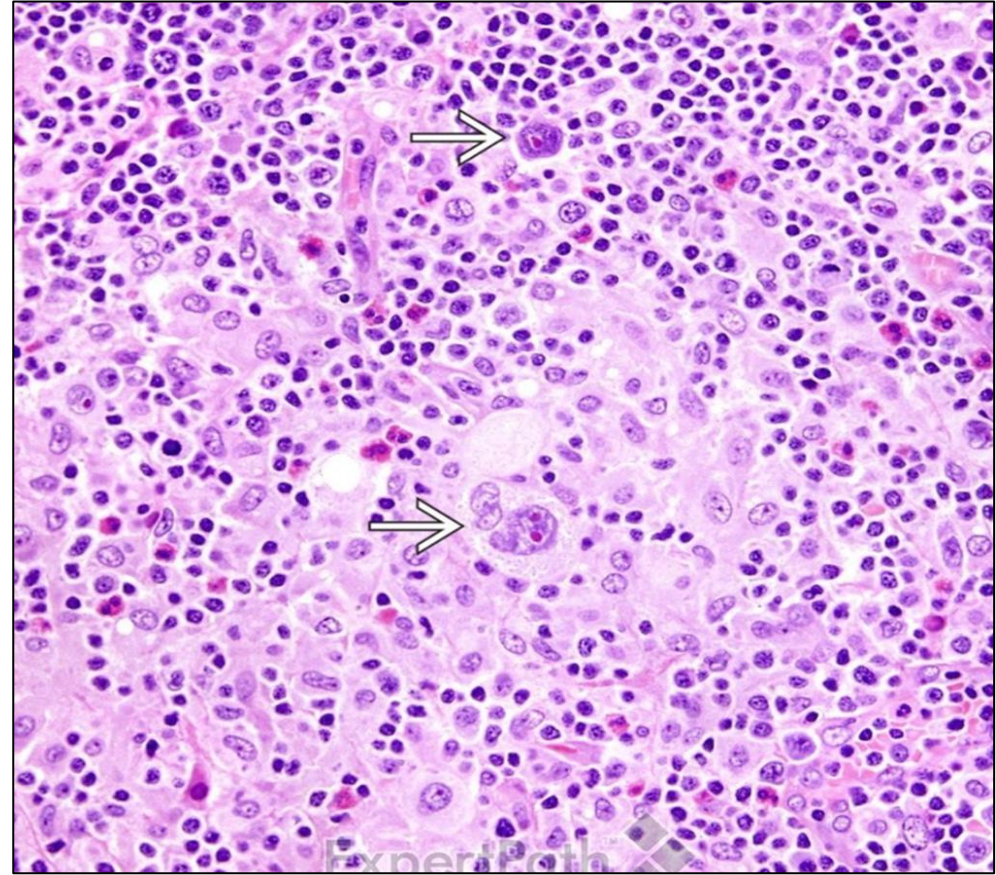


Lacunar Cells In Nodular Sclerosis HL



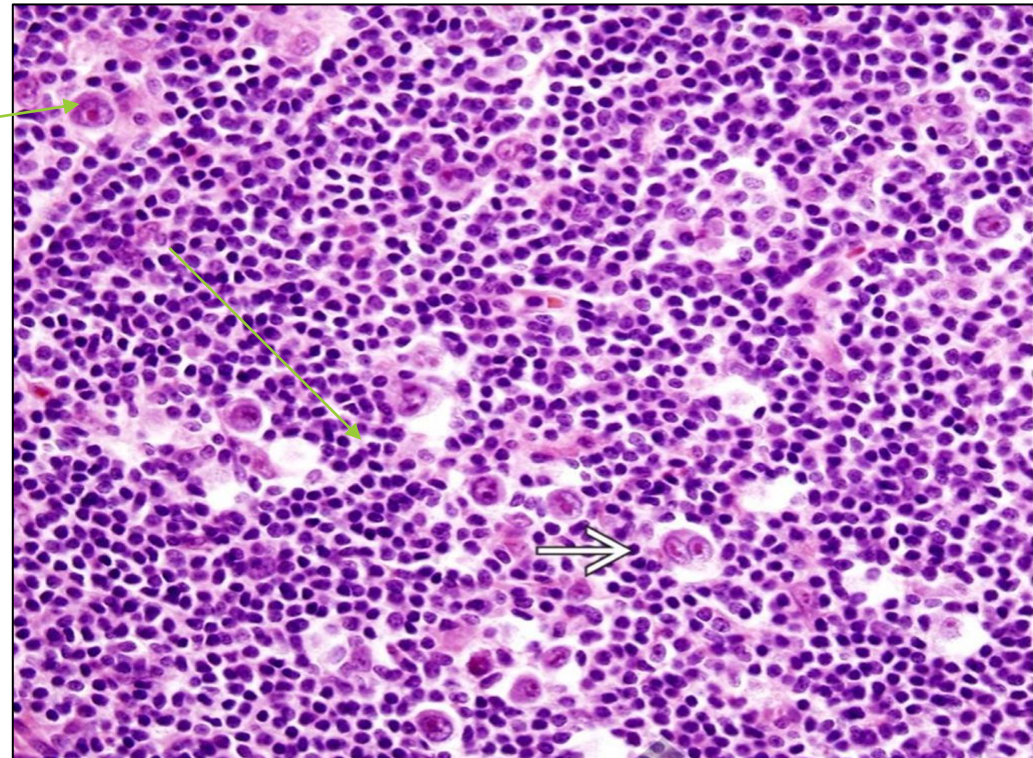
Mixed Cellularity HL

The normal architecture is effaced by Reed-Sternberg and **mononuclear Hodgkin** (RS+H) (white solid arrow) cells in a background of small lymphocytes, epithelioid histiocytes, and eosinophils.



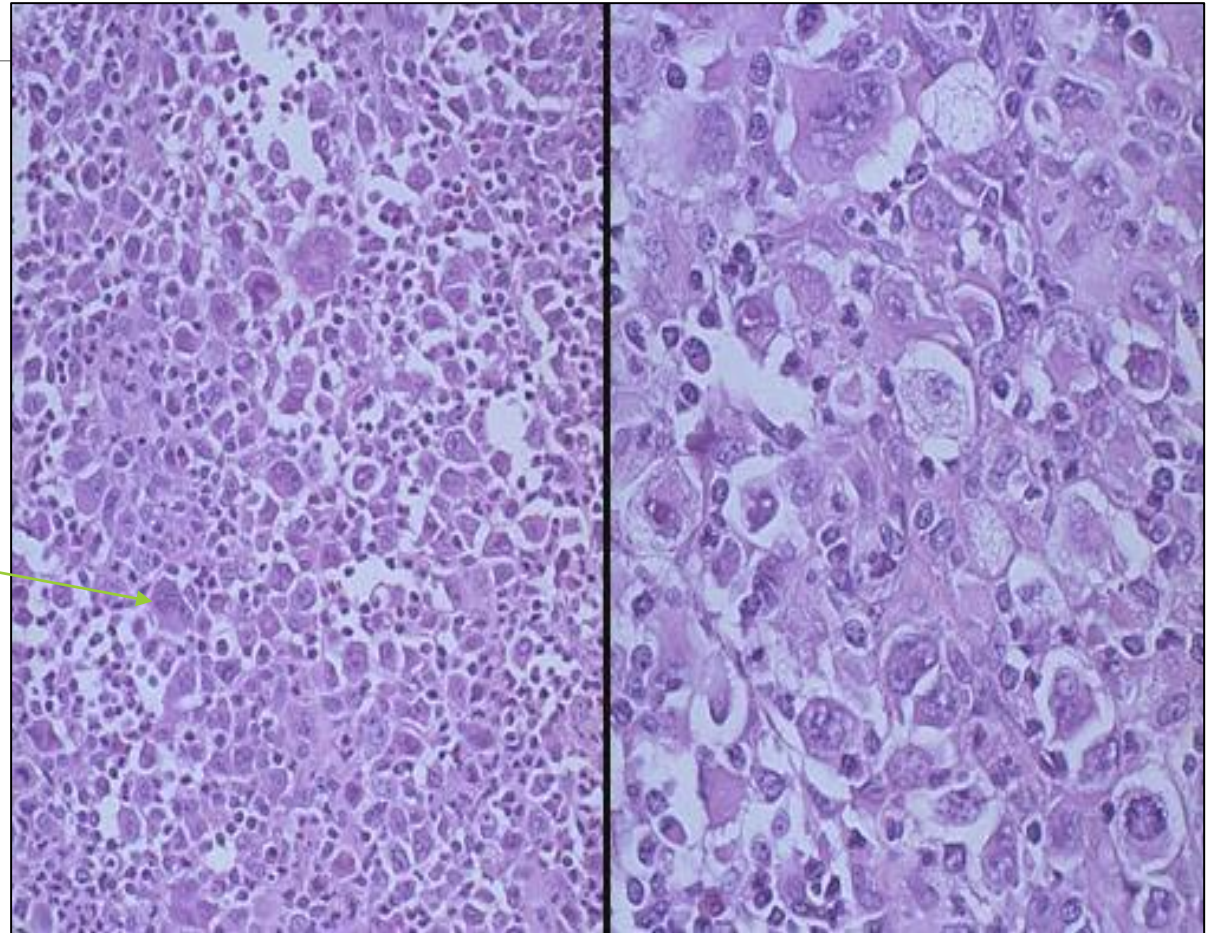
Lymphocyte Rich HL

Mononuclear Hodgkin cells and one Reed-Sternberg cell (solid white arrow) in a background of small lymphocytes.



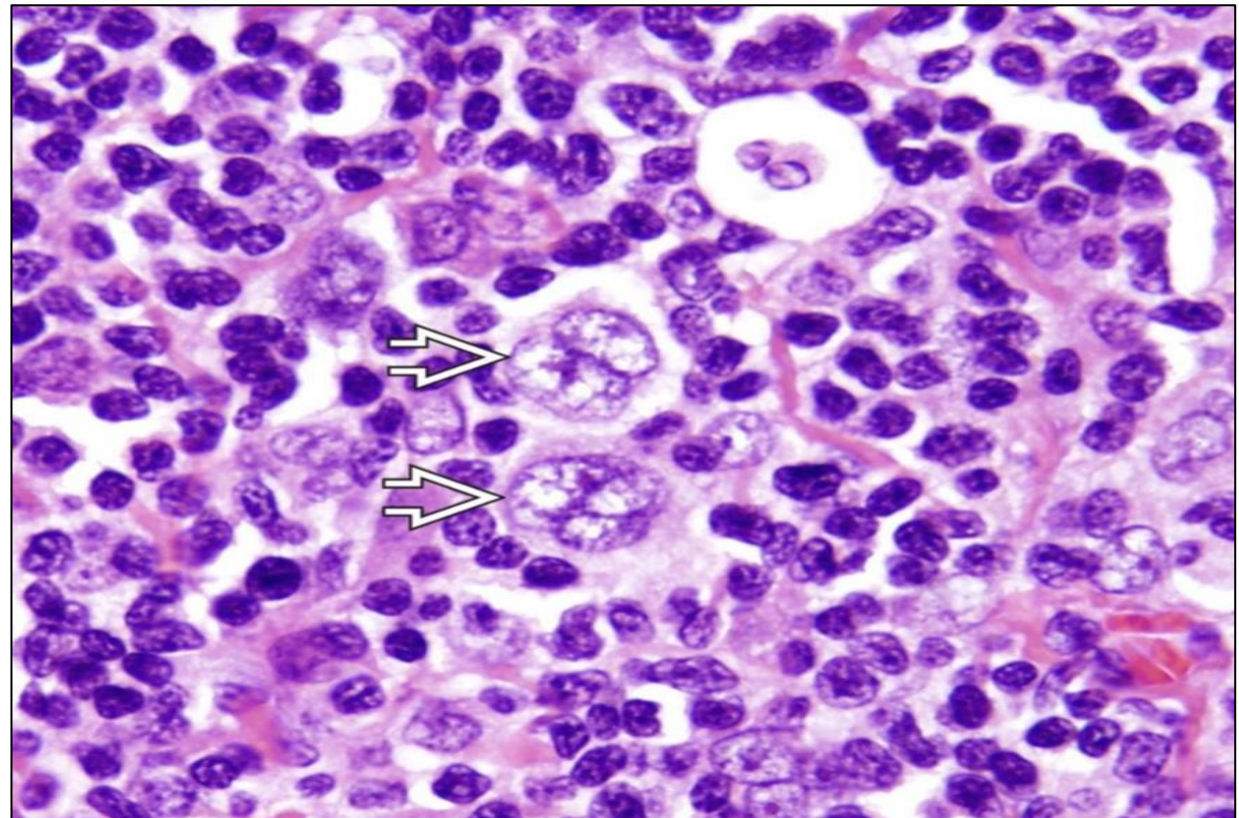
Lymphocyte depleted HL:

Many Reed-Sternberg cells and variants are present, small lymphocytes are depleted



NLPHL, Nodular Lymphocyte predominant (NLPHL)

The large neoplastic cells, known as **lymphocyte-predominant (LP) cells (lymphohistiocytic (L&H))** (white open arrow), often have multilobated nuclear contours and **resemble popcorn**.



Thank you

