Lymphatic System

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ILOs

- - Recognize lymphadenitis types
- - Identify reactive follicular hyperplasia
- - Classify lymphoid tissue tumors

Lymphoid tissue exists in:

- - Lymph nodes
- - Bone marrow
- - Thymus
- - Spleen
- - Nasopharynx, tonsils, Peyer's patches
- - Appendix and bronchus-associated tissue

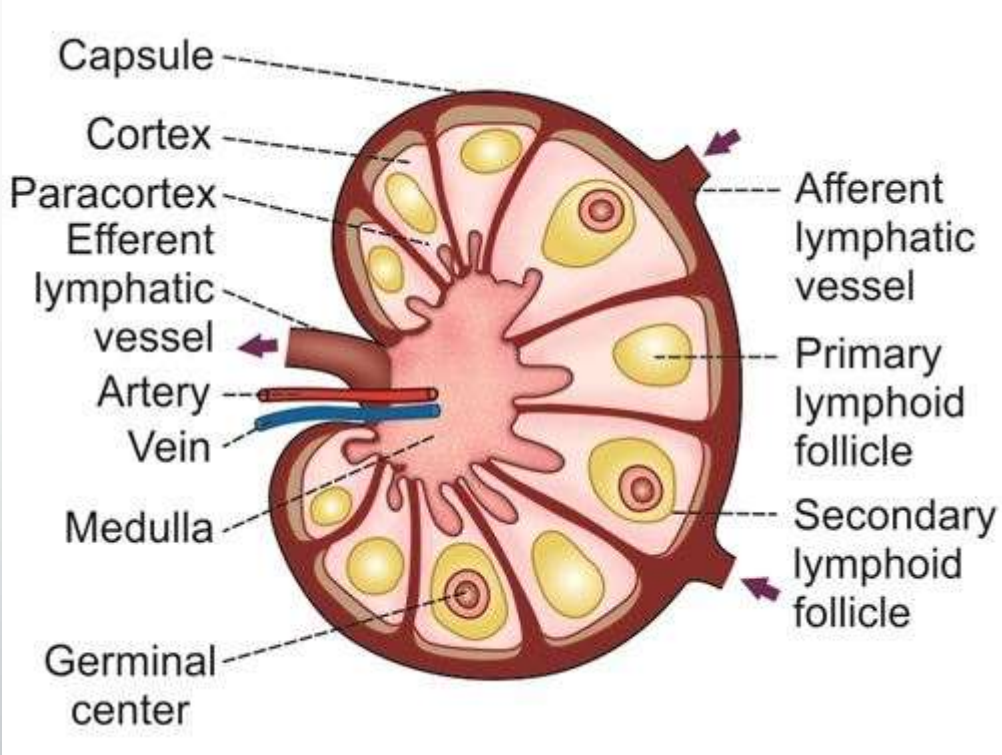
Lymphoid Organs Classification

- **Primary lymphoid organs:** -
- - Bone marrow, thymus
- - Yolk sac, fetal liver

- **Secondary lymphoid organs**:
- - Lymph nodes, spleen
- - Tonsils, adenoid
- - Peyer's patches, appendix

Histology of Lymph Nodes

- - Capsule, subcapsular sinus
- - Cortex (B cell zone)
- - Paracortex (T cell zone)
- - Medullary sinuses/cords
- - Afferent/efferent lymphatics
- - Primary/secondary follicles



- **Cortex:** Outer/Inner
- **Medulla:** Follicles, cords, sinuses
- **Germinal center** with macrophages
- **Mantle zone** surrounding follicles
- Medullary cord/sinus structure
- Hilum with efferent vessel
- **Follicle Types**
- Primary follicles
- Secondary follicles
- Germinal center

- **Tangible body macrophages:**
- Large cells with clear cytoplasm
- Antigen-presenting cells in GC

Lymph Node Diseases Classification

- 1) Reactive lymphoid hyperplasia
- 2) Inflammatory diseases (lymphadenitis)
- 3) Tumors of lymph nodes:
- - Lymphoma
- - Metastatic carcinoma
- Lymphadenopathy general

Lymphadenitis

- **Definition:** Inflammation of lymph nodes resulting in Swelling and tenderness L.N
- **Classification**
- 1.Acute lymphadenitis:
- **A. Bacterial B. viral**
- 2. Chronic lymphadenitis:
- **A. Non-specific**
- **B. specific ,Granulomatous** :
- TB, sarcoidosis
- Toxoplasmosis, Crohn's, cat scratch

Acute Bacterial Lymphadenitis

- Occurs in LNs draining acute inflammation
- **example**: Acute suppurative tonsillitis/abscess
- **leads to** Nodal acute inflammatory reaction Rich in **neutrophils**
- Gross: cardinal signs of inflammation(Enlarged, soft, red, tender)
- May progress to **abscess formation**

Acute Viral Lymphadenitis

- Causative: any Viral infections
- **Commonest:** Infectious mononucleosis Caused by **Epstein-Barr virus (EBV)**
- Symptoms: Lymphadenopathy Splenomegaly, fever, sore throat
- Microscopical : Paracortical hyperplasia

Chronic Lymphadenitis Types

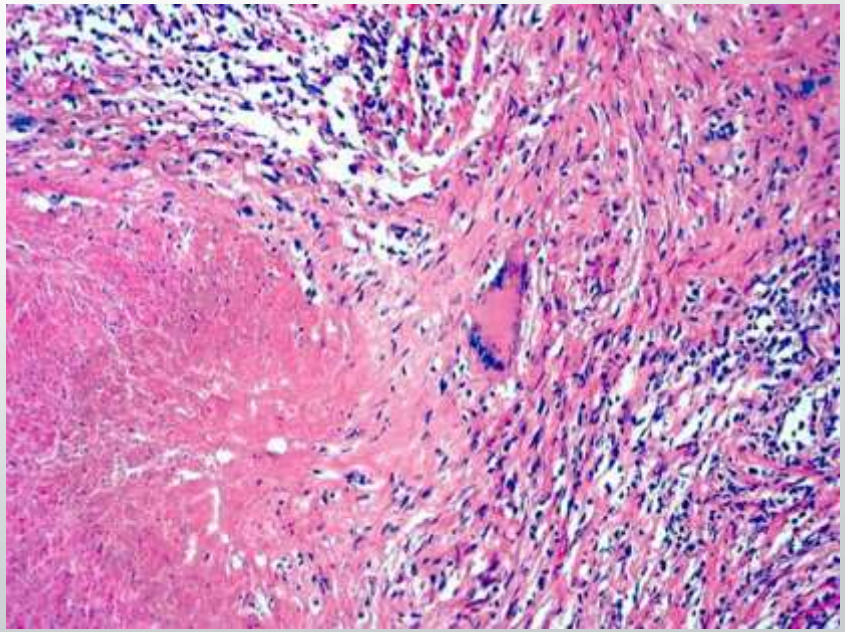
- **Non-specific**: Indicates chronic inflammatory reaction of the lymph node that show infiltration by chronic inflammatory cells mainly histocytes and plasma cells. Associated with Reactive **hyperplasia of affected lymph node**
- **Specific**: Granulomatous lymphadenitis
- TB, Sarcoidosis, Toxoplasmosis
- Crohn's disease, Cat scratch disease

A. TB. lymphadenitis

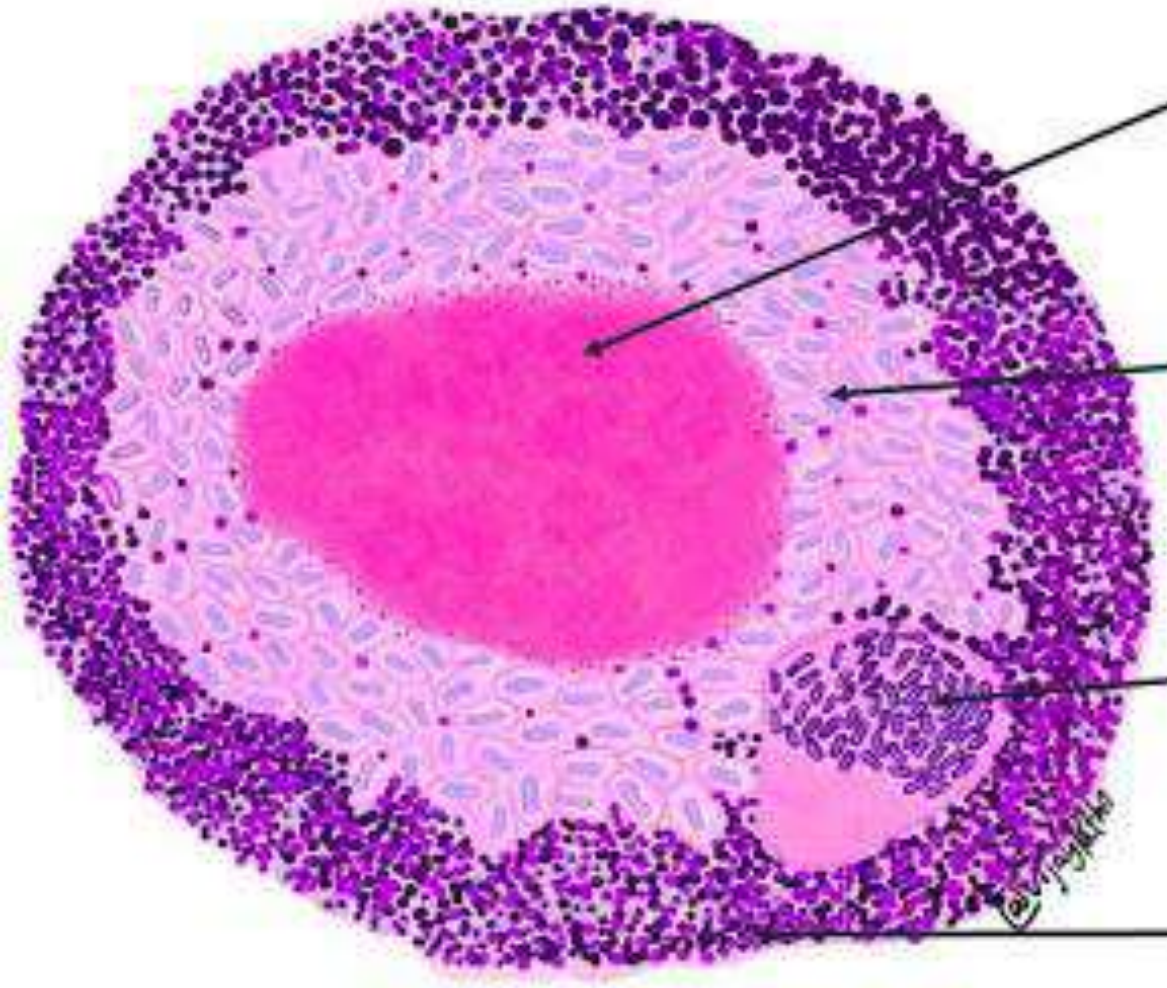
- Mycobacterial infection (human/bovine)
- Primary or secondary TB
- **Affected LNs**: Cervical, mediastinal ,Mesenteric lymph nodes
- **Gross picture:**
- Early: LNs are enlarged firm and not adherent together with grayish white cut surface.
- Late: LNs become fused to each other (matted LNs) due to peria-denitis. Cut surface show cheesy-like yellowish material (caseous necrosis)

Microscopic features

- **Early lesion** : lymph node is involved by multiple **small pale granulomas** formed of **epitheliod cells, few Langhan's giant cells and lymphocytes** with absent or minimal caseation.
- **Late cases:** lymph node showed multiple variable sized caseating granulomas.
- The lymph node may be near totally or totally replaced by caseous necrosis with small granulomas at the periphery.



TUBERCULOUS LYMPHADENITIS: Necrotizing granuloma



Amorphous granular eosinophilic debritic material
CASEOUS NECROSIS

Modified macrophages with abundant cytoplasm and pale staining "slipper" shaped nuclei
EPITHELOID CELLS

Multinucleated giant cell
LANGHAN GIANT CELL

Collar of lymphocytes surrounding epitheloid cell aggregates

Complications

Local spread to adjacent tissue

Distant spread to other organs Isolated organ TB or miliary TB

Cold abscess formation with multiple sinuses discharging caseous material.

Cold abscess of cervical LN opens to skin,

cold abscess of mediastinal LN opens to mediastinum and

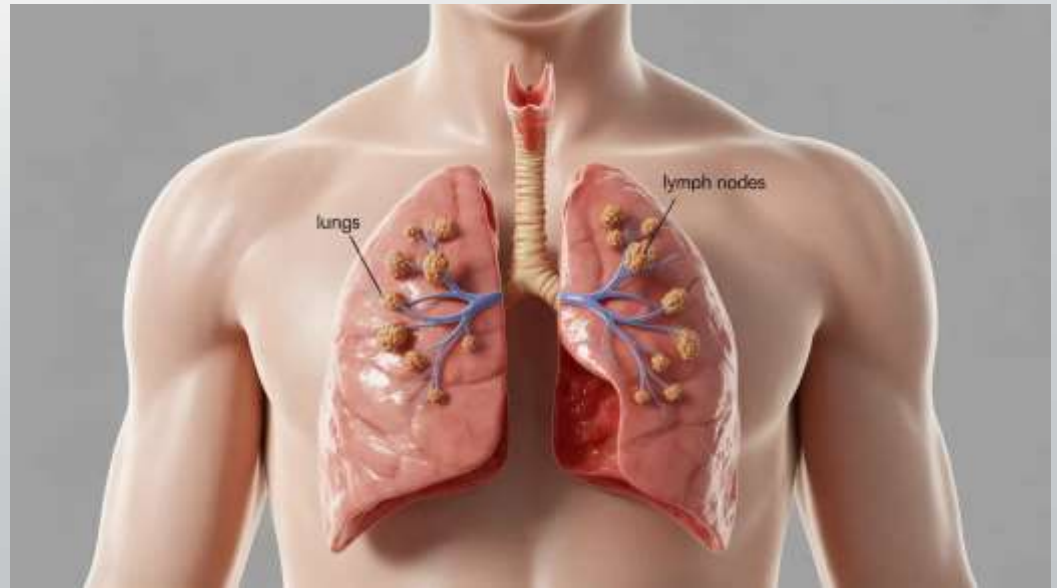
cold abscess of mesenteric LNs opens to peritoneum leading to TB peritonitis

Secondary amyloidosis

Pathological calcification

B.Sarcoidosis

- It is a disease forming non-caseating epithelioid cell granuloma
- The granulomas are typically “naked” with few surrounding lymphocytes and a rim of mild fibrosis.
- Schaumann bodies & asteroid bodies, While frequently seen, these findings are not specific to sarcoidosis.



C. Toxoplasmosis

- Is infection caused by (toxoplasma gondii)
- These microscopic parasites live inside the cells of human and animals (cats & farm animals)
- It forms non caseating epithelioid cell microgranuloma.

D. Crohn's disease

One of the inflammatory bowel disease of the intestine that forms non caseating epithelioid cell granuloma in the GIT wall.

E. Cat scratch disease

- It is transmitted to man through skin scratches or bites of cats or rabbits.
- Axillary group of L.Ns. are usually affected.
- Microscopic:
- characterized by **granulomatous inflammation**
- It is characterized by **nodal formation** of **microabscesses** having **central stellate** shaped areas of necrosis with neutrophiles surrounded by palisading of histiocytes i.e., **stellate necrotizing granuloma**

Reactive Lymphoid Hyperplasia

Non-neoplastic enlargement of lymph nodes due to reactive proliferation (immune response) of lymphoid tissue.

Clinically / Grossly:

Non painful enlargement involving one or more groups of lymph nodes

Lymph nodes are diffusely enlarged, soft and discrete (not fused).

Types of reactive hyperplasia:

– Follicular

–Para-cortical

–Sinusoidal

A. Reactive follicular hyperplasia

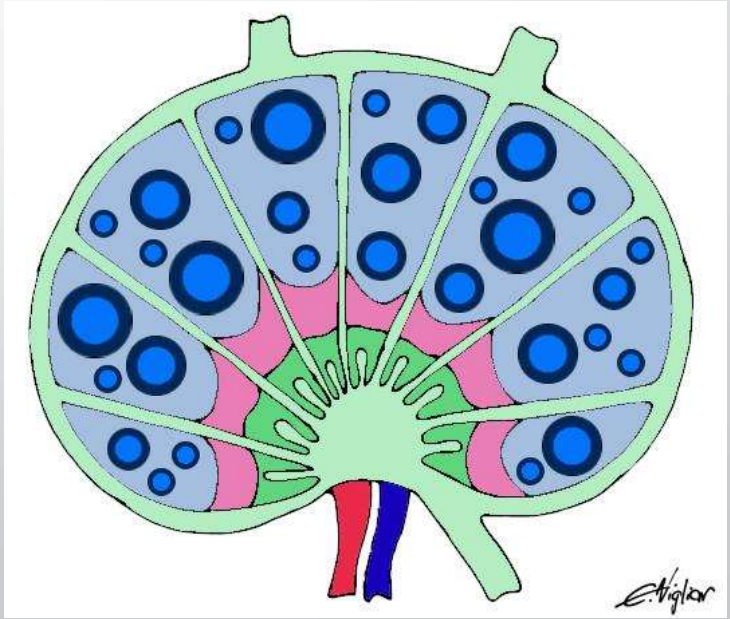
- **Etiology**: due to stimulation of follicular B lymphocytes of lymphoid follicles as in:
- –Irritation of lymph nodes draining site of infection or any irritation at draining area (example: hyperplasia of cervical LNs in cases of tonsillitis)
- –Occurs in systemic diseases as rheumatoid arthritis and Jorgen's syndrome.
- **M/P:**
- –Increase number of secondary lymphoid follicles.
- –The follicles are variable in size.
- –The follicles have large pale stained germinal centers.
- –Numerous tingible body macrophages at

germinal center

- –The follicles are surrounded by well-formed

mantle zones.

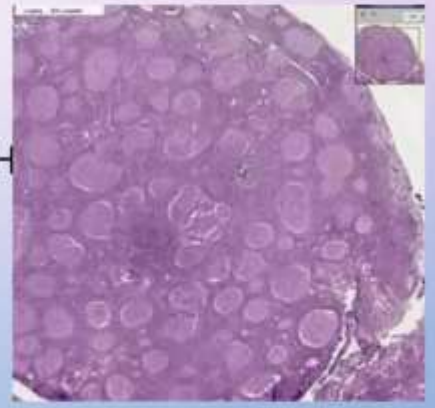
- –Lymphocytes does not infiltrate lymph node capsule



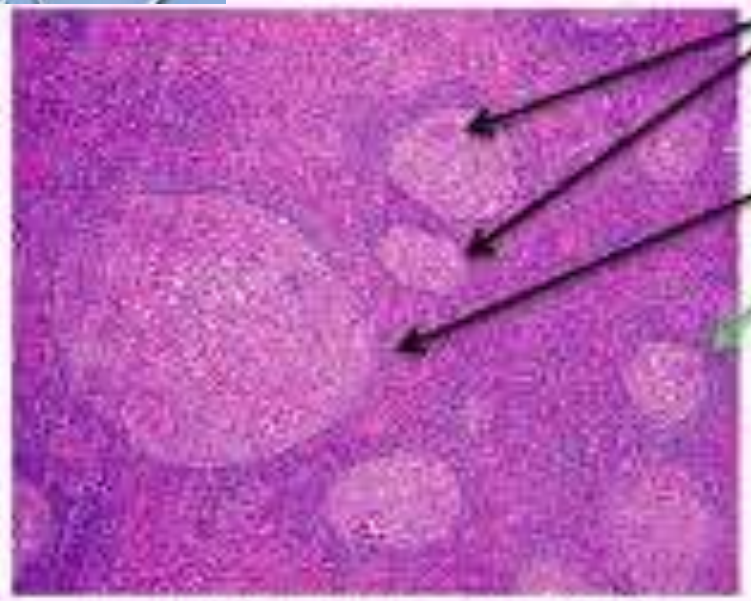
FOLLICULAR / NODULAR HYPERPLASIA

NEOPLASTIC

1. Follicular Lymphoma
2. Nodular Lymphocyte Predominant H
3. Nodular Sclerosis HD
4. Mantle Cell Lymphoma
5. Marginal Cell Lymphoma



Follicular hyerplasia



Differences in size of germinal centers

Well circumscribed

Well defined mantle

B. Paracortical hyperplasia

Due to stimulation of the para-follicular T cells
Can be seen in: Systemic lupus erythematosus (SLE), Viral lymphadenopathy as infectious mononucleosis (EPV) and Drug-induced lymphadenopathy

C. Sinusal hyperplasia

The lymphoid sinuses are expanded due to distension by benign histocytes and lymphocytes.
Can be seen in sinus histiocytosis with massive lymphadenopathy and Langerhans cell histiocytosis

Follicular/nodular	Paracortical/mixed	Sinus	↑ Histiocytes
• Follicular hyperplasia • Progressive transformation of germinal centers • Autoimmune disorders (RA) • Castleman disease hyaline-vascular • Toxoplasma gondii	• Paracortical hyperplasia and dermatopathic reaction • Kikuchi disease/SLE • Viruses (EBV, HIV…) • Drug-induced • IgG4-related disease • Kimura disease	• Sinus histiocytosis • Rosai-Dorfman disease • Vascular transformation of sinuses • Hemophagocytic syndrome (HLH)	• Granulomatous LAD • Infectious • Sarcoidosis