

Lymph node pathology

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Outline of the lecture

Normal anatomy and histology reviewed.

Presentations of lymph node diseases

Histological patterns of lymph node diseases

Causes for enlargement of lymph nodes

- Infections
- Immune diseases

Evaluation of a lymph node diseases

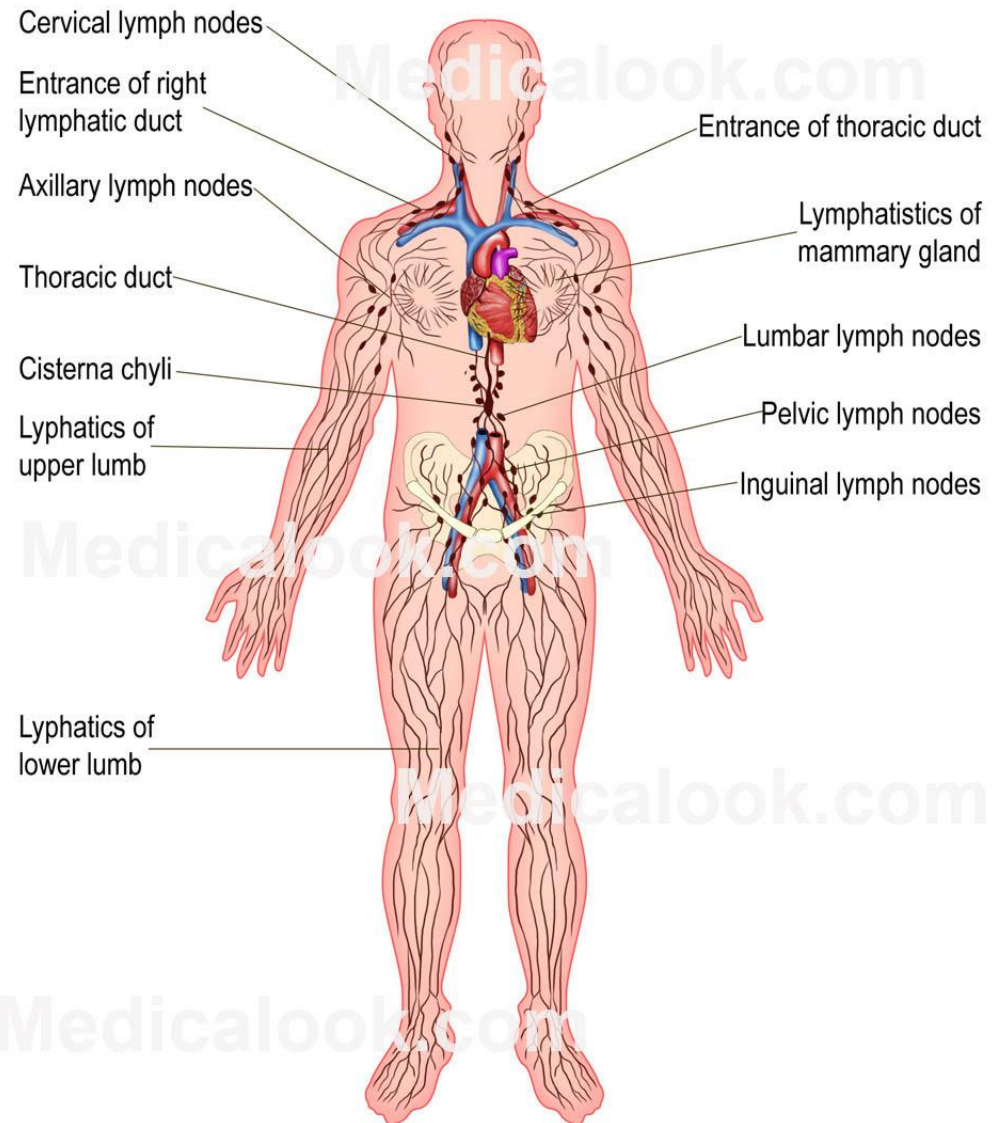
Lymphomas – malignant tumours of lymphoid cells

Functions of the lymphatic system:

Drains excess fluid from tissue

Removes excess fluid from the body

Transports fat from the digestive system



Anatomical organization

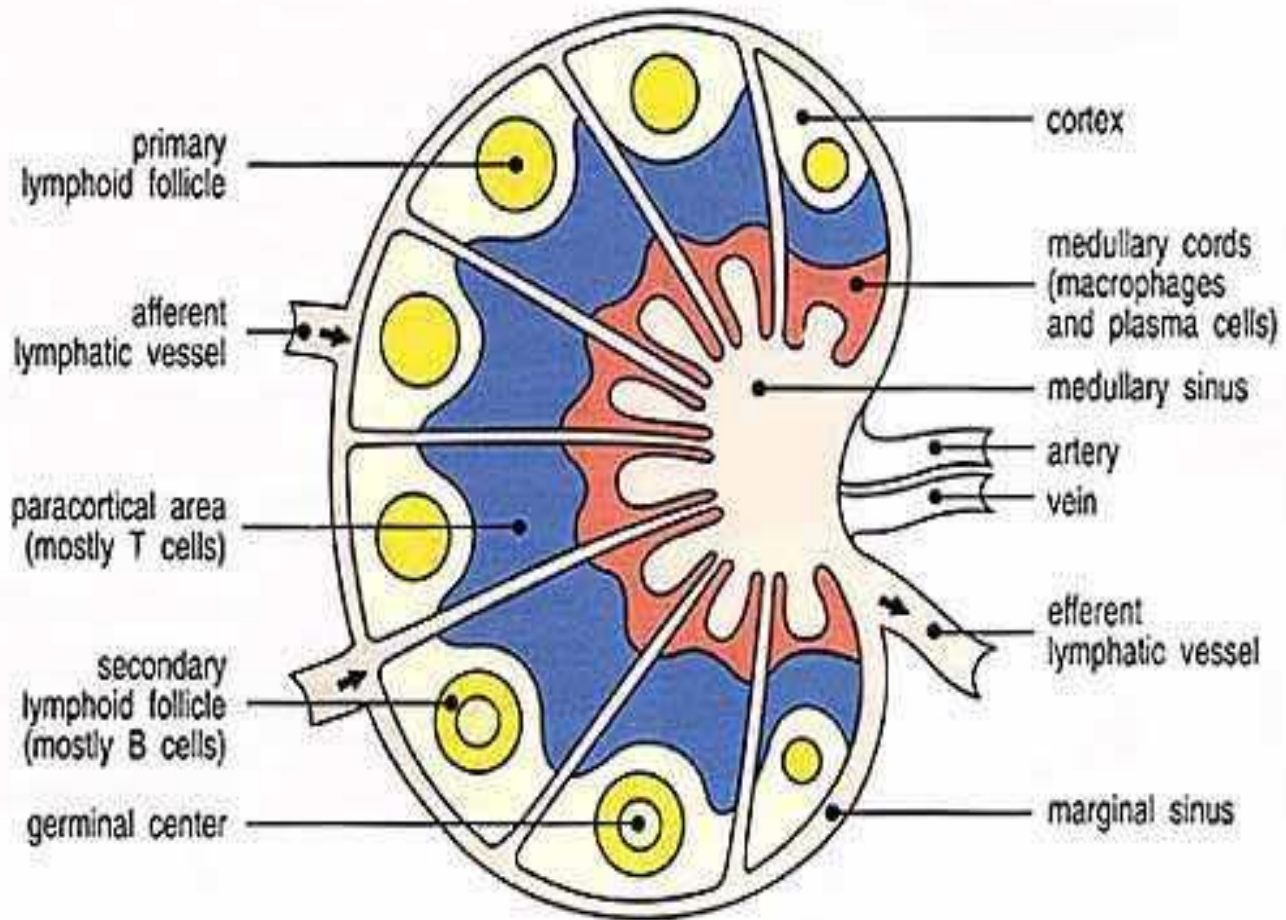
Two major functional regions:

- **The primary immune organs: sites of initial maturation --> immune competent cells:**
 - **B cells- bone marrow**
 - **T cells- thymus**
- **The secondary immune organs: sites of antigen driven replication and differentiation into committed effector cells**
 - **Lymph nodes**
 - **Spleen**
 - **Mucosal Associated Lymphoid System (MALT)- lymphoid cells lining the respiratory and gastrointestinal tracts**
 - **Everywhere else**

The lymph nodes, in their totality, represent the largest secondary organ, and the major site of lymphoid pathology

The diagram illustrates the internal structure of a lymph node. It features several labeled components:

- cortex**: The outer layer of the lymph node.
- primary lymphoid follicle**: A cluster of small, dark-staining cells in the cortex.
- secondary lymphoid follicle (mostly B cells)**: A larger cluster of cells, often containing a central germinal center.
- germinal center**: The central region of a secondary follicle where B cell proliferation occurs.
- paracortical area (mostly T cells)**: The region between the follicles, primarily composed of T cells.
- medullary cords (macrophages and plasma cells)**: The innermost part of the node, containing macrophages and plasma cells.
- medullary sinus**: The space between the medullary cords.
- marginal sinus**: The space at the periphery of the node.
- afferent lymphatic vessel**: The vessel entering the node from the left.
- efferent lymphatic vessel**: The vessel exiting the node from the right.
- artery** and **vein**: Blood vessels located near the efferent lymphatic vessel exit.



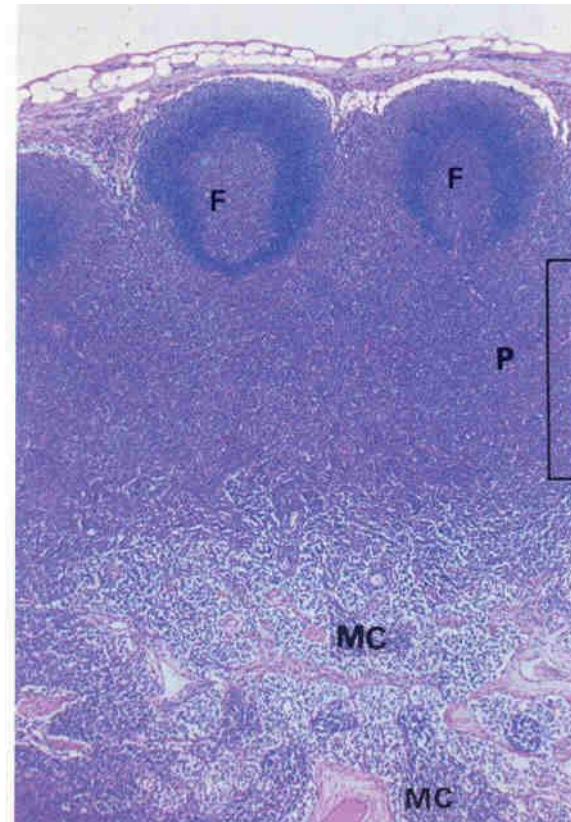
Normal histology

Surrounded by a capsule
afferent lymphatics drain
into the subcapsular
sinus

Terminate at the hilum as
efferent lymphatics.

Cortex

Medulla



Normal histology

Cortex (B cells)

- Primary lymphoid follicles
- Secondary lymphoid follicles with germinal centres

Paracortex (T cells)

- Zone between cortex and medulla containing a mobile pool of T lymphocytes

Medulla (B cells)

- Medullary cords with plasma cells and lymphocytes

Lymphocytes evolve from pluripotent stem cells

- B lymphocytes, comprising the humoral immune (production of antibodies)
- T lymphocytes, comprising the cellular immune system,
 - Direct killing of foreign or intracellularly infected cells, cytotoxic T cells
 - Fine control of the immune response through the secretion of cytokines, helper and suppressor T cells.

Lymph node pathology

As with other organs, lymph nodes, can be the site of

- infectious,
- immune
- neoplastic disease, the latter either primary or metastatic

The clinical manifestations of diseases of the lymph nodes are:

- Local enlargement, tender on nontender, +/-
- Compression of adjacent structures +/-
- Release of cytokines producing "systemic" symptoms of fever, weight loss and night sweats

Histological patterns seen in lymph nodes

Suppurative inflammation

Chronic non specific lymphadenitis

Reactive follicular hyperplasia

Granulomatous inflammation - Suppurative, necrotizing, caseous.

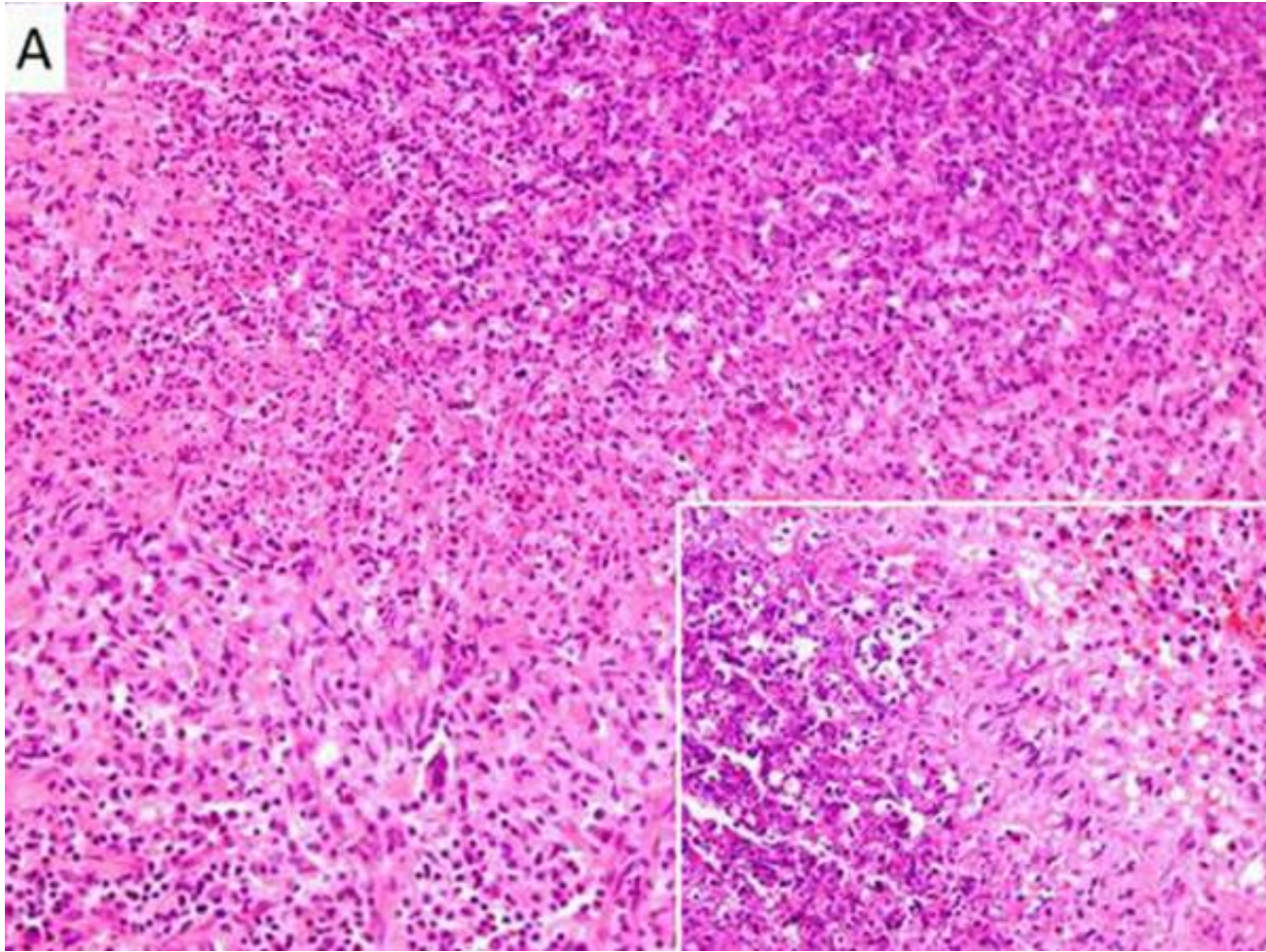
Paracortical expansion - Diffuse & nodular

Sinus histiocytosis / hyperplasia

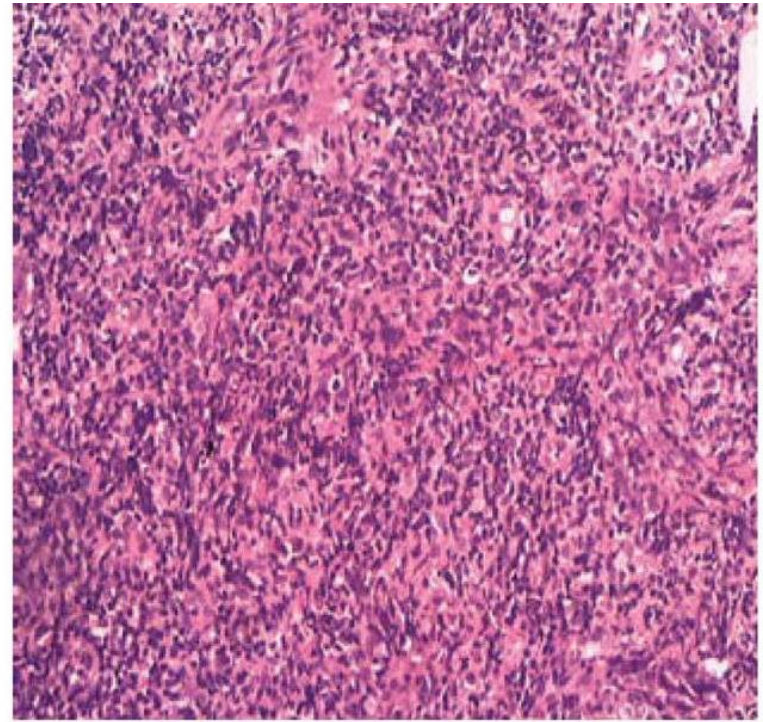
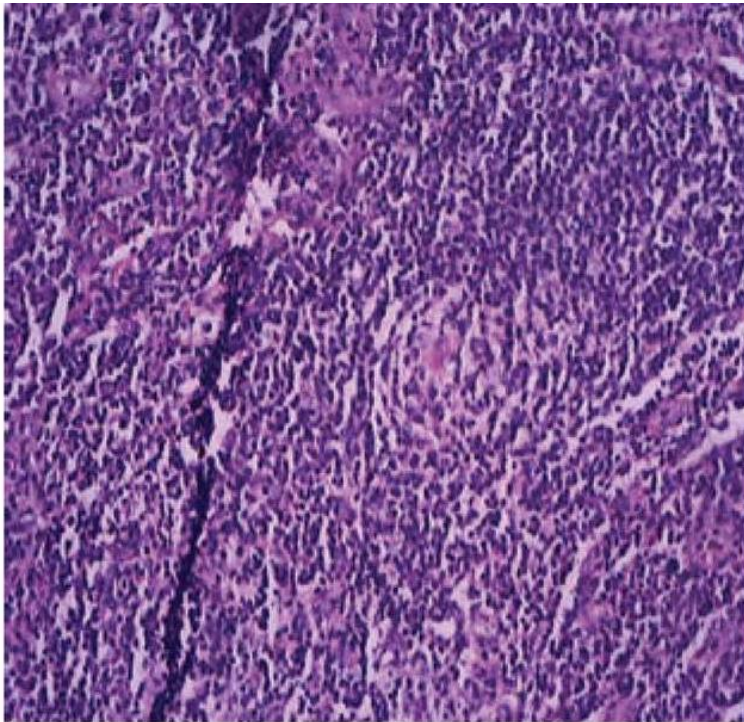
Monocytoid B cell hyperplasia

Presence of polykaryocytes

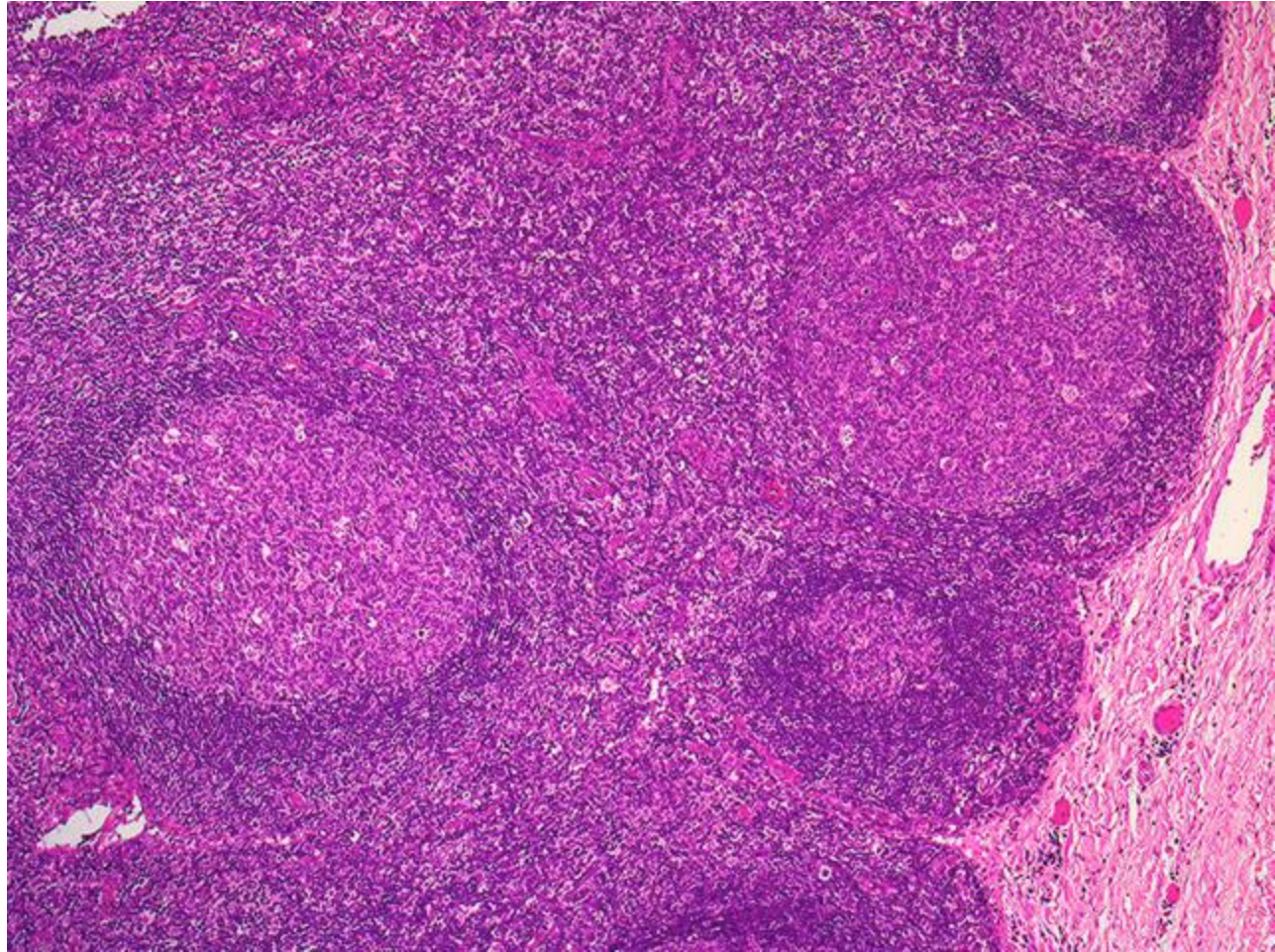
Suppurative lymphadenitis

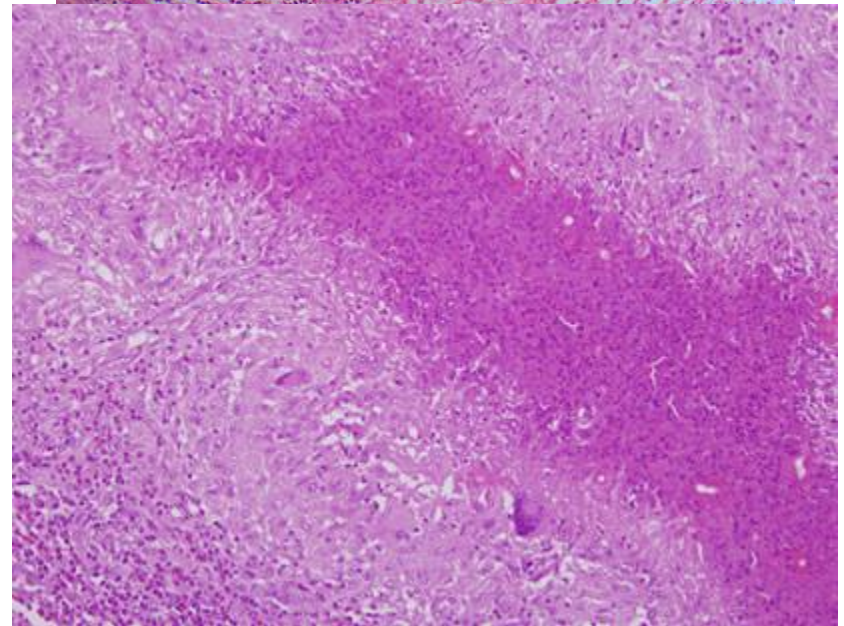
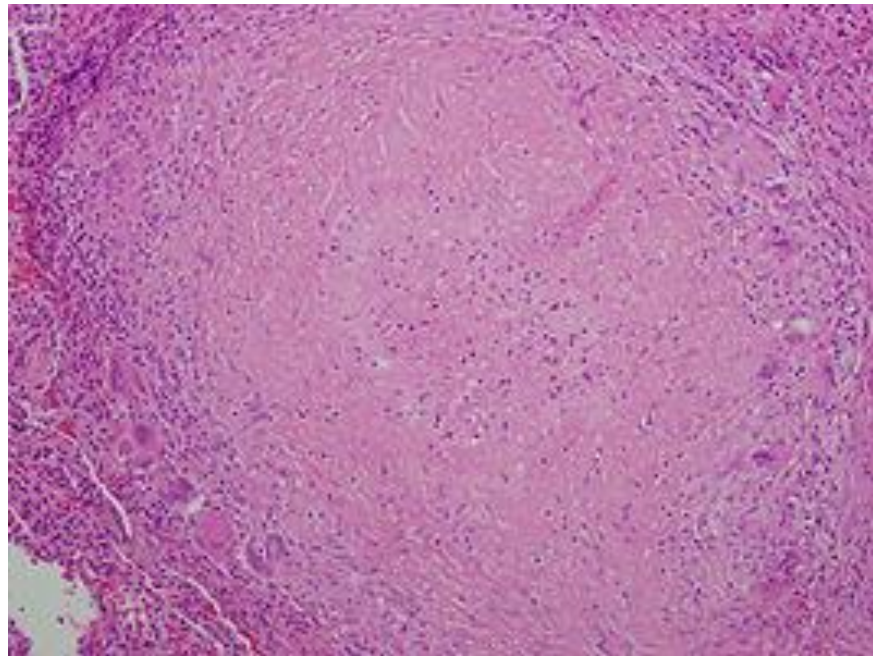
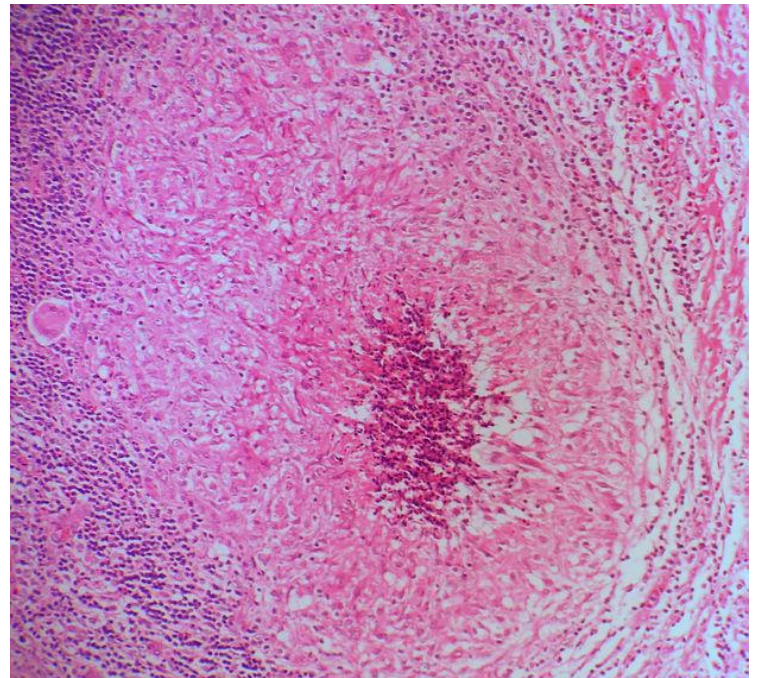
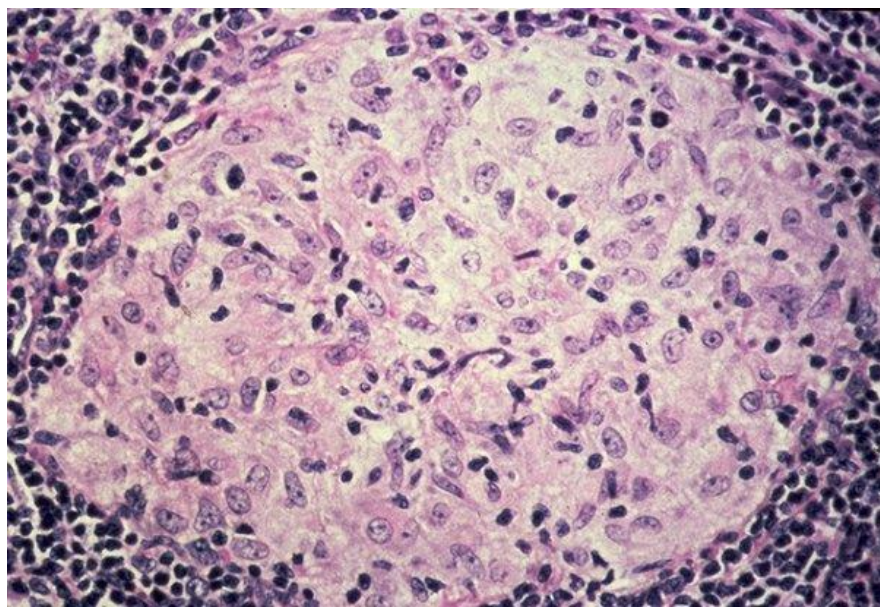


Chronic lymphadenitis- small follicles, fibrosis and vascular proliferation

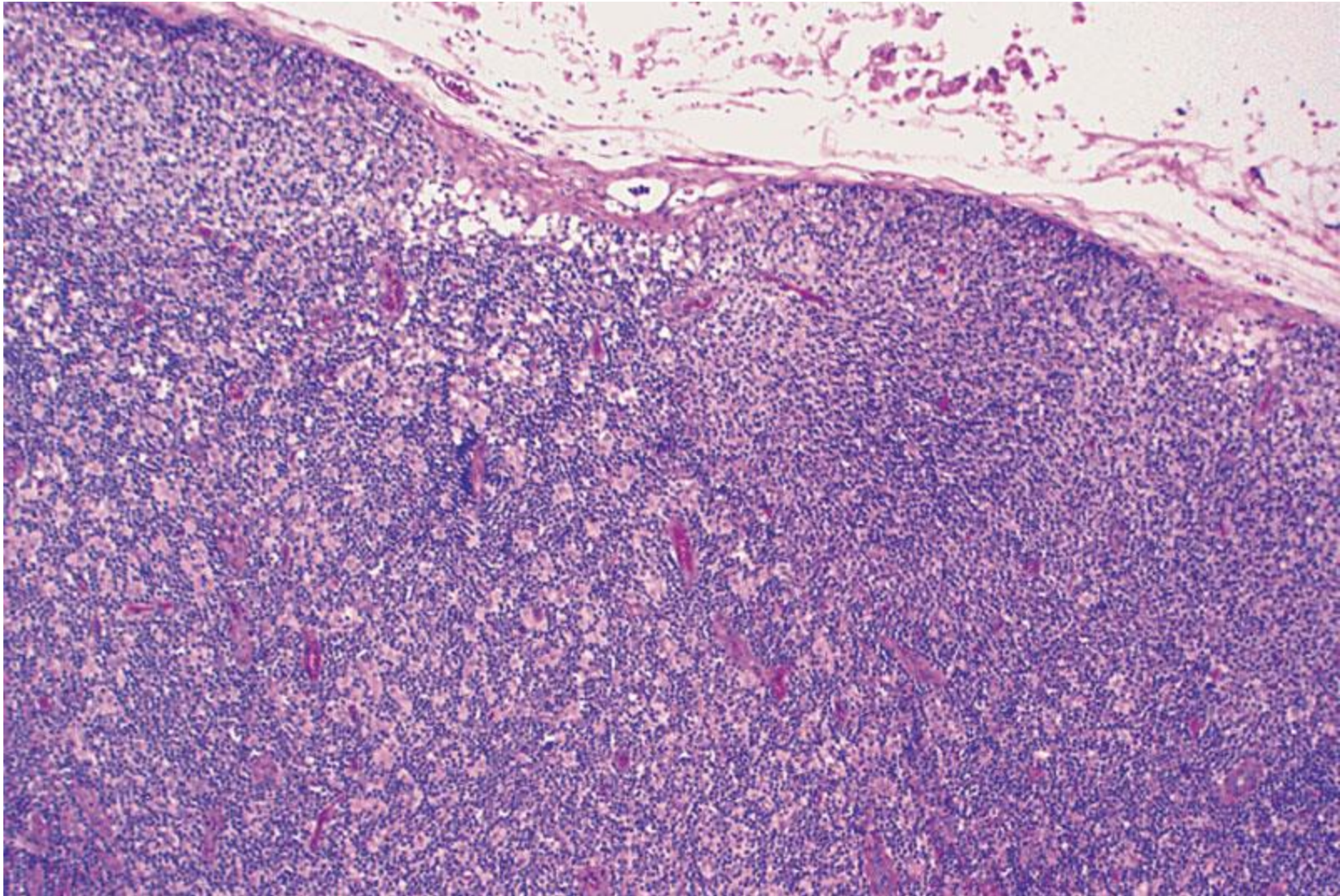


Reactive follicular hyperplasia

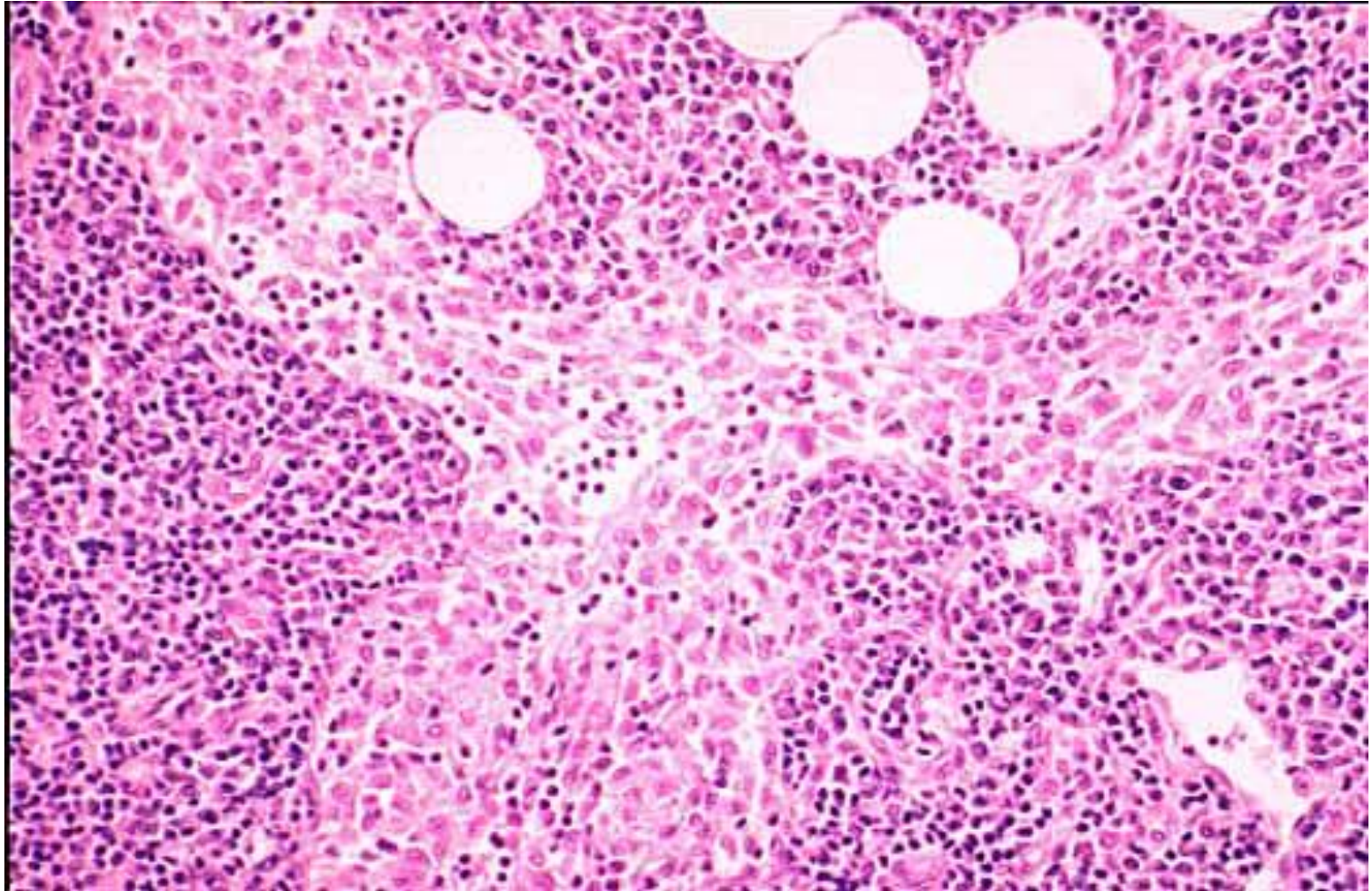




Paracortical expansion / hyperplasia

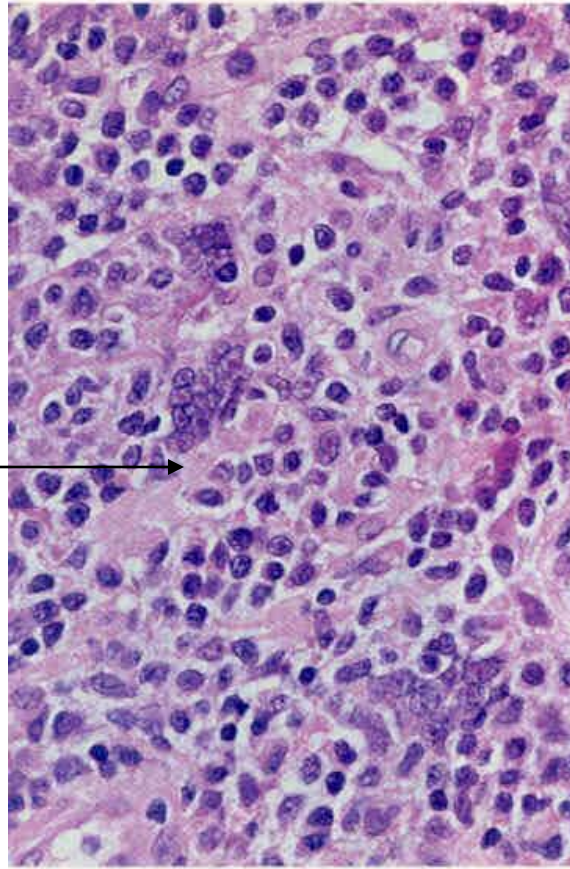


Sinus histiocytosis

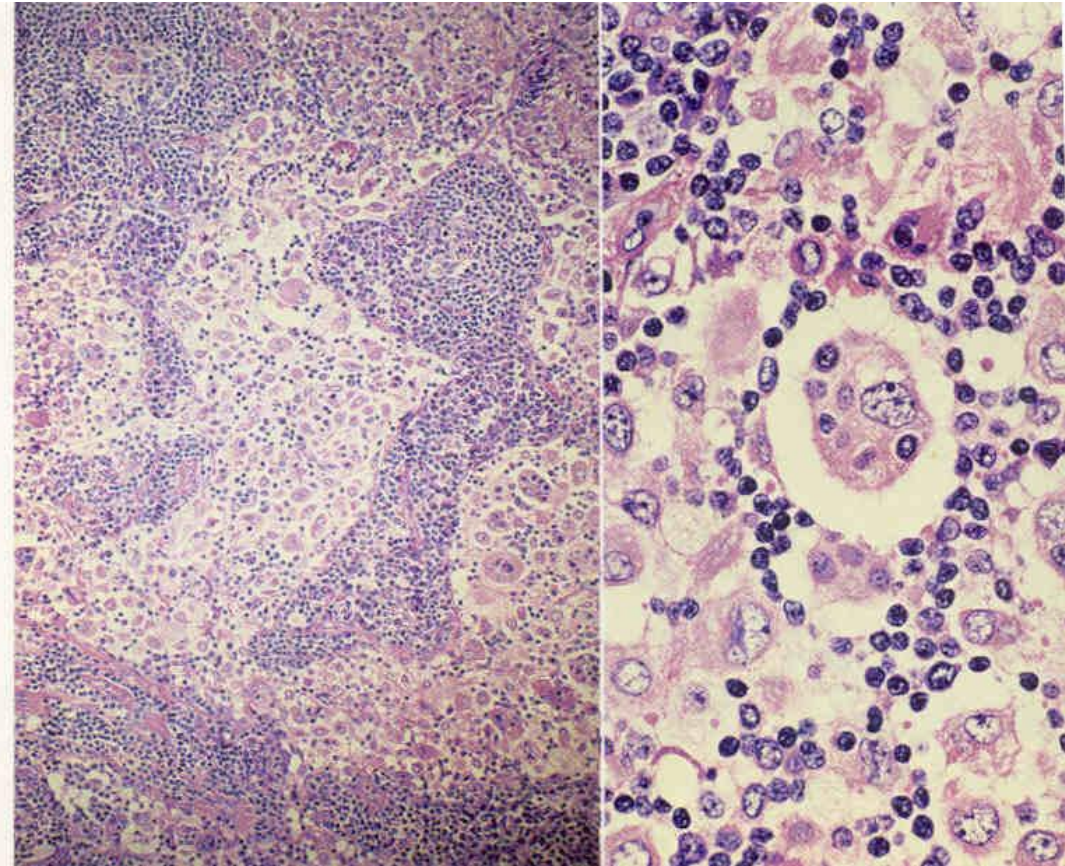


Polykaryocytes – Eg: Viral infections

Polykaryocytes



Sinus histiocytosis with massive lymphadenopathy - SHML



Evaluation of a lymph node

Fine needle aspiration

Bacteriological examination

Biopsy - Histological assessment

Immunophenotyping - CD antigen markers.

Electron microscopy - Langerhan cell histiocytosis (Histiocytosis X)

Genotyping

Causes of Lymphadenopathy

Congenital

- Chronic granulomatous lymphadenitis
 - (suppurating granulomas)

Infective

- Bacterial -
 - Acute non specific lymphadenitis.
 - Acute suppurative lymphadenitis Staphylococcal
 - Necrotizing lymphadenitis
 - Tularaemia, anthrax, Typhoid fever, plague
 - Chronic non specific lymphadenitis
 - Granulomatous lymphadenitis - Suppurating, necrotizing, caseous, epithelioid.

Infective causes of lymphadenopathy (Bacterial)

Tuberculosis

- Matted LN,s resembling malignant lymph nodes.

Atypical mycobacteriosis

- More poorly defined granuloma than above.

Leprosy -

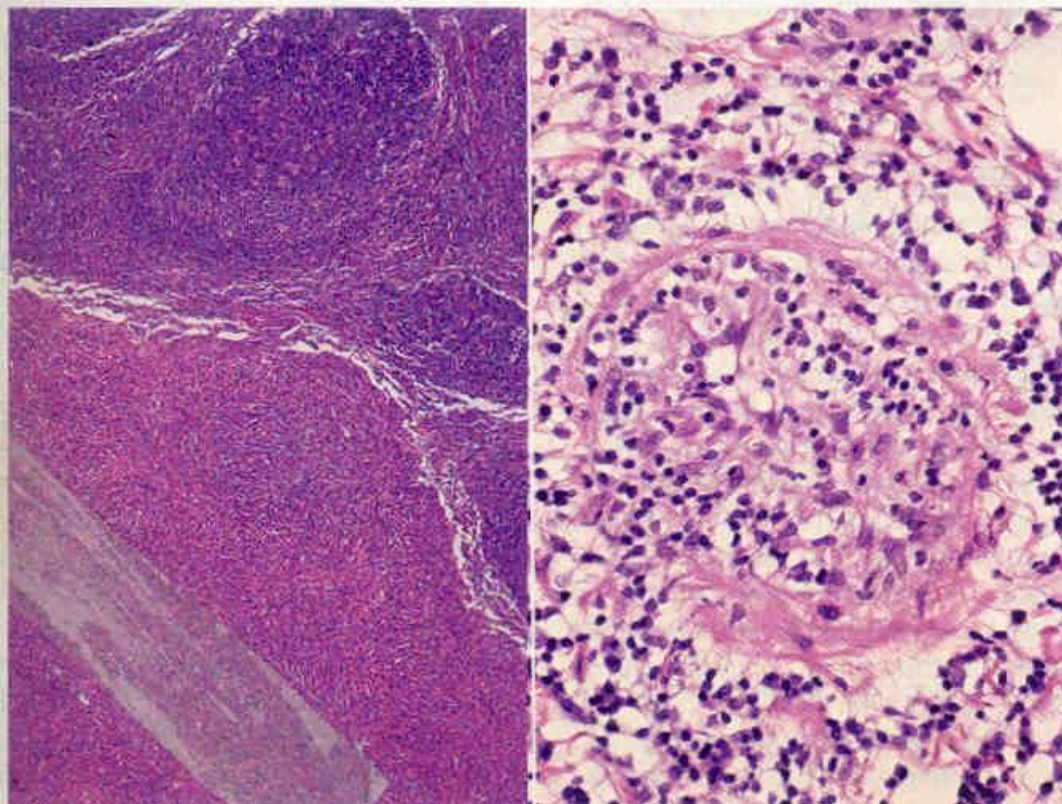
- Presence of lepra cells infiltrating LN in LL.

Syphilis

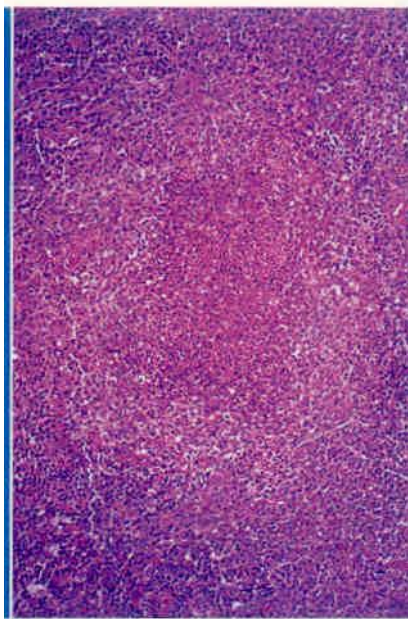
- capsular inflammation, vessel proliferation, plasma cells, granulomas , fibrosis and follicular hyperplasia.
- Depends on stage.

Syphilis

Note – Follicular hyperplasia with associated vasculitis (perivascular infiltration)



Stellate abscess / necrotising granulomatous inflammation



Cat scratch disease

LGV

Tularaemia

Masshoff's disease /
mesenteric lymphadenitis.

- Note site and clinical history.

Causes of lymphadenopathy (Fungal)

Granulomas with suppuration

Widespread necrosis

Histoplasmosis Coccidiomycosis, blastomycosis, sporotrichiosis,
coccidioidomycosis

PAS / Grocott stain

Infective causes of lymphadenopathy

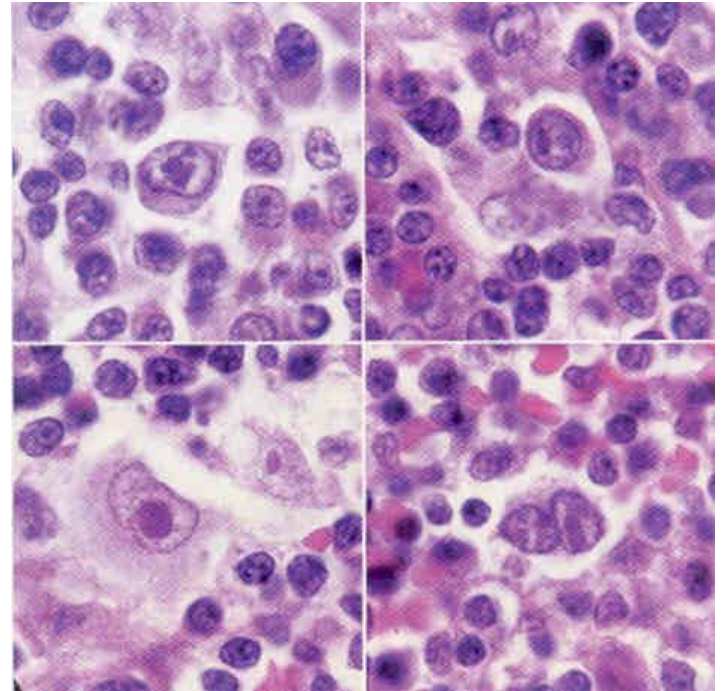
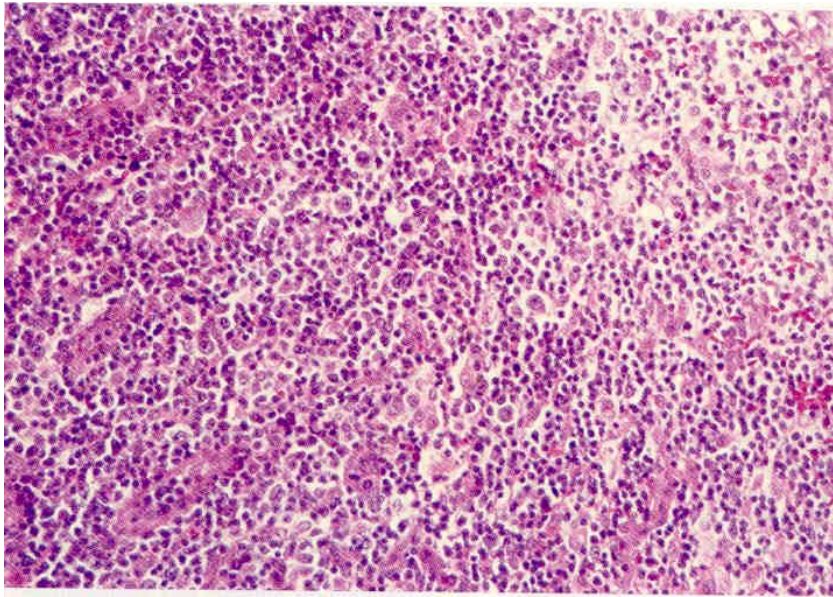
Viral

- Infectious mononucleosis
- AIDS related lymphadenopathy
- Measles
- HSV
- Post vaccinal lymphadenopathy

Chlamydia - Lymphogranuloma venereum

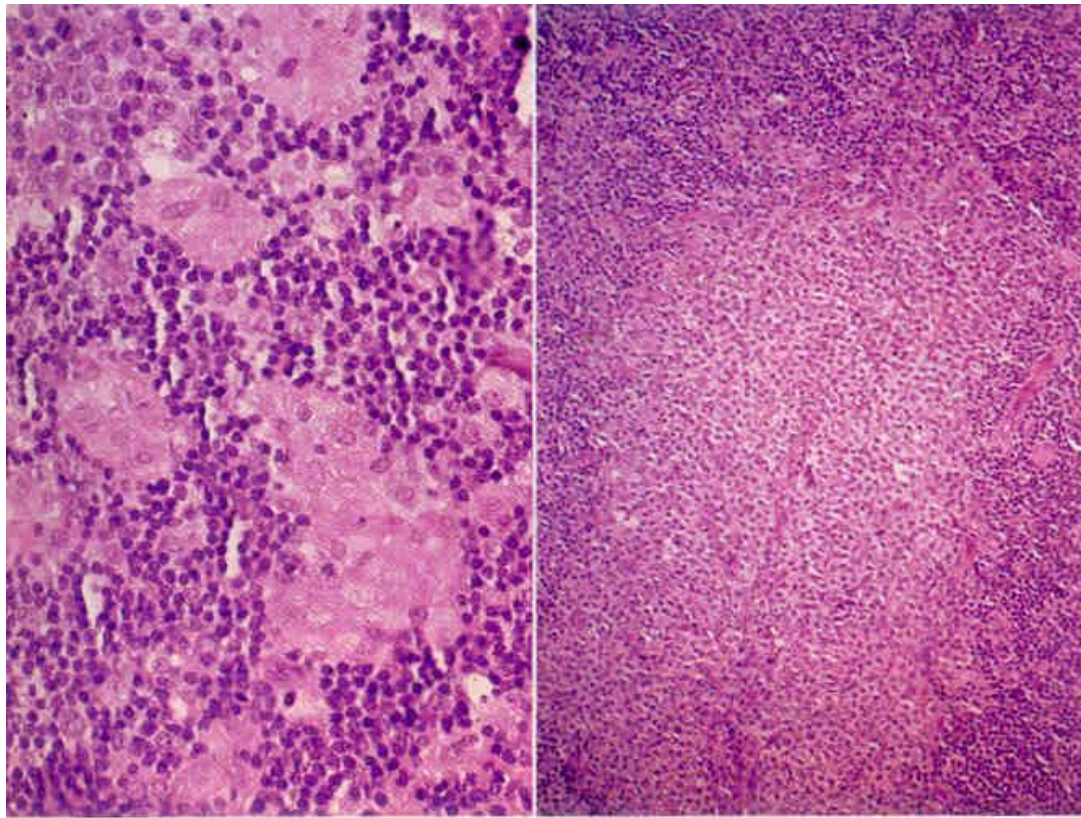
Protozoa - Toxoplasma gondii

Viral infections (Infectious mononucleosis)



Toxoplasmosis

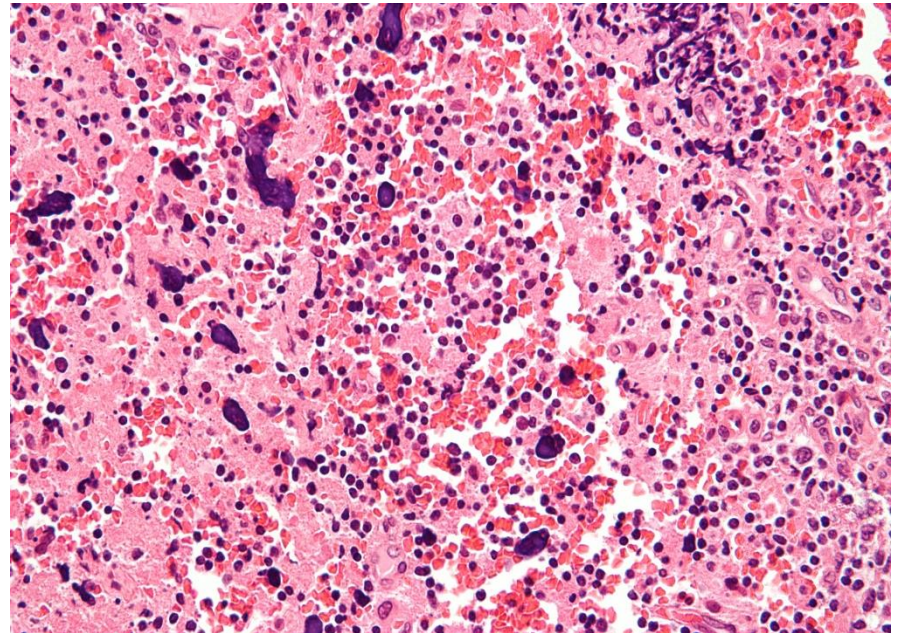
Note microgranulomata and follicular hyperplasia with effacement of the follicular margins.



Causes of lymphadenopathy

Connective tissue disease

- Lupus erythematosus
- Rheumatoid arthritis



Note : Necrosis and haemotoxyphil bodies in SLE

Causes of lymphadenopathy

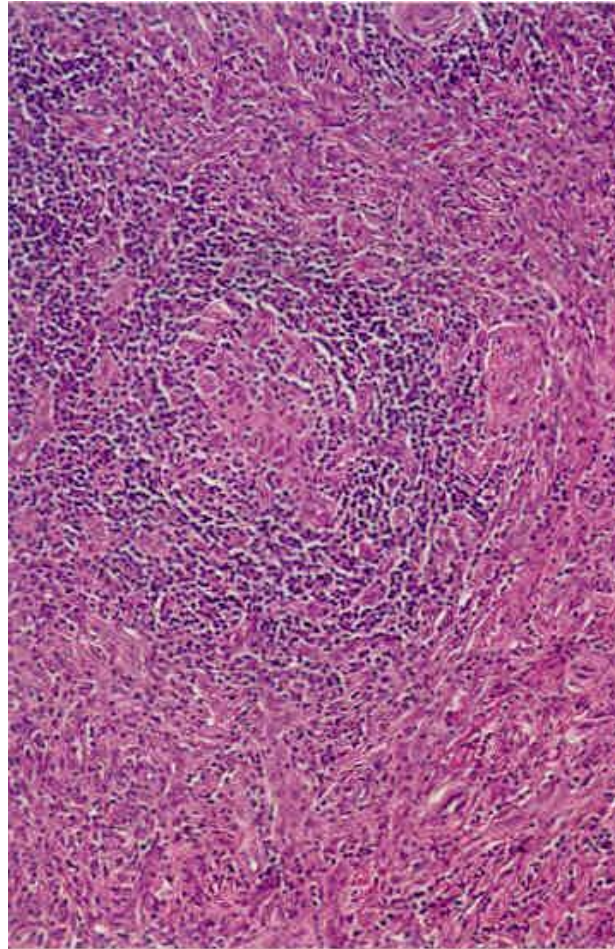
Miscellaneous / Tumour like conditions

- Necrotizing lymphadenitis (Kikuchi - fujimoto's disease)
- Castleman's disease
- Kimuras disease
- Rosai Dorfmann disease
- Dermatopathic lymphadenitis
- Sarcoidosis.

Castleman's disease

Note – Hyaline vascular type with onion skin appearance

Similar features may be seen in Rheumatoid disease



Causes of lymphadenopathy

Drug induced lymphadenopathy

- Mainly with antiepileptic drugs - Phenytoin
- Effacement of the lymph node architecture
- polymorphic cell infiltrate
- plasma cells, eosinophils, neutrophils and immunoblasts which resemble RS cells.

Next lecture –
Lymph node neoplasms