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Pathology - Topic 19 - Lymph node and spleen

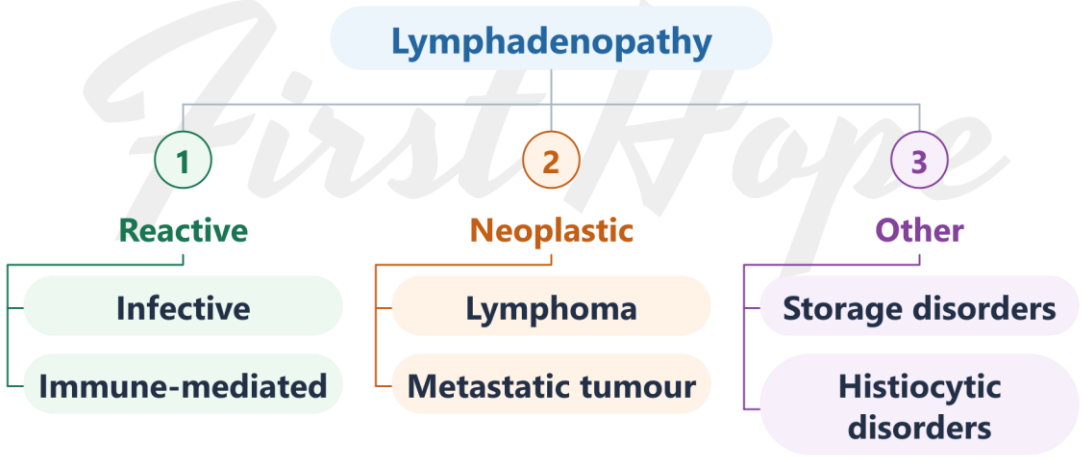
Lymphadenopathy

- Lymphadenopathy means abnormal enlargement or other abnormality of lymph nodes and may be reactive, infectious or neoplastic.

Normal Function and Meaning of Enlargement

- Lymph nodes filter lymph and provide sites where lymphocytes meet antigens and mount immune responses.
    - B cells mainly occupy follicles, T cells mainly occupy the paracortex, and macrophages help clear material in the sinuses.
- **Lymphadenopathy** means abnormal lymph-node size, number or character.
- Localised enlargement suggests a process in one drainage region, while generalised enlargement affects more than one non-contiguous region.
    - The distribution narrows the differential but does not alone establish the cause.

Major Causes and Differentiating Features



1. Reactive and Infective Causes

Acute Bacterial Inflammation

- Acute bacterial drainage often produces tender, enlarged nodes with neutrophilic inflammation.
- Suppuration can cause an abscess, and the overlying skin may become warm or red.

Viral and Chronic Infections

- Viral infections can produce generalised enlargement with paracortical activation.
- Chronic infections, including tuberculosis, can produce persistent nodes with granulomatous inflammation.
- The clinical exposure, site and tissue findings determine which microbiological tests are needed.

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2. Immune and Other Non-neoplastic Causes

- Autoimmune disease, drug reactions and sarcoidosis can produce lymphadenopathy.
    - Sarcoid-type non-necrotising granulomas still require exclusion of relevant infectious and other causes.
- Storage disorders and uncommon histiocytic diseases are additional possibilities when the systemic pattern fits.

3. Neoplastic Causes

- Lymphomas are primary lymphoid neoplasms, while metastatic carcinomas and melanomas reach nodes through lymphatic drainage.
- Hard irregular nodes may suggest metastatic carcinoma, while rubbery nodes are classically associated with lymphoma.
    - These descriptions are clues rather than dependable rules, and tissue may be required.

Clinical Assessment

- Assess duration, tenderness, growth, distribution and associated fever, weight loss, night sweats or local symptoms.
- Examine the drainage area, other node groups, liver and spleen; a dental infection, for example, can produce localised cervical enlargement.
    - Persistent unexplained enlargement, progressive growth or concerning systemic features require further evaluation.

Choosing and Handling a Tissue Sample

- Fine-needle aspiration can identify many metastatic and inflammatory processes but may not preserve enough architecture for full lymphoma classification.
- A core or excision biopsy is selected when tissue architecture and ancillary studies are needed.
    - Plan sample allocation before fixation if flow cytometry, culture or molecular studies are required, because placing every specimen in formalin can prevent culture and some ancillary investigations.

Reactive Histological Patterns

- Preserved architecture and a mixed cell population often support reactivity, but difficult cases need immunophenotypic correlation.

1. Follicular Hyperplasia

- Reactive B-cell follicles vary in size and retain dark and light germinal-centre zones, mantle zones and tingible-body macrophages.
- This pattern accompanies antigenic stimulation such as infection and autoimmune disease.

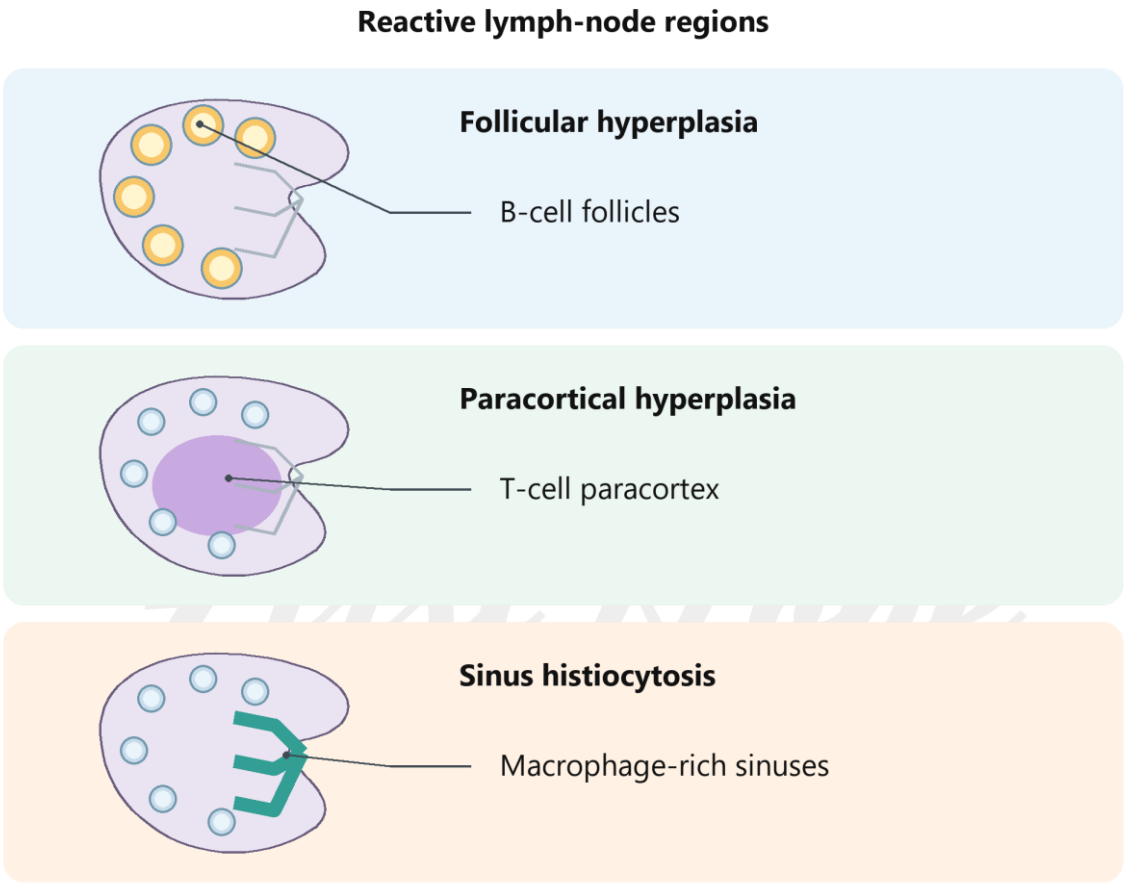
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2. Paracortical Hyperplasia

- Expansion of the T-cell zone occurs with many viral infections and drug reactions.
- Activated immunoblasts may be large and atypical, so their presence alone does not establish lymphoma.

3. Sinus Histiocytosis

- Distended sinuses contain increased macrophages and may be seen in nodes draining inflammatory lesions or malignancy.



Reactive lymph-node patterns involve different anatomical regions

Tuberculous Lymphadenitis

- Tuberculous lymphadenitis is infection of lymph nodes by Mycobacterium tuberculosis complex organisms.

Spread and Granulomatous Response

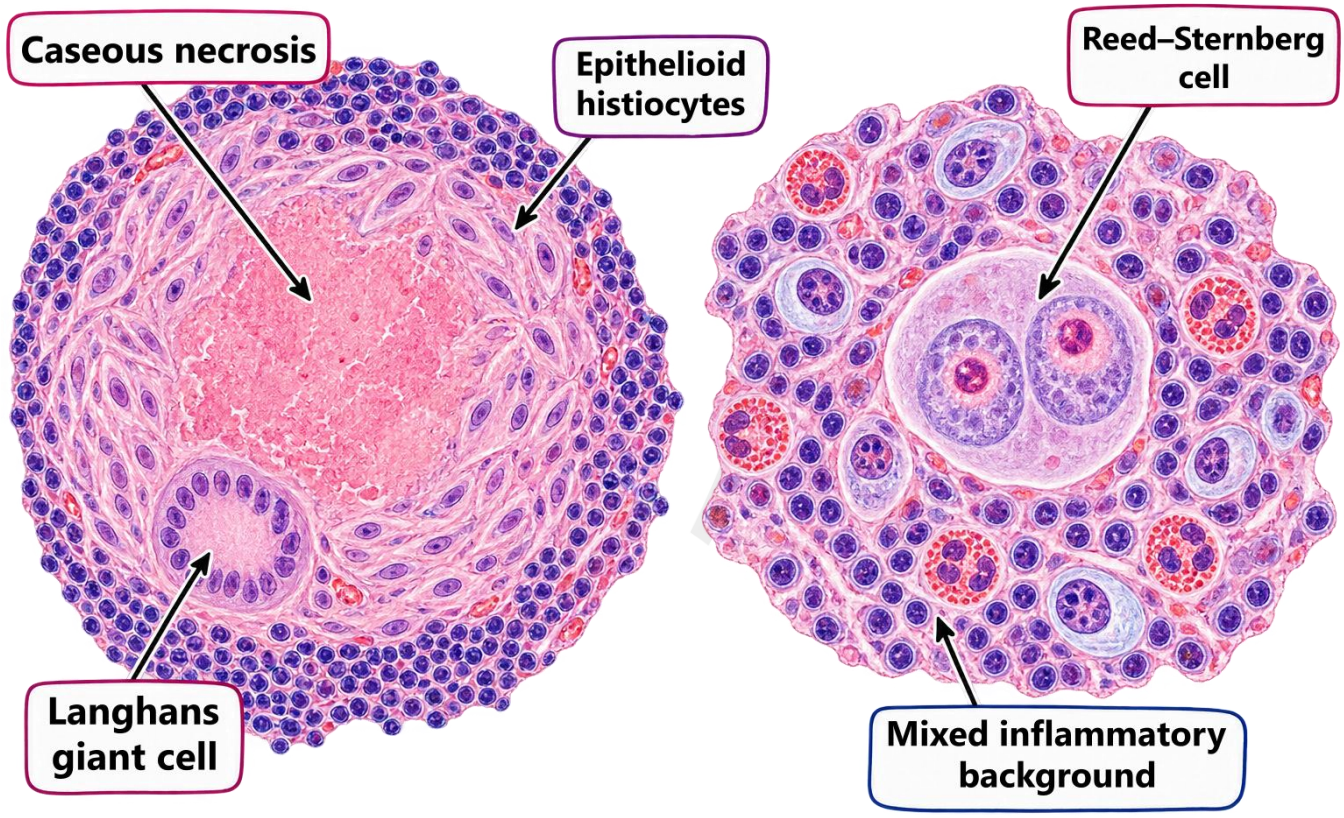
- Mycobacterium tuberculosis may reach a node from a regional primary focus or through wider dissemination.
- Cell-mediated immunity activates macrophages and organises them into granulomas.
    - The response limits spread but can also cause tissue injury and caseous necrosis.

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Nodal Changes and Local Complications

- Cervical nodes are a common site, and involved nodes may be firm, matted or fluctuant at different stages.
    - Matting results partly from inflammation extending outside the capsule and joining neighbouring nodes.
- A cold abscess or a draining sinus can develop in advanced disease.
    - The word cold describes relatively limited acute inflammatory signs, not absence of infection.

Gross and Microscopic Features



Tuberculous granuloma and a Reed–Sternberg cell in lymph-node pathology

1. Gross Appearance

- The cut surface may show yellow-white friable material representing caseation.
- Nodes may be enlarged and matted, and later lesions can develop fibrosis or calcification.
    - A small specimen or early lesion may not show the classical gross appearance.

2. Microscopy

- Typical lesions contain granulomas made of epithelioid histiocytes with an outer rim of lymphocytes.
- Langhans-type giant cells may contain nuclei arranged around the periphery in a horseshoe pattern.

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- Central caseous necrosis is amorphous and granular, with loss of normal cellular outlines.
    - The amount of granuloma formation and necrosis varies with immune status and stage of infection.

Confirmation and Differential Diagnosis

- Acid-fast staining, culture and molecular tests are used according to sample availability and clinical need.
    - A negative acid-fast stain does not exclude tuberculosis because organisms may be sparse.
- Fungal infection, non-tuberculous mycobacteria and other granulomatous disorders can produce overlapping appearances.
    - Langhans giant cells and caseation are useful clues but are not an organism-specific diagnosis.
- In immunocompromised patients, poorly formed granulomas or numerous organisms can replace the classical appearance.

Practical Specimen Description

- Describe the enlarged or matted node and any caseous, fibrotic or calcified cut-surface areas.
- On microscopy, identify granulomas, epithelioid cells, giant cells and necrosis before giving a likely diagnosis.
    - State that microbiological correlation is needed where appropriate rather than claiming that a giant cell alone proves tuberculosis.

Lymphomas

- A lymphoma is a clonal lymphoid neoplasm that usually presents in tissue rather than primarily as circulating blood cells.

Clonal Disease and Leukaemia Overlap

- Lymphoma and leukaemia can overlap because the same clone may involve nodes, marrow and blood.

Genetic and Antigenic Drivers

- Genetic changes can activate growth pathways, prevent apoptosis or alter normal lymphocyte differentiation.
- Immunodeficiency, persistent antigen stimulation and selected infections contribute to some lymphoma types.
    - Examples include EBV-associated lymphomas and gastric MALT lymphoma associated with chronic H. pylori infection.

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