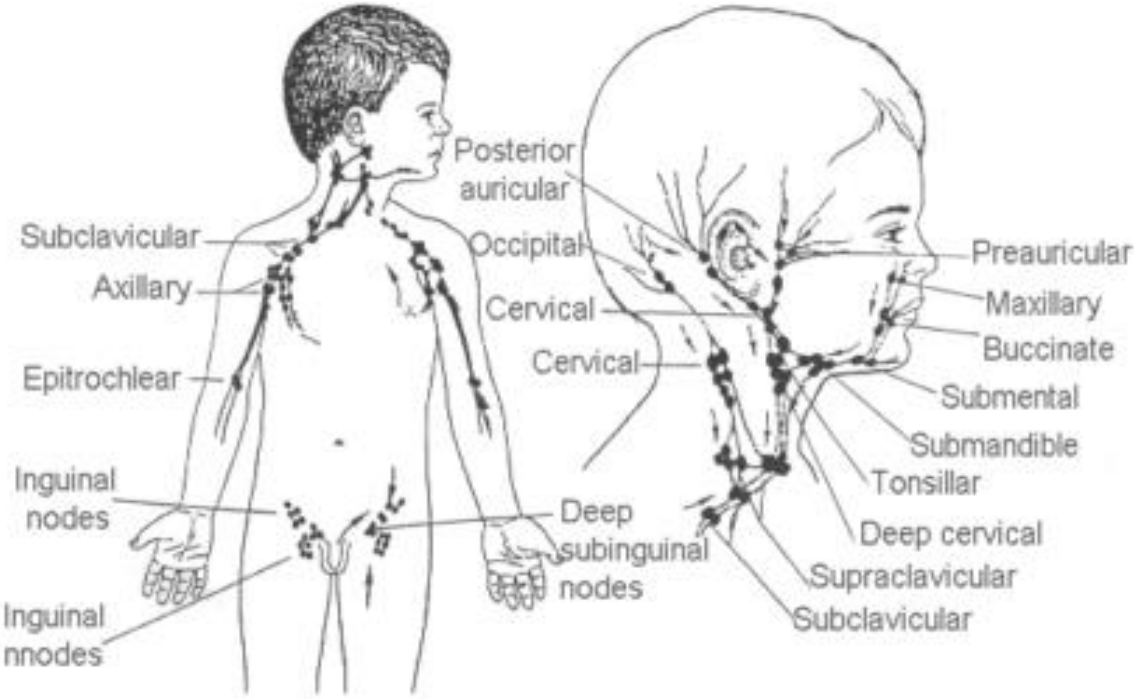
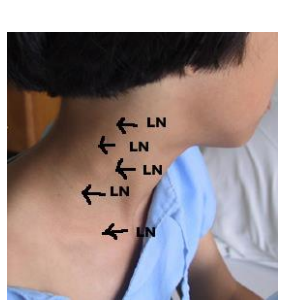


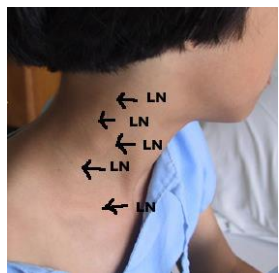
# Lymphadenopathy in Children





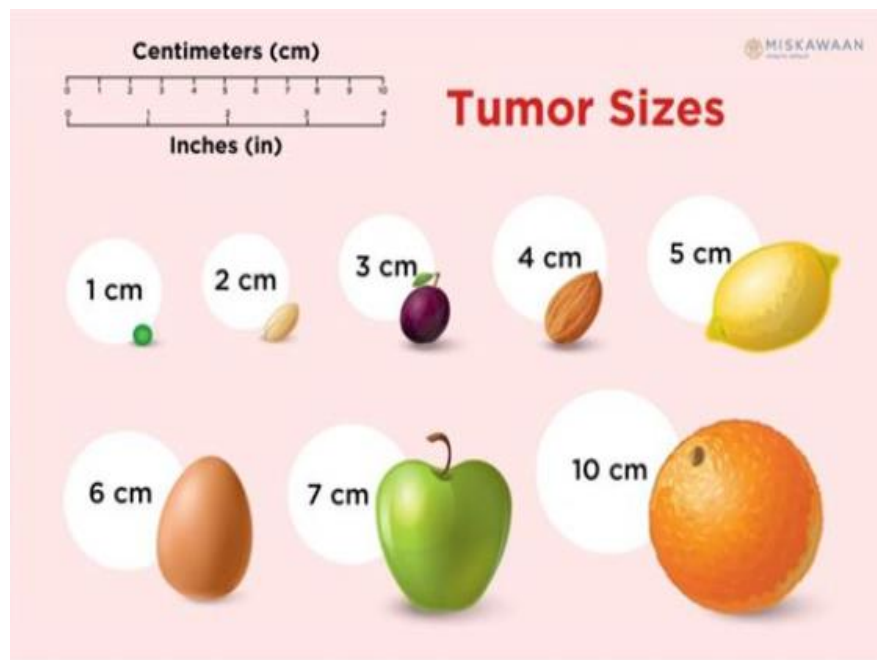
# Definition

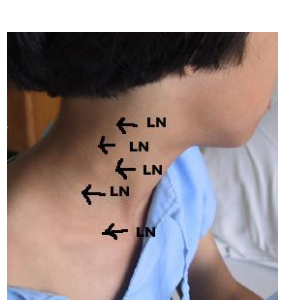
- Palpable lymph nodes are normal in anterior cervical, axillary and inguinal regions in healthy children.



# Lymphadenopathy

- Enlargement of the lymph nodes beyond normal state. Practically this is any node  $>1.0$  cm in greatest diameter
- Certain nodes should be considered enlarged at different sizes (i.e. epitrochlear nodes  $> 0.5$  cm, inguinal nodes  $> 1.5$  cm, submandibular nodes  $> 1.5$  cm)





The most common  
cause of LAP?

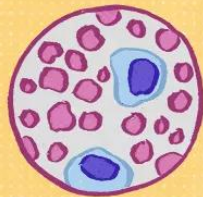
## Common Causes of Enlarged Lymph Nodes in Children



Upper respiratory infection (e.g. cold and flu)



Bacterial infection (e.g. strep throat)

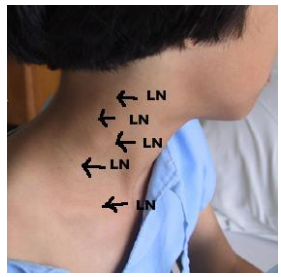


Viral infection (e.g. mono)



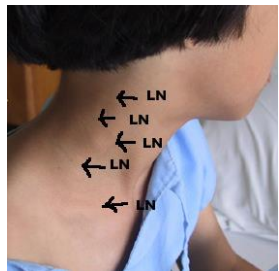
verywell

Upper respiratory infections: Including the cold and influenza  
Strep throat: Caused by streptococcal bacteria  
Infectious mononucleosis: Caused by the Epstein-Barr virus



# When to worry?

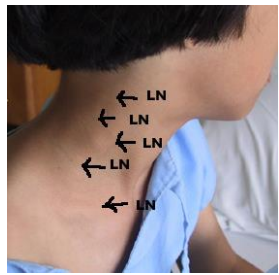




# History & Physical Exam

You start thinking of a list of differential diagnosis and ultimately the timing, workup and treatment of lymphadenopathy.



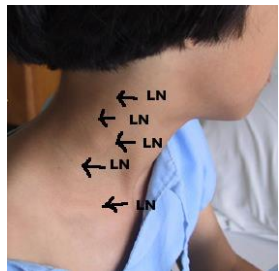


# History

## Duration

- Short (< 2 weeks) - likely to be infectious
- Long (> 2 weeks but < 1 year) - likely to be infectious, malignancy, autoimmune, drug reaction
- Very long (> 1 year) likely to be pathologic but not malignancy





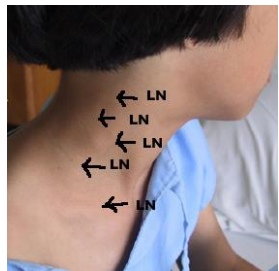
# Cont. History

## Location

- Localized - likely to be infectious
- Regional - likely to be infectious
- Generalized - more likely pathologic (e.g. malignancy, autoimmune, etc.)

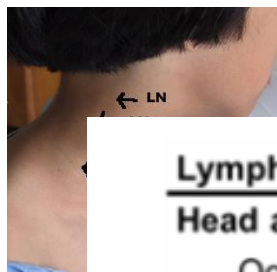
## Location

- Head and Neck - likely infectious
- Mediastinal - likely pathologic
- Abdominal - likely pathologic
- Inguinal - likely infectious



# Location

- Supraclavicular lymphadenopathy
- Paraumbilical node (Sister Joseph's)-- intrabdominal
- Epitroclear nodes- lymphoma or melanoma
- Inguinal adenopathy



<b>Lymph Node Group</b>	<b>Region Drained by Lymph Nodes</b>
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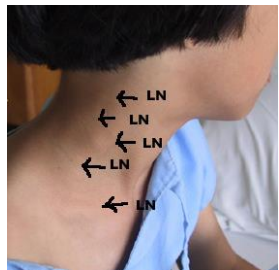
<b>Head and Neck</b>	
----------------------	--

Occipital	Posterior scalp
Postauricular	Temporal and parietal scalp
Preauricular	Anterior and temporal scalp, anterior ear canal and pinna, conjunctiva
Parotid	Forehead and temporal scalp, midface, external ear canal, middle ear, gums, parotid gland
Submandibular	Cheek, nose, lips, tongue, submandibular gland, buccal mucosa
Submental	Lower lip, floor of mouth
Deep cervical	Tonsils, adenoids, posterior scalp and neck, tongue, larynx, thyroid, palate, nose, esophagus, paranasal sinuses

<b>Lymph Node Group</b>	<b>Region Drained by Lymph Nodes</b>
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<b>Supraclavicular</b>	Right side: mediastinum Left side: abdomen
------------------------	---

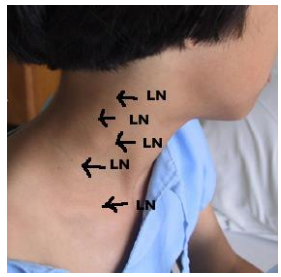
<b>Axillary</b>	Arm, breast, thorax, neck
<b>Epitrochlear</b>	Medial arm below elbow
<b>Inguinal</b>	Lower extremity, genitalia, buttocks, abdominal wall below umbilicus
<b>Popliteal</b>	Lower leg



# Associated symptoms

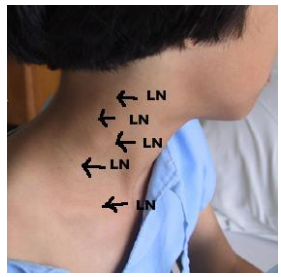
- May be associated with infectious, malignant, autoimmune, or immunodeficiency diseases:

- Pain
- Fever
- Weight loss (> 10% over 6 months)
- Night sweats
- Pruritis
- Myalgia/arthralgia
- Rashes
- Malaise



# Other history

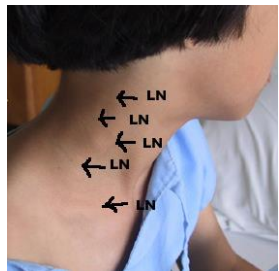
- Pets - especially cats for Cat Scratch Disease
- Travel - including Tuberculosis exposure
- Possible immunodeficiency risk such as HIV
- Family history of similar problems
- Previous treatments (such as antibiotics and how patient responded)



# Physical Examination

## • Nodes

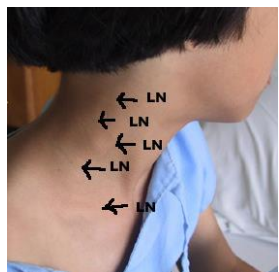
- Location - local, regional, generalized
- Size
- Character - e.g. firm, rubbery, etc. (may be subjective)
- Fixed or non-fixed
- Erythema and tenderness



## Other Signs

- Signs of anemia - tachycardia, pale conjunctiva - may be associated with malignancy, autoimmune diseases
- Dermatological changes - petechiae, bruising, bleeding - may be associated with malignancy
- Weight/growth - poor growth may be associated with malignancy





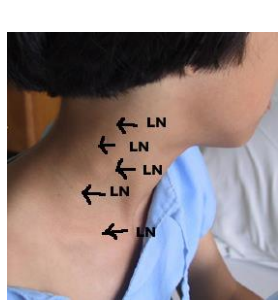
<b>Infective</b>	Bacterial, viral, fungal, parasitic, spirochaetal, mycobacterial
<b>Neoplastic</b>	Usually <b>leukaemia or lymphoma</b> but can be secondary (metastasis) from any solid tumour elsewhere in the body. The commonest solid tumours in children are neuroblastoma, rhabdomyosarcomas, osteosarcomas, nasopharyngeal carcinoma and thyroid cancers. Note that brain tumours very rarely metastasize to lymph nodes.
<b>Immunological</b>	JIA, SLE, Vasculitic disease Special mention to <b>Kawasaki Disease</b>
<b>Metabolic</b>	<b>Lipid storage disorders</b> – such as Gaucher disease and Niemann-Pick disease
<b>Drugs</b>	Phenytoin, allopurinol, atenolol, carbamazepine, penicillin
<b>Miscellaneous</b>	Post live vaccines, e.g <b>BCG</b>

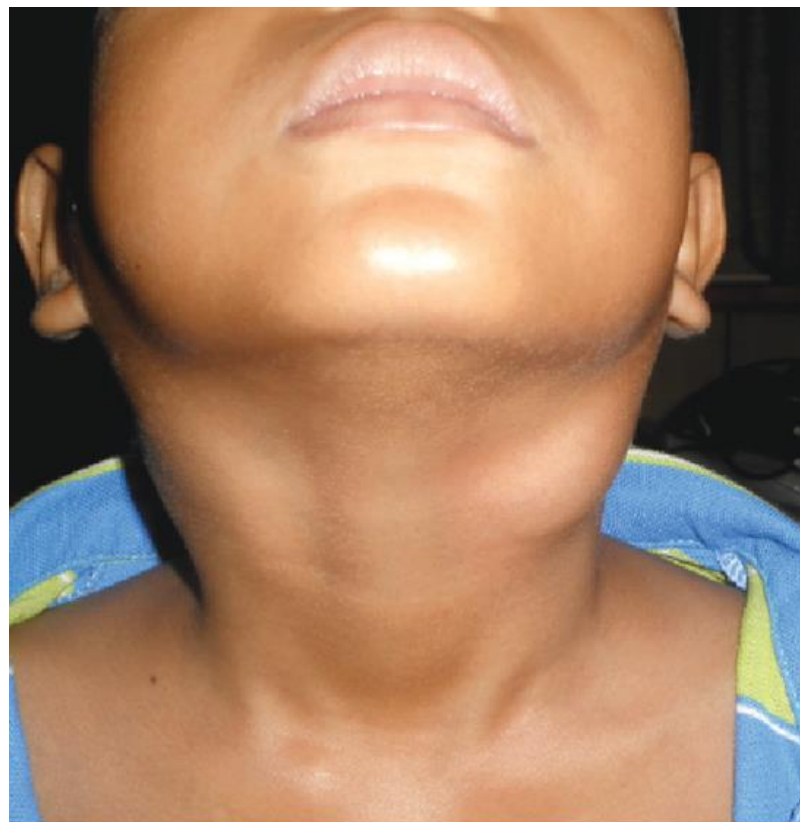
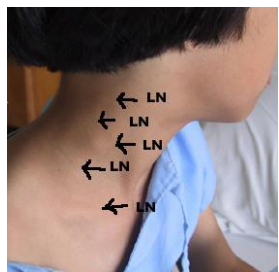
# Infectious causes

## Chronic Generalized Lymphadenopathy

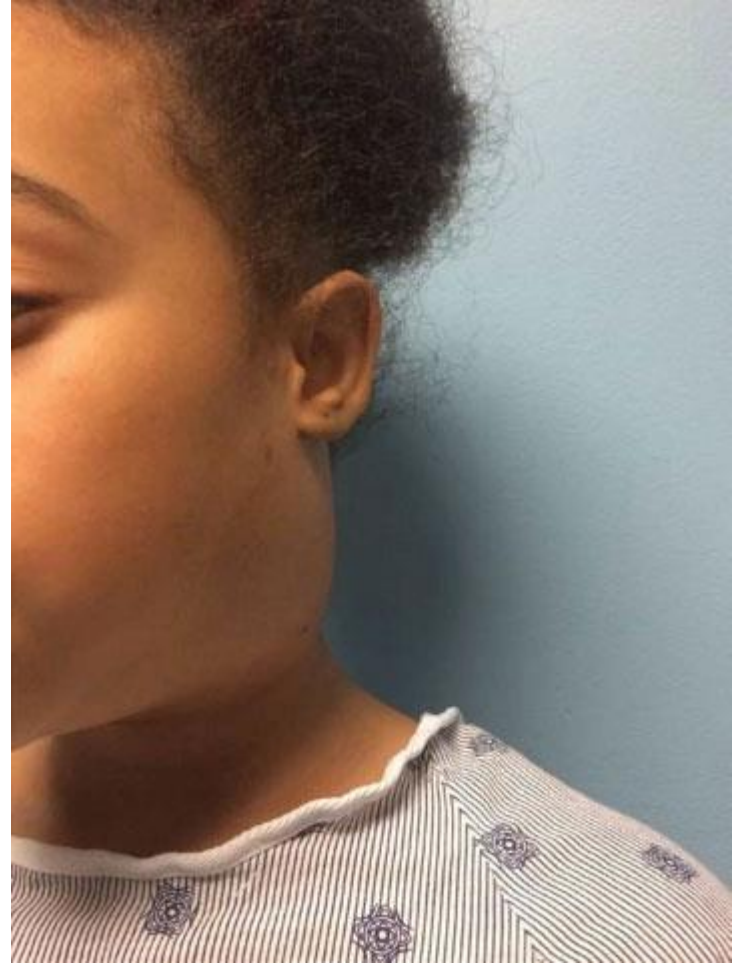
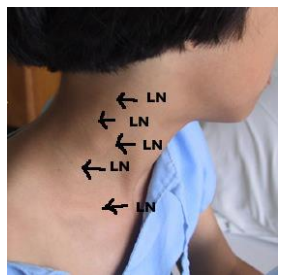
Chronic systemic infection:

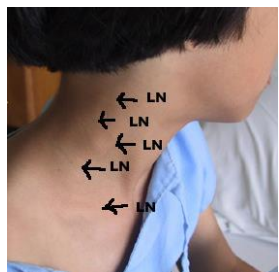
- Endemic fungal infections
- Tuberculosis and nontuberculous mycobacteria
- IM syndromes: EBV\*, CMV, toxoplasmosis
- HIV\*
- Syphilis
- Bartonella (cat scratch)
- Brucellosis
- Lymphogranuloma venereum



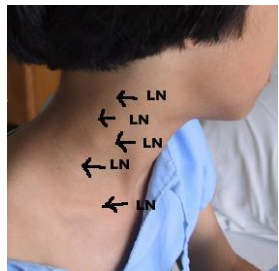


**Figure 1:** Bilateral level II cervical lymphadenopathy

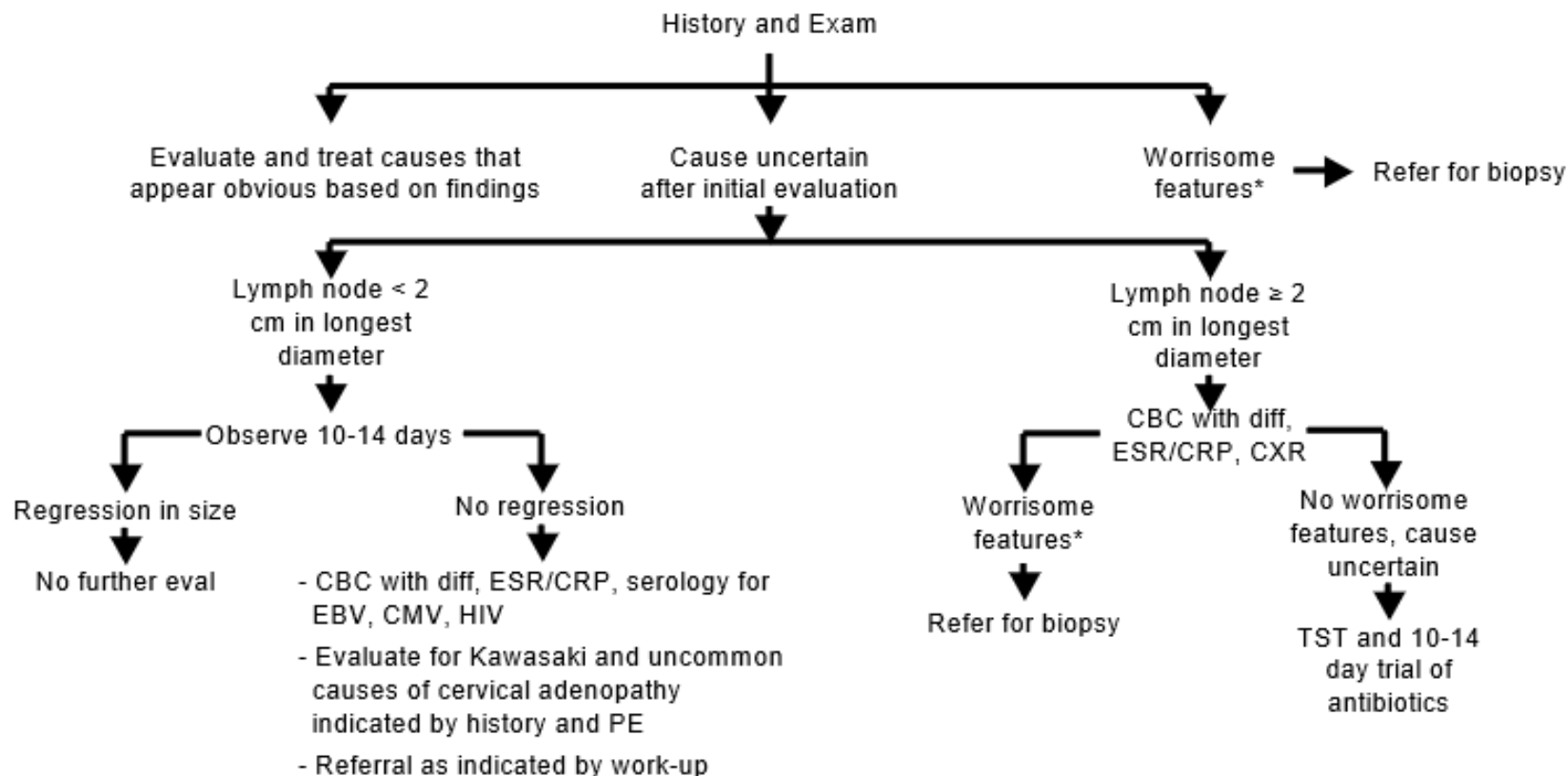




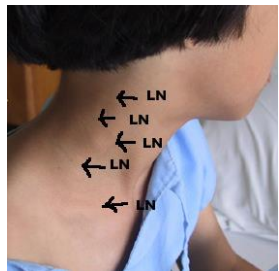
Feature	Malignant	Benign
Size	>2 cm	<2 cm (<1 cm)
Consistency	Hard, firm or rubbery	Soft
Duration	>2 weeks	<2 weeks
Mobility	Fixed	Mobile
Surroundings	Attached (invasion)	Not attached
Location	Supraclavicular, epitrochlear, or generalized	Inguinal, submandibular
Tenderness	Usually non-tender	Usually tender



# I worry about nodes that come, grow and stay..



\* Fever > 1 week, night sweats, weight loss (> 10% of body weight), fixed nontender node, abnormal CXR or labs, increasing size after 2 weeks antibiotics, persistent or increasing ESR/CRP

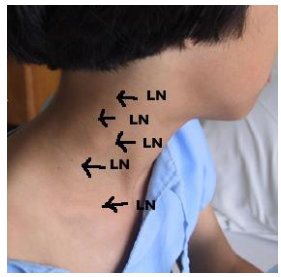


## When to Investigate ?

**Patients generally should be considered for investigation and/or referral if:**

- Unexplained generalized lymphadenopathy
- Any palpable supraclavicular or popliteal node
- Significant constitutional symptoms
- Hepatic or splenic enlargement
- Anemia or bleeding
- ? Unresponsiveness to antibiotic treatment
- Not decreasing in size after appropriate period of observation



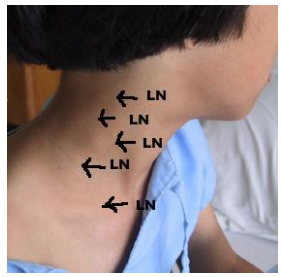


# Investigations

These may include:

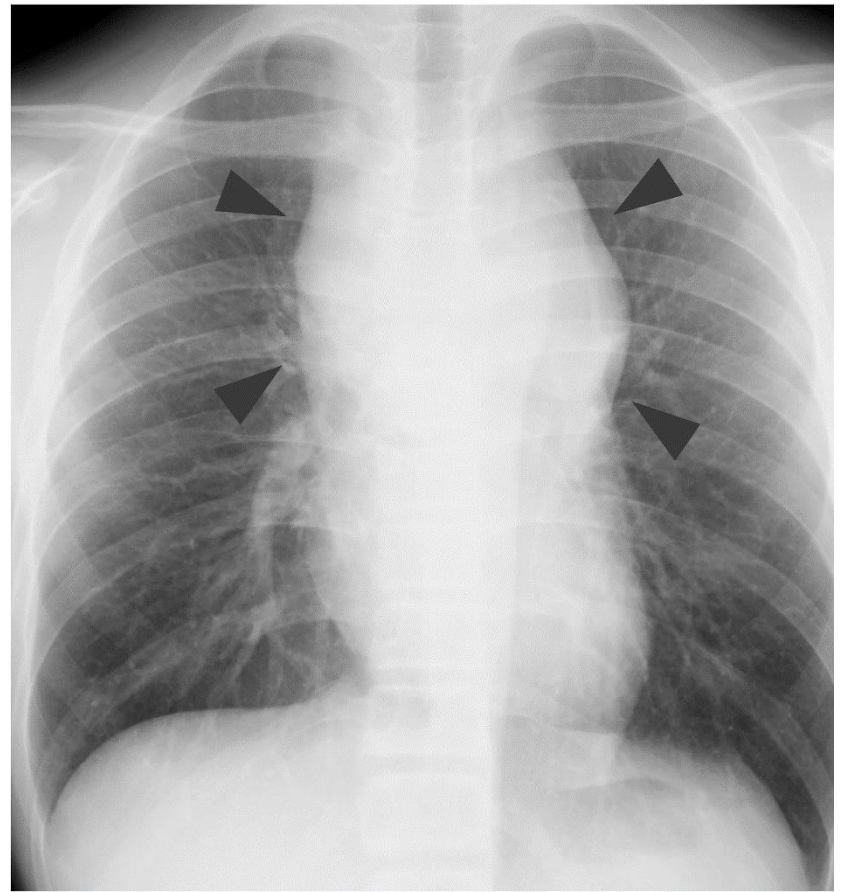
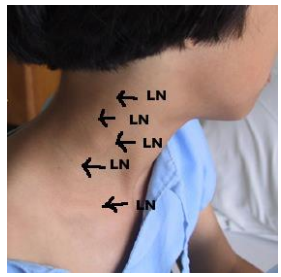
- **Laboratory**

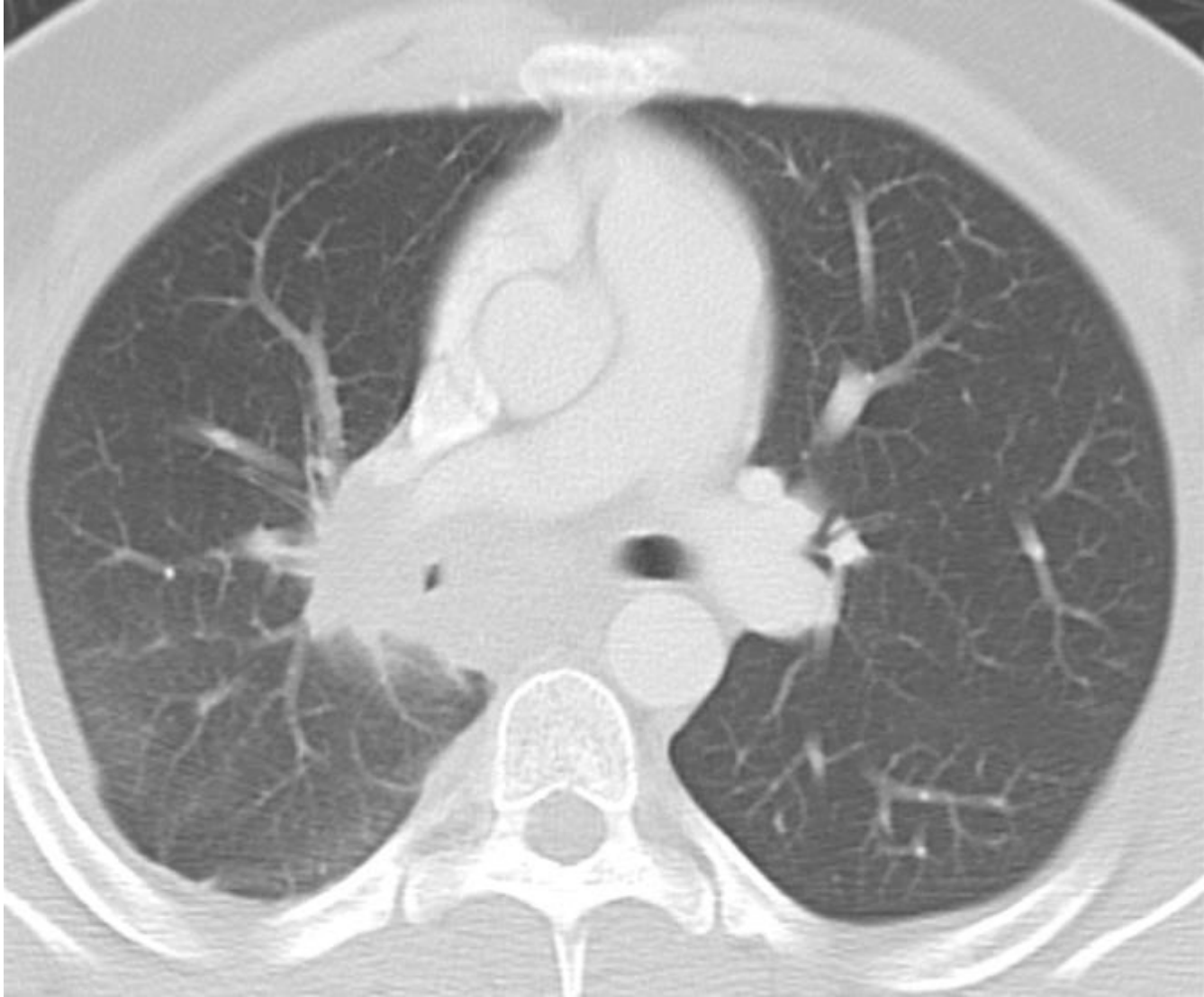
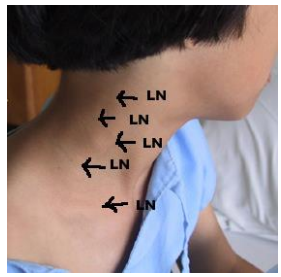
- CBC with differential
- ESR or C-reactive protein
- lactate dehydrogenase
- uric acid
- liver function tests
- BM
- Bx

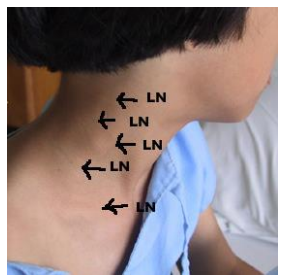


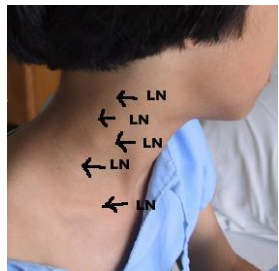
## Cont. Investigations

- PPD skin test
- Viral titers
- Other titers - Toxoplasmosis, *Bartonella henselae*
- Consultation with Oncology, Infectious Disease, Rheumatology, Surgery, Radiology
- Imaging studies: e.g. Chest radiograph, CT or PET.





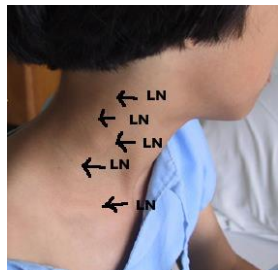




# Management

Identify underlying cause and treat as appropriate - confirmatory tests

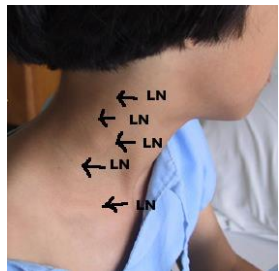
- Generalized adenopathy - usually has identifiable cause
- Localized adenopathy
- 3-4 week observation period for resolution if not high clinical suspicion for malignancy
- Biopsy if risk for malignancy - excisional



## Follow-up and Treatment

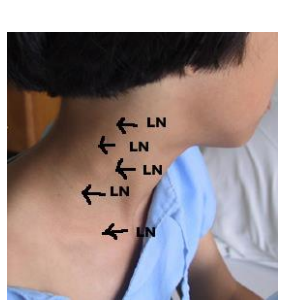
- Follow-up at 2-4 weeks interval for benign causes.
- Antibiotics are given only if there is strong evidence of bacterial infection.
- **DO NOT USE GLUCOCORTICOIDS.**



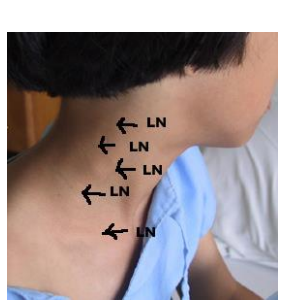


# Test your knowledge

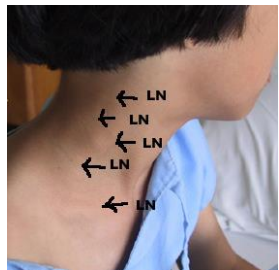
- A 10 year-old child who presents to your clinic with a complaint of enlarged lymph nodes. When enlarged, which lymph nodes are most likely to be a sign of pathology (e.g., malignancy)?
  - a. Occipital
  - b. Anterior cervical
  - c. Supraclavicular
  - d. Femoral



- Which nodes are most often associated with inflammation?
  - a. Firm
  - b. Movable
  - c. Fixed
  - d. Tender



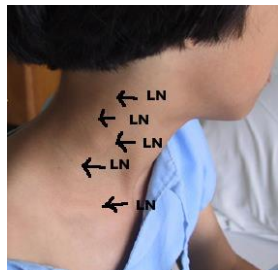
- The harder and more discrete a node, the more likely that there is a(n):
  - a. innocent cause.
  - b. infection.
  - c. malignancy.
  - d. metabolic disease.



- A 5-year-old child is referred by the general practitioner with a 2-week history of swelling to the left side of her neck. Examination reveals a firm mobile mass in the anterior cervical chain measuring 2 cm by 2 cm. Diagnosis of lymphadenitis is made, and the child is commenced on antibiotic therapy. On return for review 1 week later, the swelling has increased in size and is now measuring 3 cm by 4 cm.

**Which of the following statements are true?**

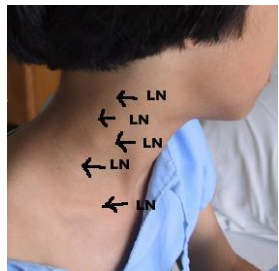
1. Further referral for biopsy should not be made until child has completed the course of antibiotics.
2. Increasing size of lymph node on antibiotic therapy should trigger clinician to refer for biopsy,



- You discuss the case with the local ENT team who suggest FNA to rule out malignancy

Which of the following statements are true?

1. An FNA showing reactive lymphadenitis rules out malignancy.
2. FNA can be performed without the need for a general anaesthetic in cooperative children.
3. An FNAB revealing malignant cells is sufficient for diagnosis of malignancy and further investigation, and classification is not required prior to commencing treatment.



• You are referred a 14-year-old patient with generalised lymphadenopathy. Examination reveals generalised lymphadenopathy and mild hepatosplenomegaly.

Which of the following statements are true?

1. The presence of an enlarged supraclavicular lymph node should trigger clinician to refer for urgent biopsy.
2. In view of a clinical picture, clinician should always wait for EBV serology prior to arranging further referral or investigations.
3. A clinician should have a lower threshold to refer the 14 year old child for a biopsy, rather than the patient who is 5 years old due to the age of patient.

