

# History of lymphatic system health and social care essay



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The first recorded document in relation to the lymph nodes can be traced back to the time of Hippocrates around the 460-360 B. C. He described axillary lymph nodes and white blood in the nodes. Aristotle around 384-322 B. C. first described lymphatics as the fibers which take position between blood vessels and nerves and which contain colorless liquid". Paul of Aegina is credited of identifying infected lymph nodes in the lower neck or scrofulae. Francis Glisson first described the theory of absorbent function of lymphatics . The spread of cancer along lymphatics was first described by Henri Francois LeDran. Johann Friedrich Meckel in 1772 described the lymphovenous connections. John Hunter discovered lymphatics in the neck of the swan and in the crocodile. Thomas Bartholin in 1643 first coined the term " lymphatics". Rudolf Virchow described the barrier theory of defensive role of lymph glands. Thomas Hodgkin in 1832 described diseases of the lymph nodes and spleen and the disease Hodgkin's lymphoma bears his name.

## **EMBRYOLOGY2**

The first lymphatic sacs arise from endothelial outgrowths of large central veins at the fifth week of gestation. The second lymphatic plexus develop from lymphatic sacs and the third lymphatic plexuses are invaded by mesenchymal cells that proliferate and aggregate to form lymph nodes. By first trimester of pregnancy small collections of lymphoblasts appear and in the second trimester the cortex is distinguishable from medulla and primary follicles are present. The primitive lymphatic system begins to develop by the end of the fifth week. The lymphatic vessels, lymph nodes, and spleen develop from lateral plate mesoderm. The lateral plate mesoderm also gives rise to myeloid tissue, the bone marrow tissue for production of various

blood cells, including lymph cells. The lymphatic vessels develop as outgrowths of the venous system or by union of small mesenchymal clefts or spaces into vessels followed by development of an endothelial lining. Lymph sacs develop from fusion and dilation of mesenchymal spaces. Adjacent spaces fuse into a network of dilated lymphatic capillaries that establish a primitive lymphatic system by the end of the second month. Lymphatic vessels drain lymph from the interstitial spaces to the blood vascular system. As the development continues the lymphatic vessels acquire valves that direct the flow of lymph toward the larger sacs. The paired jugular lymph sacs are the first lymph sacs to develop at the junction of the internal jugular and subclavian veins, lateral to the internal jugular veins. Capillary plexuses extend from the jugular lymph sacs to the thorax, upper extremities, head, and neck. The jugular lymph sacs communicate inferiorly with the single retroperitoneal, mesenteric lymph sac at the root of the mesentery of the intestine and with the cisterna chyli, a lymph sac below the developing diaphragm on the posterior abdominal wall. All lymphatic capillary plexuses are invaded by mesenchymal cells that proliferate and aggregate to form groups of lymph nodes. The mesenchymal cells form connective tissue cells that produce the cellular components of a lymph node, the fibrous capsule, trabeculae, and the reticular net. Afferent and efferent lymphatic capillaries conduct lymph to and away from the lymph node. [http://web.uni-plovdiv.bg/stu1104541018/docs/res/skandalakis'%20surgical%20anatomy%20-%202004/Chapter%2029\\_%20Lymphatic%20System\\_fichiers/loadBinaryCAQTGEKE.jpg](http://web.uni-plovdiv.bg/stu1104541018/docs/res/skandalakis'%20surgical%20anatomy%20-%202004/Chapter%2029_%20Lymphatic%20System_fichiers/loadBinaryCAQTGEKE.jpg)[<https://assignbuster.com/history-of-lymphatic-system-health-and-social-care-essay/>](http://web.uni-plovdiv.bg/stu1104541018/docs/res/skandalakis'%20surgical%20anatomy%20-</a></p></div><div data-bbox=)

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## **LYMPH NODES SITES 3**

Lymph nodes are organized to detect and inactivate foreign antigens present in lymph fluid that drains skin, GI tract and respiratory tract, the major organs in contact with the environment

### **Location**

#### **Lymphatic drainage**

SubmandibularTongue, submaxillary gland, lips and mouth,  
conjunctivaeSubmentalLower lip, floor of mouth, tip of tongue, skin of  
cheekJugularTongue, tonsil, pinna, parotidPosterior cervicalScalp and neck,  
skin of arms and pectorals, thorax, cervical and axillary  
nodesSuboccipitalScalp and headPostauricularExternal auditory meatus,  
pinna, scalpPreauricularEyelids and conjunctivae, temporal region,  
pinnaRight supraclavicular nodeMediastinum, lungs, esophagusLeft  
supraclavicular nodeThorax, abdomen via thoracic ductAxillaryArm, thoracic  
wall, breastEpitrochlearUlnar aspect of forearm and handInguinalPenis,  
scrotum, vulva, vagina, perineum, gluteal region, lower abdominal wall,  
lower anal canal[http://www.chakras.org.uk/images/chakra\\_yoga\\_lymph.gif](http://www.chakras.org.uk/images/chakra_yoga_lymph.gif)

## **LYMPH NODES STRUCTURE4**

Gross: ovoid with gray-tan cut surfacelymph\_nodeLymph node is made up of the cortex and medulla, follicles, paracortex, sinuses. The afferent lymph vessels penetrate capsule, enter marginal sinus, communicate with intranodal sinuses, then become efferent vessels, intranodal vessels contain  
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littoral cells or histiocytes with phagocytic properties. The lymph node capsule is thin fibrous connective tissue covering of lymph node thicker at hilus it is connected to fibrous trabeculae which penetrate the node the capsule contains smooth muscle cells Cortex is the subcapsular portion of node with largest number of follicles. Germinal center contains centroblasts and centrocytes also macrophages and follicular dendritic cells surrounded by a mantle zone of small B lymphocytes. Mantle zone contains small B cells surrounding pale staining germinal centers. Marginal zone contains a light zone on outer rim of mantle zone which contains post-follicular memory B cells derived after stimulation of recirculating cells from T cell dependent antigen. Medulla is the portion of node closest to hilum it contains vessels and sinuses and mast cells but minimal number of follicles. Medullary cords are found in hilar region between the sinuses, composed mostly of small B and T lymphocytes. Paracortex is the tissue between cortical follicles and medulla; mostly dark staining; contains post-capillary venules lined by high endothelial cells with intraendothelial lymphocytes, dendritic cells and T cells; expands during cell-mediated immunological reactions; has coarse network of reticulin fibers Primary follicle is a round aggregate of small, dark staining lymphocytes near the capsule, within a network of follicular dendritic cell processes and has no germinal center. Secondary follicle arises from primary follicles that develops germinal centers due to antigenic stimulation of B cells and production of antibodies and contain pale staining germinal center which may be polarized towards site of antigen entry contains B cells, follicular dendritic cells (CD21+, CD35+) and tingible body macrophages. Sinuses carry lymph from afferent to efferent lymphatics, the subcapsular sinus is below capsule and partially lined by endothelium;

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becomes " medullary" as it approaches the hilum and is lined by macrophages. Germinal centers are more common in infants and children, decrease in young adults, often absent in elderly. Germinal centers are more common in mesenteric and cervical lymph nodes. Hyaline deposits increased with age. Peripheral lymph nodes, with little antigenic stimulation, often have replacement by fat, particularly in axillary, cubital and popliteal nodes

## **NORMAL CELL POPULATION OF LYMPH NODE**

**Centroblasts:** large non-cleaved follicular center cells (B cells) with moderate amounts of basophilic cytoplasm, large round nuclei, open chromatin, multiple peripheral nucleoli; frequent mitotic figures  
**Centrocytes:** large and small cleaved follicular center cells (B cells) with scant cytoplasm and inconspicuous nucleoli  
**Plasma cells:** abundant basophilic cytoplasm with paranuclear hof, eccentrically placed nucleus with spoke wheel  
**Lymphocyte depletion, fibrosis and hyaline deposits** are associated with chronic disease, particularly cancer. <http://cw.prenhall.com/bookbind/pubbooks/martini10/chapter23/medialib/lymphnod.JPG>

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## **FUNCTIONS OF THE LYMPHATIC SYSTEM**

Drainage of fluid from blood stream into the tissues -Provides the provision of a labyrinth of channels of large volume and surface area, through which lymph slowly percolates. The circulating blood through narrow vessels leads to leakage of fluid or plasma into the tissues carrying oxygen and nutrients to the tissues and carrying waste materials from the tissues into the lymph channels. The leaked fluid drains into the lymph vessels. This forms a

circulatory system of fluids within the body. Thus, the Lymph plays important <https://assignbuster.com/history-of-lymphatic-system-health-and-social-care-essay/>

role in redistribution of fluid in the body  
Filtration of the lymph at the lymph nodes -The nodes contain white blood cells that can attack any bacteria or viruses they find in the lymph as it flows through the lymph nodes . Exposure of foreign material in the lymph to macrophages in nodal sinuses. The cancer cells may also get trapped similarly at the lymph nodes and thus lymph nodes act as indicators of how far the cancer has already spread. Filtering blood -This is done by the spleen. The spleen filters out bacteria, viruses and other foreign particles. Raise an immune reaction and fight infections -The lymphatic system especially the lymph nodes are over active in case of an infection the lymph nodes or glands, producing, B-lymphocytes and mature T-lymphocytes.

## **ANATOMY OF NECK 6**

The classic surgical approach divides the neck into two spaces, the anterior and posterior triangles. The anterior triangle contains the major structures of the neck: hypopharynx, larynx, trachea, esophagus, thyroid, parathyroid, and salivary glands as well as the carotid sheath, nerves, and lymph nodes. Each anterior triangle is bordered posterolaterally by the sternocleidomastoid muscle and superiorly by the mandible. The anterior triangle is subdivided by the hyoid bone into suprahyoid and infrahyoid portions. The suprahyoid provides support for the floor of the mouth and contains sublingual, submandibular salivary glands and associated nodes. The infrahyoid portion contains the remaining components. The posterior triangle is bounded anteriorly by the sternocleidomastoid muscle and posteriorly by the trapezius and is subdivided by the posterior belly of the omohyoid muscle. The space is primarily filled with fat and includes the

hypoglossal nerve, vessels, and nodes. <http://ars.els-cdn.com/content/image/1-s2.0-S0889852907001302-gr3.jpg>

## **Skin**

Blood supply • Descending branches: • The facial • The submental • Occipital • Ascending branches • Transverse cervical • Suprascapular The branches perforate the platysma muscle, anastomose to form superficial vertically-directed network of vessels

## **Platysma muscle:**

• Wide, quadrangular sheet-like muscle • Run obliquely from the upper part of the chest to lower face • Skin flap is raised immediately deep to the muscle • The posterior border is over or just anterior to IJV and great auricular nerve • Does not cover the inferior part of the anterior triangle and the posterolateral neck

## **Sternocleidomastoid muscle: SCM**

• Differentiated from the platysma by the direction of its fibres • Crossed by the IJV and the great auricular nerve from inferior to posterior deep to platysma • The posterior border represent the posterior boundary of nodes level II - IV

## **Marginal Mandibular nerve: MMN**

• Located 1 cm in front of and below the angle of the mandible • Deep to the superficial layer of the deep cervical fascia • Superficial to adventitia of the anterior facial vein



## **Spinal Accessory nerve: SAN**

- Emerge from the jugular foramen medial to the digastric and stylohyoid muscles and lateral and posterior to IJV (30% medial to the vein and in 3 -5% split the nerve)•It passes obliquely downward and backward to reach the medial surface of the SCM near the junction of its superior and middle thirds, Erb's point

## **Trapezius muscle:**

- Its anterior border is the posterior boundary of level V•Difficult to identify because of its superficial position•Dissect superficial to the fascia in order to preserve the cervical nervesDigastric Muscle; Posterior belly:•Originate from a groove in the mastoid process, digastric ridge•The marginal mandibular nerve lie superficial•The external and internal carotid artery, hypoglossal and 11th cranial nerves and the IJV lie medial

## **Omohyoid muscle:**

- Made of two bellies, and is the anatomic separation of nodal levels III and IV•The posterior belly is superficial to the brachial plexus, phrenic nerve and transverse cervical artery and vein•The anterior belly is superficial to the IJV

## **Brachial Plexus & Phrenic nerve:**

- The plexus exit between the anterior and middle scalene muscles, pass inferiorly deep to the clavicle under the posterior belly of the omohyoid•The phrenic nerve lie on top of the anterior scalene muscle and receive it is cervical supply from C3 - C5

## **Thoracic duct:**

- Located in the lower left neck posterior to the jugular vein and anterior to phrenic nerve and transverse cervical artery
- Have a very thin wall and should be handled gently to avoid avulsion or tear leading to chyle leak
- Exit via the hypoglossal canal near the jugular foramen
- Passes deep to the IJV and over the ICA and ECA and then deep and inferior to the digastric muscle and enveloped by a venous plexus, the ranine veins
- Pass deep to the fascia of the floor of the submandibular triangle before entering the tongue

## **ANATOMY OF LYMPH NODES IN NECK 8**

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## **Causes of cervical lymphadenopathy**

Cervical lymphadenopathy: the cervical lymph nodes drain the scalp, skin, oral cavity, larynx and neck. Infectious etiologies Noninfectious etiologies <http://www.aafp.org/afp/2002/1201/afp20021201p2103-f1.gif>

## **Infectious etiologies**

Bacterial infections Bacterial Atypical mycobacteria cause subacute cervical lymphadenitis Mycobacterium tuberculosis Dental abscess Ear infections Viruses enveloped viruses Cytomegalovirus Epstein-Barr virus Herpes simplex virus types 1 and 2 Human herpesvirus 6 Varicella-zoster virus DNA nonenveloped viruses Adenovirus RNA enveloped viruses Human immunodeficiency virus Influenza virus Measles virus Mumps virus Parainfluenza virus Respiratory syncytial virus Rubella virus RNA nonenveloped viruses Coxsackieviruses Rhinoviruses

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## **Fungi**

Aspergillus fumigatus Candida sp Cryptococcus

neoformans Dermatophytes Histoplasma capsulatum Paracoccidioides

brasiliensis Sporothrix schenckii

## **Protozoa**

Leishmania sp Toxoplasma gondii Trypanosoma brucei

gambiense Trypanosoma brucei rhodesiense

## **Noninfectious etiologies**

Kawasaki disease Histiocytosis Postvaccination Immunologic deficiencies

predisposing to recurrent infection Chronic granulomatous disease Hyper-IgE

syndrome (Job syndrome) Collagen vascular diseases Systemic lupus

erythematosus Juvenile rheumatoid arthritis Sarcoidosis Infectious

mononucleosis Head and neck Malignancies Thyroid cancer Leukemia, Hodgkin

disease and Non-hodgkin lymphoma Supraclavicular lymphadenopathy: this

group of lymph nodes drains the gastrointestinal tract, genitourinary tract

and the lungs. Virchow's node refers to pathological enlargement of one of

the left supraclavicular lymph nodes is associated with the presence of an

abdominal or thoracic neoplasm. Other common causes of supraclavicular

lymphadenopathy include: Hodgkin's lymphoma Non-Hodgkin's

lymphoma Bronchogenic carcinoma Breast carcinoma Infection.

## **Diagnosis**

Diagnosis of cervical lymphadenopathy involves history, clinical examination and investigations

## History

The history may be diagnostic, suggestive, or non-diagnostic of the cause of lymphadenopathy. Age of the patient  
Symptoms of infection  
Symptoms of metastatic malignancy  
Symptoms of connective tissue disorders  
Age of the patient: The dictum younger patients have benign lesions and older patients have malignant aetiology. malignancy found during lymphadenopathy work-up is probably much lower  
Symptoms of infection: Pharyngitis, conjunctivitis, Skin ulceration, Localised tenderness or discharge, Fever  
Night sweats  
Symptoms of metastatic malignancy: Constitutional symptoms of malignancy such as weight loss and night sweats  
Localised symptoms such as difficulty in swallowing, Hoarseness and pain (in head and neck cancer), Cough and haemoptysis (in lung cancer)  
Constitutional or b symptoms: fever, night sweats and/or unexplained weight loss greater than 10% of bodyweight over 6 months are concerning for lymphoma; Symptoms of connective tissue disorders  
Arthralgias, Rash, and Myalgias  
specific disorders  
Epidemiological clues: Exposure to pets, Occupational exposures, Recent travel or High-risk behaviours  
Medication history: Drug hypersensitivity (e. g., to phenytoin) is a common cause of lymphadenopathy.

## Duration of lymphadenopathy:

Persistent lymphadenopathy (more than 4 weeks) is indicative of chronic infection, collagen vascular disease or underlying malignancy. localised lymphadenopathy of brief duration often accompanies some infections (e. g., infectious mononucleosis and bacterial pharyngitis).

## **PHYSICAL EXAMINATION**

**Size:** Lymph node size varies according to their location. The significance of enlarged lymph nodes must be viewed in the context of their location, duration and associated symptoms, and the age and gender of the patient. As a general rule, lymph nodes measuring less than 1 cm are rarely of clinical significance.

**Consistency:** In general, lymph node consistency should not be used to distinguish between malignant and benign aetiologies. However, rock-hard nodes are seen more commonly with malignancies, whereas tender nodes often suggest an inflammatory disorder. **Mobility:** Fixed or matted nodes suggest metastatic carcinoma freely movable nodes may occur in infections, collagen vascular disease and lymphoma. **Distribution:** In most cases, generalised lymphadenopathy is a sign of systemic disease, especially when associated with splenomegaly. In certain locations, localised lymphadenopathy can provide clues for the possible underlying aetiology.

### **Approach to a patient with lymphadenopathy**

<http://www.aafp.org/afp/2002/1201/afp20021201p2103-f4>.

Investigations Hematological Total Count- Infection Differential Count -

Viral / Bacterial ESR Fine needle aspiration

cytology Ultrasonography Histopathology Molecular Testing- PCR FOR TB In

general, excisional lymph node biopsies are preferred, particularly if

lymphoma is suspected Fine needle aspiration (FNA) of a lymph node is

occasionally useful for the diagnosis of underlying carcinomas or recurrent

malignancy Biopsies should be obtained at the most abnormal or largest

lymph node site Biopsies that are interpreted by the pathologist as atypical

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lymphoid hyperplasia should be considered non-diagnostic rather than negative for a malignancy, and these patients should be carefully followed and an additional lymph node biopsy strongly considered. For patients in whom suspicion for an underlying malignancy is high, an unrevealing lymph node biopsy should be considered non-diagnostic rather than negative for malignancy, and further work-up should be pursued. <http://www.aafp.org/afp/1998/1015/afp19981015p1313-f2.gif> Algorithm for the evaluation of a patient with lymphadenopathy. (HIV = human immunodeficiency virus; CBC = complete blood count; PPD = purified protein derivative; RPR = rapid plasma reagin; ANA = antinuclear antibody; HBsAg = hepatitis B surface antigen) FNAC Histopathology Imaging Full-size image (33 K) (A) Rounded, hyperechoic metastatic thyroid cancer lymph node (arrow). (B) Increased vascularity of this lymph node by color flow Doppler. Lymph nodes in healthy people are usually hard to feel. But lymph nodes in the neck, armpit, or groin can get bigger and become tender. Swollen lymph nodes usually mean an infection, but the swelling can also be caused by a cut, scratch, insect bite, tattoo, a drug reaction, or cancer. FBC with WBC differential Throat culture Monospot test HIV test Hepatitis serologies PPD placement Chest x-ray. There are several ways to do a lymph node biopsy. The lymph node sample will be looked at under a microscope for problems.

- Fine-needle aspiration biopsy. Your doctor inserts a thin needle into a lymph node and removes a sample of cells.
- Core needle biopsy. Your doctor inserts a needle with a special tip and removes a sample of tissue about the size of a grain of rice.
- Open (surgical) biopsy. Your doctor will make a small cut in the skin and remove a lymph node. If more than one lymph node is taken, the biopsy

is called a lymph node dissection. Open biopsy and lymph node dissection let your doctor take a bigger sample than a needle biopsy.

## **Ultrasonography**

Ultrasound is a useful imaging modality in assessment of cervical lymph nodes. Distribution of nodes, grey scale and power Doppler sonographic features are useful to identify the cause of cervical lymphadenopathy. Useful grey scale features include size, shape, status of echogenic hilus, echogenicity, micronodular appearance, intranodal necrosis and calcification. Adjacent soft tissue edema and matting are particularly useful to identify tuberculosis. Useful power Doppler features include vascular pattern and displacement of vascularity. Ultrasonography can be combined with fine needle aspiration cytology