LYMPHATIC SYSTEM CONSISTS OF:

- Lymph
- Lymphatic vessels
- Lymph nodes
- Lymphatic ducts
- Lymphatic tissue
LYMPHATIC SYSTEM FUNCTIONS:

- Works with the CV system to remove wastes and excess fluids from the tissues.

- Part of the body’s defense (immune system) to protect us from pathogens.
A lymph node has two important functions. What are they?
A) lymphocyte production and pumping lymph fluid
B) Transportation of fats and lymph fluid
C) Lymphocyte production and lymph filtration
D) Pumping lymph fluid and transporting fats.

Correct answer: C
TEST YOUR KNOWLEDGE

What cells are a normal component of both lymph and blood?
A) erythrocytes
B) lymphocytes
C) platelets
D) thrombocytes

Correct answer: B
LYMPH:
- Thin, watery fluid made of intercellular (interstitial) fluid
- It forms when plasma leaks out of blood vessels into tissue spaces
- Made of water, digested nutrients, salts, hormones, O2, CO2, lymphocytes, metabolic wastes (urea)
- Once this interstitial fluid enters lymphatic system it is called lymph
LYMPHATIC VESSELS:

- Located in almost all body tissues close to blood vessels
LYMPHATIC VESSELS:

- Contain valves to keep lymph flowing in one direction
- Skeletal muscle contractions against lymph vessels cause lymph to flow through the vessels
LYMPHATIC VESSELS:

- **Lymphatic capillaries** = small, open-ended lymph vessels that pick up lymph at tissues
- Lymphatic capillaries join together to form larger lymphatic vessels which pass through lymph nodes

![Schematic Illustration: Lymph Flow](image)
LYMPHATIC VESSELS:

- **Lacteals** = specialized lymph capillaries in the small intestines that pick up digested lipids (fats)
LYMPHATIC VESSELS:

- **Chyle** = lymph mixed with lipids
- Lacteals transport chyle to the bloodstream through the thoracic duct

Name this lymphatic vessel.
LYMPH NODES:

- AKA lymph glands
- Located in clusters all over the body
- Small, round, or oval masses
- Size ranges from pinhead to almond
- Filter lymph and remove impurities—carbon, cancer cells, pathogens, dead blood cells
TEST YOUR KNOWLEDGE

Where would you find lymph vessels?
A) In tissues that do not have blood vessels
B) In the 4 chambers of the heart
C) Throughout the body
D) Only in organs of the digestive system

Correct answer: C
TEST YOUR KNOWLEDGE

What causes lymph to flow through lymph vessels?
A) peristalsis
B) the heart
C) Contractions of skeletal muscles against lymph vessels
D) Wavelike contractions of the muscular lining of lymph vessels

Correct answer: C
LYMPH NODES:

- Produce lymphocytes (type of WBC) and antibodies (fight infection)
- Purified lymph with added lymphocytes and antibodies leaves node by a single lymphatic vessel
LYMPHATIC DUCTS:

- As lymphatic vessels leave nodes, they continue to join together to form larger lymph vessels.
- These vessels drain into 1 of 2 lymphatic ducts: right lymphatic duct or thoracic duct.
LYMPHATIC DUCTS:

- **Right lymphatic duct** - short tube, receives all the purified lymph from R side of head & neck, R chest, & R arm.
- It empties into the R subclavian vein, returning the purified lymph to the blood.
LYMPHATIC DUCTS:

- **Thoracic Duct** - larger than R lymphatic duct
- Drains lymph from the rest of the body
- It empties into the L subclavian vein
LYMPHATIC DUCTS:

- **Cisterna chyli**-enlarged pouchlike structure found at the start of the thoracic duct
- It serves as a storage area for purified lymph before this lymph returns to the bloodstream
- It receives chyle from the intestinal lacteals
LYMPHATIC DUCTS:
LYMPHATIC TISSUE:

- Tonsils
- Spleen
- Thymus
TONSILS:

- Masses of lymphatic tissue that filter interstitial fluid
- 3 pairs of tonsils:
  1. **Palatine tonsils** = located on each side of the soft palate
  2. **Pharyngeal tonsils** = AKA adenoids, located in nasopharynx
  3. **Lingual tonsils** = located on the back of the tongue
TONSILS:

Which tonsils can you see here?
TEST YOUR KNOWLEDGE

Where are the lingual tonsils located?
A) tongue
B) Nose
C) lips
D) on the voice box

Correct: A
**SPLEEN:**

- Organ located beneath the L side of the diaphragm & posterior to the upper part of the stomach
- Produces WBCs & antibodies
- Destroys thrombocytes & old RBCs
- Stores RBCs to release into bloodstream if excessive bleeding occurs
- Filters metabolites & wastes from body tissues
THYMUS:

- Mass of lymph tissue in the center of the upper chest
- Produces antibodies & lymphocytes to fight infection
- Atrophies (wastes away) after puberty and is replaced by fat & connective tissue
- Its function is taken over by the lymph nodes
LABEL THE DIAGRAM WITH THE WORDS FROM THE BANK:
TEST YOUR KNOWLEDGE

What organ recycles red blood cells?
A) lymph node
B) spleen
C) thymus
D) lingual tonsil

Correct answer: B
TEST YOUR KNOWLEDGE

If a child does not have a functioning thymus, her or she might have difficulty:

A) fighting infection
B) breathing
C) Swallowing
D) Removing toxic waste from the body

Correct answer: A
LYMPHATIC SYSTEM

Diseases and abnormal conditions include:

- Adenitis
- Hodgkins’ Disease
- Lymphangitis
- Splenomegaly
- Tonsillitis
ADENITIS

- Inflammation or infection of the lymph nodes
- Caused by large amount of harmful substances (pathogens, cancer cells) enter the lymph nodes and infect them

**S/SX** = fever, swollen & painful nodes which if not treated can form an abscess

**Tx** = abx & warm, moist compresses; I&D for abscess

**I&D 0:47** [https://www.youtube.com/watch?v=f19SFdC3Mp0](https://www.youtube.com/watch?v=f19SFdC3Mp0)
HODGKIN’S DISEASE

- Chronic, malignant disease of lymph nodes
- Most common form of lymphoma (tumor of lymph tissue)
- **S/Sx** = painless swelling of nodes, fever, night sweats, weight loss, fatigue, pruritus
- **Tx** = chemotherapy, radiation

1:37 [https://www.youtube.com/watch?v=saYsSIsBObw](https://www.youtube.com/watch?v=saYsSIsBObw)
5:58 [https://www.youtube.com/watch?v=bKoni1D6lDE](https://www.youtube.com/watch?v=bKoni1D6lDE)
**LYMPHANGITIS**

- Inflammation of lymphatic vessels
- Usually results from infxn in extremity
- **S/Sx**= red streak extending up an UE or LE from the source of infxn; fever, chills, tenderness or pain
- **Tx**= abx, rest, elevation of affected part; warm, moist compresses

[2:07](https://www.youtube.com/watch?v=R2mrSSwbLfQ)
**SPLENOMEGALY**

- Enlargement of spleen
- Results from abnormal accumulation of RBCs, mononucleosis, cirrhosis of the liver

*S/Sx* = swelling, abd pain, ruptured spleen, increased destruction of RBCs leads to anemia, leukopenia, & thrombocytopenia

- If spleen ruptures it can lead to intraperitoneal hemorrhage & shock can lead to death

*Tx* = for severe cases where cause cannot be treated splenectomy is done

12:21  [https://www.youtube.com/watch?v=txCYSkZIrlE](https://www.youtube.com/watch?v=txCYSkZIrlE)
**TONSILLITIS**

- Inflammation or infxn of tonsils-usually pharyngeal & palatine tonsils

- **S/Sx**=throat pain, dysphagia, fever, white or yellow spots of exudate on tonsils, swollen nodes near mandible

- **Tx**=abx, warm throat irrigations, rest, analgesics; tonsillectomy
TONSILLITIS

- Tonsillectomy = surgical removal of tonsils
- Used for pts with:
  - chronic tonsillitis
  - frequent infections
  - hypertrophy (enlargement) that causes obstruction of the airway

- 2:47 https://www.youtube.com/watch?v=zzXzr-zDLX8
- 1:59 https://www.youtube.com/watch?v=gzJzg4wz1p8
What disorder of the lymph system is classified as a malignancy?

A) adenitis
B) Hodgkin’s disease
C) splenomegaly
D) tonsillitis

Correct answer: B
Juan is a firefighter who is diagnosed with splenomegaly. Why would his doctor tell Juan he cannot go to work for a month?

A) his is most likely contagious

B) his throat could swell shut and block his airway

C) If bumped in the abdomen, his spleen could rupture

D) He cannot be exposed to others because he cannot fight infection

Correct answer: C
TEST YOUR KNOWLEDGE

What is the usual treatment for occasional bouts of tonsillitis?
A) tonsillectomy
B) splenectomy
C) antibiotics and warm throat irrigations
D) narcotic pain medication and steroids

Correct answer: C