

# What is Lymphedema?

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## About the Author

Jessica graduated from Hunter College –CUNY with her Doctorate in Physical Therapy in 2016. Her employer was looking to add a new CLT to their staff so she took the Norton School of Lymphatics course in 2017 and had no idea the world it would open up. Since then, she has dedicated her professional practice to serving those with lymphatic diseases as well as other cancer-related functional disabilities. She has taken courses with PORi, Klose Training, Summit, Institute of Physical Art, NAIOMPT, as well as attended numerous National Lymphedema Network conventions. She is a PORi-Certified Oncology Rehab Therapist, a member of the National Lymphedema Network, and also a member of the APTA Oncology section.



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## Objectives

- What is the Lymphatic System?
- What is Lymphedema?
  - Pathology
  - Stages
- Treatment



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## Lymphatic System

- System of organs (lymph tissue, vessels, and nodes) responsible for certain immune functions and fluid balance
  - Lymph- plasma, proteins, blood cells, cellular waste, dead bacteria, viruses, and fat (Lymphatic Load)
  - Made up of lymph vessels (capillaries, collectors, trunks) as well as lymph nodes (LN)
  - Lymph Nodes are encapsulated organs where lymphocytes/ white blood cells filter the lymph fluid and deal with pathogens
  - 600-700 LN, 100-200 in the mesenteric tissue
  - Lymph nodes situated along important intersections and along the digestive/ respiratory tracts
    - Increased activity= Inflamed LN



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## Simplified diagram of the most important anatomical areas

**Epithelium with blood capillaries has an interstitial space**

- 1 Blood capillary
- 2 Interstitial space
- 3 Epithelium

**Initial lymph vessel**

- 1 Endothelial cells
- 2 Endothelial fenestrations
- 3 Afferent of subcuticular fluid
- 4 Afferent of interstitial fluid
- 5 Afferent of lymph

**Lymph capillary network**

- 1 Lymph capillary
- 2 Lymph collector
- 3 Lymph node
- 4 Lymph node
- 5 Lymph node
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**Major lymphatic vessels**

- 1 Cisterna chyli
- 2 Thoracic duct
- 3 Lymphatic trunk
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**Major blood vessels**

- 1 Superior vena cava
- 2 Inferior vena cava
- 3 Aorta
- 4 Pulmonary artery
- 5 Pulmonary vein
- 6 Superior mesenteric artery
- 7 Inferior mesenteric artery
- 8 Renal artery
- 9 Renal vein
- 10 Common iliac artery
- 11 Common iliac vein
- 12 External iliac artery
- 13 External iliac vein
- 14 Internal iliac artery
- 15 Internal iliac vein
- 16 Femoral artery
- 17 Femoral vein
- 18 Popliteal artery
- 19 Popliteal vein
- 20 Tibial artery
- 21 Tibial vein
- 22 Peroneal artery
- 23 Peroneal vein
- 24 Dorsal artery
- 25 Dorsal vein
- 26 Plantar artery
- 27 Plantar vein
- 28 Digital artery
- 29 Digital vein
- 30 Toe artery
- 31 Toe vein
- 32 Finger artery
- 33 Finger vein
- 34 Hand artery
- 35 Hand vein
- 36 Wrist artery
- 37 Wrist vein
- 38 Forearm artery
- 39 Forearm vein
- 40 Elbow artery
- 41 Elbow vein
- 42 Axillary artery
- 43 Axillary vein
- 44 Brachial artery
- 45 Brachial vein
- 46 Radial artery
- 47 Radial vein
- 48 Ulnar artery
- 49 Ulnar vein
- 50 Carpal artery
- 51 Carpal vein

**Major lymphatic nodes**

- 1 Cervical lymph node
- 2 Axillary lymph node
- 3 Inguinal lymph node
- 4 Mesenteric lymph node
- 5 Splenic lymph node
- 6 Thoracic lymph node
- 7 Lumbar lymph node
- 8 Sacral lymph node
- 9 Coccygeal lymph node
- 10 Perineal lymph node
- 11 Anal lymph node
- 12 Rectal lymph node
- 13 Sigmoid lymph node
- 14 Cecal lymph node
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# Lymph Drainage Basics

- Fluid enters the capillaries at tissue level
- Moves through to larger vessels/collectors
- Filtered at LN, where some fluid is also removed
- Progresses through the thoracic duct or subclavian veins where it mixes with deoxygenated blood to reconstitute

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 LYMPHEDEMA
   
 TREATMENT SYMPOSIUM

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# Lymphatic Watersheds

**PRIMARY AND COLLATERAL LYMPHATIC SYSTEM**

**Subcutaneous lymphatic system**

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**Deep lymphatic system**

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**Deep or superficial anastomoses**

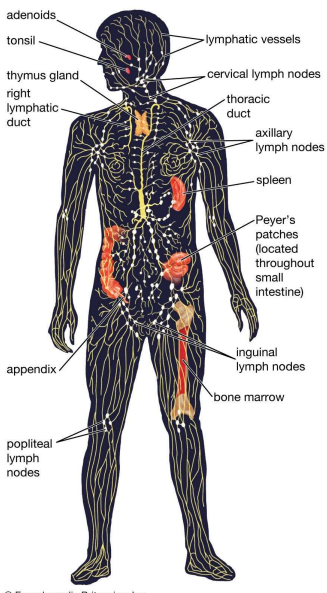
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- Linear areas of the skin/body that separate the drainage territories
- Collectors within an area may converge, but do not cross watersheds
- Why swelling may be limited to one area

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## The Lymphatic System



Labels in the diagram include: adenoids, tonsil, thymus gland, right lymphatic duct, appendix, popliteal lymph nodes, lymphatic vessels, cervical lymph nodes, thoracic duct, axillary lymph nodes, spleen, Peyer's patches (located throughout small intestine), inguinal lymph nodes, and bone marrow.

- Lymphatic tissue also in bone marrow, thymus, spleen, Waldeyer's Throat Ring/ tonsils and Peyer's Patches
- LN clusters in strategic locations
  - Neck
  - Axilla/ Armpit
  - Inguinal/ Groin
  - Knee and Elbow


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## What is Lymphedema?

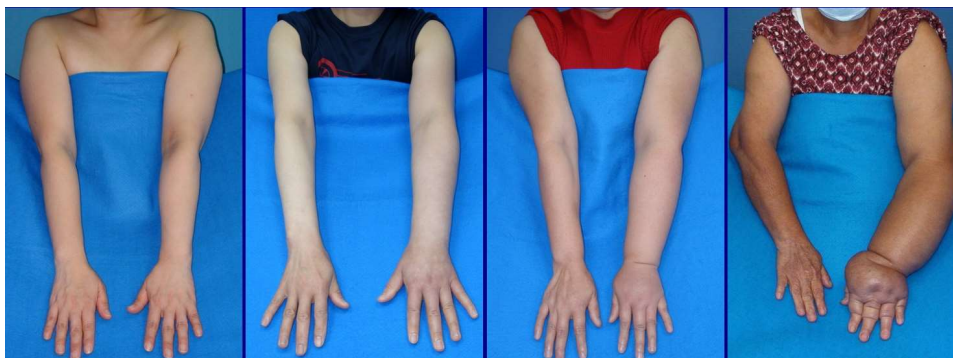
- Chronic swelling that occurs due to reduced functioning of the lymphatic system
- Primary- born with lymphatic dysfunction
- Secondary- develops due to damage to the system
  - Trauma (surgery, radiation, accidents)
  - Medications
  - Cellulitis
  - Vascular Disease
  - Obesity
  - Sedentary Lifestyle



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## Stages of Lymphedema

- 0: Impaired Lymphatic system, no or very little swelling, subclinical
- I: Spontaneously reversing swelling, can be reversed to Stage 0
- II: Chronic, no longer returns on its own, late Stage II, skin changes occur (fibrosis)
- III: Excessive swelling with skin changes, possible breakdown and weeping



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## Complete Decongestive Therapy

- Manual Lymphatic Drainage
  - Manual Therapy sequence
  - Stimulates Lymphatic System
  - Assists with moving fluid from affected area
- Compression
  - Multi Layer Bandaging
  - Special Garments
- Skin Care
- Exercise



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## References

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