Lymphatic and Immune Pathophysiology
ANATOMIC STRUCTURES AND PHYSIOLOGIC PROCESSES RELATED TO THE LYMPHATIC SYSTEM.

DIFFERENT TYPES OF IMMUNOLOGIC REACTIONS.
Lymphatic System Overview

Composed of:
- Lymph
- Lymphocytes
- Lymphatic vessels
- Lymph nodes
- Organs and glands containing lymphoid tissue

The image on the slide located in the lower left hand corner features the areas drained by the two main lymphatic trunks. These are the thoracic duct (blue area) and the right lymphatic duct (green area).
Lymphatic System Overview

Lymphatic system important for massage therapists

Asymmetrical; functions with circulatory and immune systems

**Lymph system structure**

- Interstitial fluid (ISF) originates at capillary exchange sites
- Medium for diffusion
- ISF taken up by lymph system (open tubes)
- Cleaned, neutralized in nodes
- Put back in circulatory system at subclavian veins

**Starling equilibrium:** the amount of fluid squeezed out of circulatory capillaries should be almost equal to the amount being drawn into lymphatic capillaries, with about 10% left over to become interstitial fluid.
Lymphatic system functions:
- Drains excess interstitial fluid
- Transports dietary lipids and lipid-soluble vitamins from digestive tract to the blood
- Carries out immune functions

Lipids and lipid-soluble vitamins are too large to fit into blood capillaries. Thus when they are absorbed from the digestive tract, they move into the larger-diameter lymphatic capillaries instead, entering the blood when lymph drains back into the bloodstream.
**TASKS:**
Draining excess interstitial fluid
- Enters lymphatic capillaries; drains into larger vessels

- Lymph nodes situated along lymphatic vessels; these filter out pathogens and debris

- Lymph finally drains into subclavian veins
Lymphatic System Overview (cont’d.)
Lymphatic System Overview (cont’d.)

Immunity – Anatomic and physiologic defense reactions to invading organisms

Key components are:
- Lymphocytes
- White blood Cells

Structures such as skin and chemicals (i.e., digestive enzymes) are also involved
Immunity; two types:

**Natural:** nonspecific responses to invading pathogens (i.e., physical barriers of the skin, chemical barriers of enzymes, fever, and inflammation)

**Acquired:** diverse but specific responses to invaders involving lymphocytes; two types of lymphocytes

B cells
T cells
T and B cells both form in red bone marrow

B cells mature in red bone marrow

T cells mature in the thymus

Mature T and B cells then travel to lymphatic tissues
Immune response

- T and B cells activate when they come into contact with pathogens.
- T cells leave lymphatic tissue to kill pathogens directly.
- B cells produce antibodies.
  - Antibodies leave lymphatic tissue to circulate in body fluids.
  - Antibodies inactivate pathogens as they come across them.
Autoimmune diseases

T and B cells unable to distinguish body’s own tissues from something foreign to body

T and B cells then attack the tissues
- appropriate massage considerations

- emergency measures for anaphylaxis.
Conditions of the Lymphatic System

Lymphedema and Edema

Lymphangitis

Lymphadenopathy and Lymphadenitis
Lymphedema
Abnormal accumulation of fluids caused by obstruction in lymph flow causing swelling

Primary: due to lymph vessel or nodal malformation; rare

Secondary: due to a condition or medical procedure

Edema
Abnormal accumulation of fluids from a sluggish or overloaded lymph transport system causing swelling
FORMS OF EDEMA

**Inflammatory:**

- **mechanism:** vessel permeability, hyperemia
- **ex:** acute inflammation

**Hydrostatic:** contraindication

- **mechanism:** increased arterial pressure, increased venous backpressure
- **ex:** hypertension, heart failure

**Oncotic:** contraindication

- **mechanism:**
  - a. hypoproteinemia, increased protein loss,
  - b. decreased protein synthesis
- **ex:**
  - a –nephrotic syndrome, b - cirrhosis of the liver

**Obstructive:**

- **mechanism:** lymphatic obstruction
- **ex:** lymphatic blockage (e.g. tumor)

**Hypovolemic:** with caution

- **mechanism:** retention of sodium
- **ex:** hyperaldosteronism
MORE ON EDEMA

MASSAGE THERAPY CAUTIONS AND RECOMMENDATION

KALYANI PREMKUMAR, M.D., LMT

The development of edema in your client is often the harbinger of something very serious. Please read Dr. Premkumars cautions.

Before planning a session, take a detailed history and possibly have a consultation with client’s physician to establish the cause of edema. Generalized edema is usually due to chronic cardiac, kidney, or liver problems, and massage can be detrimental to such clients. If the edema is due to other causes, massage can be beneficial.

In edema of the limbs following the removal of lymph nodes, the lib is hard, tender and painful due to lymphatic fluid congestion. The joints are stiff, and the joint movements are painful. In the case of the arm, swelling may be seen in front of the chest or behind the shoulders. The purpose of massage in these clients is to help lymphatic drainage by promoting the flow of the fluid back into the capillaries. This helps the body make new drainage pathways.

Next page
MORE ON EDEMA, cont’d

SPECIAL TECHNIQUES:
Position of the client with so the edematous limbs is supported and elevated. If you can get the client to maintain the position for 10 minutes before the massage, gravity will help with drainage. Manual lymphatic drainage techniques are appropriate (special training required). Use slow, deep effleurage and kneading strokes to the proximal area and then the distal areas, thus emptying the proximal lymphatic vessels before forcing the lump from the distal vessels through them. Use friction movement around the joints. The client will have relief even there might not be a visual reduction in size. Make sure that the strokes follow the lymph movement directions of the area. Upper arms, perform strokes toward the axilla. The chest: movement should be toward the neck and axilla on the affected side. Legs, toward the inguinal region. Use passive and active joint movements after the massage to assist both venous and lymphatic flow. In clients with chronic edema, organization of the proteins in the interstitial spaces results in fibrosis and thickening of the skin and connective tissue. In such clients, adhesion have to be stretched, using gentle friction. If pain or swelling increases, stop the session, refer to physician.
Lymphedema and Edema (cont'd.)

Primary lymphedema

Secondary lymphedema

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Lymphedema and Edema (cont'd.)

**Peripheral edema** – Edema of an extremity

**Dependent edema** – Type of peripheral edema found in gravity-dependant areas of the lower extremity

**Angioedema** – Edema seen in allergic reactions

**Pitting edema** – Edema that leaves a pit or dent in skin once compressed and released

**Non-pitting edema** – Does not leave a dent after skin is compressed and released
Lymphedema and Edema (cont'd.)

IN MASSAGE:

1. Avoid vigorous massage in affected areas
2. Avoid all forms of thermotherapy
3. During massage, elevate affected areas
4. Massage proximal to affected areas if located on the extremities
Lymphangitis

Infection of lymphatic vessels; usually an indication that a primary infection is spreading

Local contraindication

Etiology

- Lymph capillaries are infected, usually with Streptococcus pyogenes
- Usually starts at skin lesion
- In lymph nodes: lymphadenitis

Lymphadenopathy – Enlarged lymph nodes

Lymphadenitis – Infected lymph nodes

Local contraindication; absolute

Contraindication if systemic disease is present

Conditions of Immune System

- Allergy
- Chronic fatigue syndrome
- Systemic lupus erythematosus
- Acquired immunodeficiency syndrome
Allergy

- Over-reaction of immune system to otherwise harmless agents; also called a hypersensitivity reaction Type I
- Anaphylaxis is the least common, but most perilous reaction
  Caused by insect sting, ingestion of nuts or shellfish, or drug reaction
- Ascertain and avoid allergens during massage

Definition
- Immune system reactions against stimuli that are not inherently hazardous

Demographics
- 50 million people in the United States
- Hygiene hypothesis
- Repeated exposures
- Multiple chemical sensitivity: exposure to toxic substances leading to extreme reactions to other substances
Angioedema

Rapid onset of local swelling
Skin, genitals, extremities, gastrointestinal (GI) tract

At tongue, larynx, pharynx: may interfere with breathing

Triggers: nuts, chocolate, fish, eggs, aspirin, angiotensin-converting enzyme (ACE) inhibitors, poison ivy, etc.
Emergency Measures for Anaphylaxis

Call 911
- Calmly reassure the person
- Check for special medications, such as injectable epinephrine; administer medication
- Have person lie flat; elevate feet 12 inches
- Cover person with coat or blanket; loosen tight clothing

Cautions:
- Do not give anything to drink
- If person is vomiting or bleeding from mouth, place on side to prevent choking
- Perform CPR if person is not breathing or does not have a pulse
Emergency Measures for Anaphylaxis (cont’d.)

**Treatment**

- Antihistamines to interrupt inflammatory process
- Epinephrine and oxygen if necessary
- EpiPen

**Massage**

- Contraindicated while acute
- Use hypoallergenic lubricant, avoid perfumes, oils, etc.
Chronic Fatigue Syndrome

Disease characterized by prolonged and severe tiredness and disabling fatigue; this fatigue is not relieved by rest and may worsen with physical or mental activity. Reduce treatment time and pressure if client is overly fatigued.

Treatment

- Make supportive lifestyle choices
  - Avoid stress
  - Minimize stimulants and depressants
  - Take careful exercise
- Education, some medications

Massage

- Indicated to stimulate parasympathetic response, improve tissue nutrition, relieve muscle and joint pain
Systemic Lupus Erythematosus

Chronic inflammatory disease affecting skin, bones and joints, nervous system, kidneys, lungs, and other organs

Massage is contraindicated during flare-ups; otherwise, reduce treatment time and pressure if client is overly fatigued; avoid skin rashes.
ANY MANIFESTATION OF ILLNESS THAT INCLUDES A FEVER:

**DEFINITION:** body temperature of over 100 degrees farhrenheit.

If the client has a temperature - - -

**Massage:**
Fever systemically contraindicates massage
Energetic techniques may be helpful
Viral disease causing progressive impairment of immune system

**AIDS** is the final stage (Stage IV) of HIV infection

Demographics, Worldwide:
40.3 million = HIV+
2.3 million < 15 years
5 million new infections/year; 14,000/day
3.1 million deaths/year
90% of infections from heterosexual activity

Demographics, United States:
950,000 = HIV+
(240,000 don’t know)
40,000 new infections/year
  70% in men, 30% in women
20,000 deaths/year
Most common in racial minorities:
  Blacks 7x > whites
  Hispanics 3x > whites
See notes
Acquired Immunodeficiency Syndrome (cont’d.)

- **CD4⁺ T-cell count**
- **HIV viral load in the blood**
- **HIV specific antibody blood levels**

HIV infection

ACUTE

CHRONIC

Months

Years

AIDS

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**HIV/AIDS**

**Signs and Symptoms**
Depend on the stage of infection

**Communicability**
Exchange of intimate fluids
Not sweat, saliva, tears
Unstable outside a host
Can’t use insect or other vectors

**Diagnosis**
May take 6 months for accurate test
ELISA (enzyme-linked immunosorbent assay) test
Western blot test
Centers for Disease control (CDC) recommends screening for all adults and teens; may reduce spread

**Treatment**
Virus constantly changes during replication
Combination of drugs to anticipate mutations (can be toxic)
Highly active antiretroviral therapy (HAART) can slow progression; can’t access virus in dormant T cells
Challenge: when is it best to initiate therapy?
Acquired Immunodeficiency Syndrome (cont’d.)

**Massage**

Take care for health of client
Indicated for asymptomatic clients; may improve T-cell count
For clients with AIDS, stay within tolerance and resilience
Reduce treatment time and pressure if client is overly fatigued
Inquire about and avoid skins lesions, enlarged lymph nodes, and area of most recent site of blood work
Avoid or administer joint mobilizations and compressions carefully when condition is advanced
Lymphoma

**Definition**

Cancer of lymph nodes, spleen
Delineations between lymphoma and lymphocytic leukemia becoming hazy
Hodgkin lymphoma (HL)
Non-Hodgkin lymphoma (NHL)

**Demographics**

67,000 diagnoses/year in the United States
- 8,000 HL
- 59,000 NHL
519,000 lymphoma patients alive today
Diagnosis rates are climbing; incidence up 80% since 1973
Better screening, early diagnosis
Aging population
Survivors of immuno-compromising conditions
HIV, organ transplants, etc.
Lymphoma

Prognosis
- Depends on type, stage, age, etc.
- 5-year survival for HL > 86% (children > 95%)
- NHL: 63%

Massage
- Rigorous circulatory massage inappropriate for malfunctioning lymph tissue
- Noncirculatory work can be supportive
- Work to ameliorate problems with chemotherapy, radiation therapy, other treatments
GOOD-BYE

Winnie the Pooh’s Corner http://www.hello.to/poohcorner

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