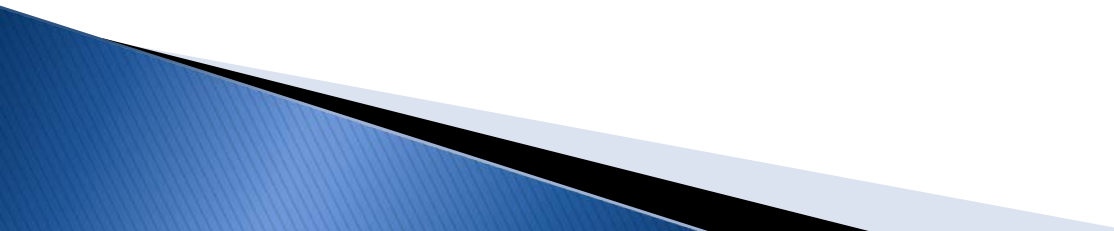


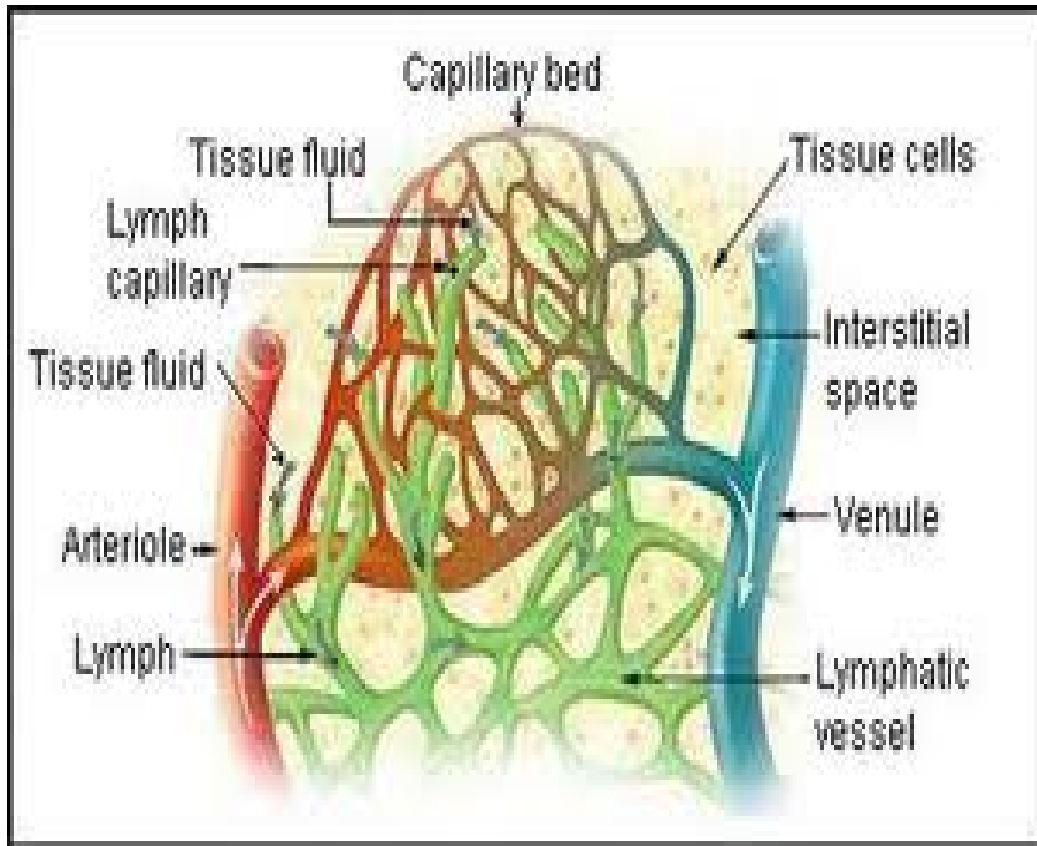
# The Traumatic “Fat” Hand

What does therapy do?

Laura Karls, OTR/L, CHT

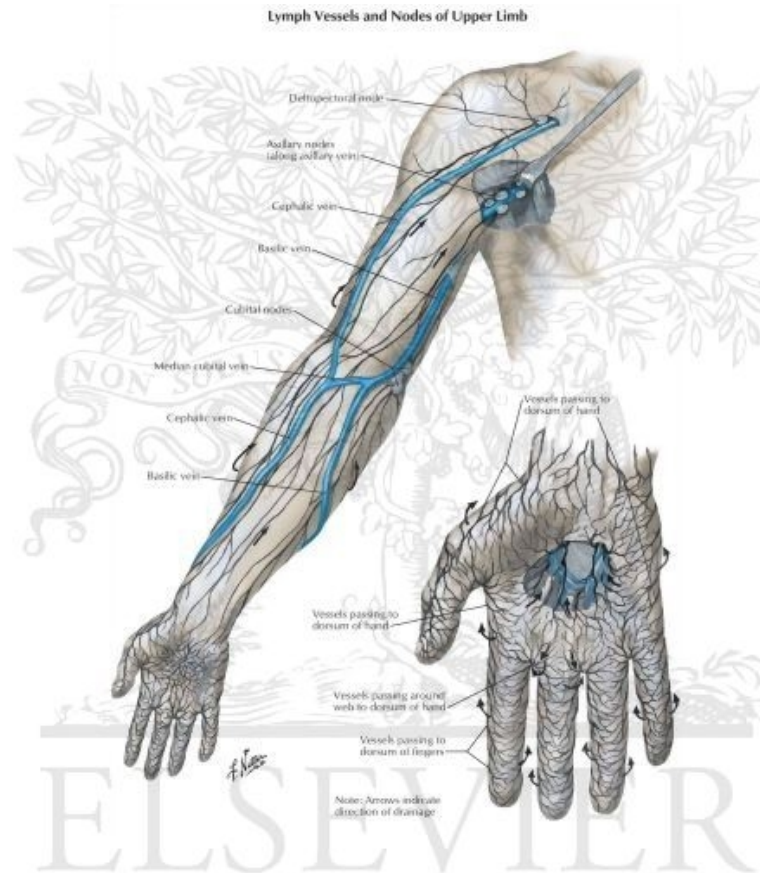
# A brief review of the anatomy

- ▶ Arterial system brings oxygen and nutrients to the cells
  - ▶ Venous system removes waste and carbon dioxide
  - ▶ Lymphatic system removes the small proteins that leak into the interstitium and return them to the venous system
- 



- ▶ The exchange of nutrients takes place at the level of the capillaries—primarily through diffusion and filtration.
- ▶ There is a constant exchange of fluid between the intercellular tissue spaces and the blood plasma across the capillary membrane.

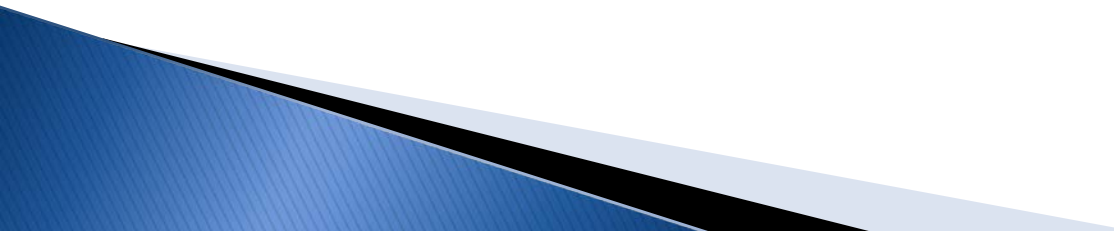
# Lymphatic flow



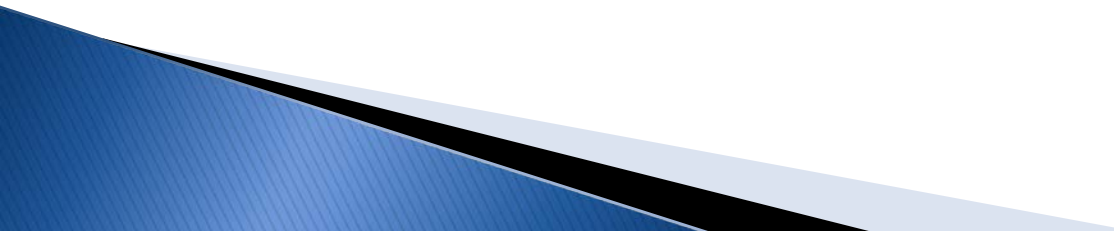
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# What is edema?

- ▶ Edema is the accumulation of excessive fluid in the intercellular space
  - ▶ The interstitial fluid volume can increase to several hundred percent above the normal free fluid volume in severe edema cases
  - ▶ Capillary permeability is increased following external injury, operative trauma, and burns
  - ▶ Increase fluid can cause pain, decrease ROM and decrease in function
- 

# Types of Edema

- ▶ Pitting edema—soft to touch and displaces leaving a dent
  - ▶ Brawny edema occurs when the fluid becomes clotted with fibrinogen—firm to the touch
  - ▶ Lymphedema—accumulation of protein rich fluid
- 

# 5 guides for successful edema reduction

## 1. Etiology

- ▶ nature of the injury
- ▶ stage of wound healing
- ▶ any other medical issues (i.e. renal, liver, cardiac, medications)

# 5 guides for successful edema reduction

## 2. Start at the trunk

- ▶ Only the lymphatic system can reduce high protein edema
- ▶ Inhalation causes changes in tissue pressure resulting in negative pressure thereby draining fluid from the periphery towards the trunk
- ▶ Diaphragmatic breathing is very important
- ▶ In sense a vacuum is created



# 5 guides for successful edema reduction

## 3. Frequent exercise

- ▶ Exercise increases lymphatic pumping speed by 10–30 fold
- ▶ Beneficial to start with the trunk and work down the arm in segments

# 5 guides for successful edema reduction

## 4. Keep Compression Light

- ▶ One study showed that 60 mmHg of pressure begins to collapse the initial lymphatics and 75mmHg collapses them
- ▶ Gentle stretching of the skin will stimulate the initial lymphatics

# 5 guides for successful edema reduction

## 5. Neutral warmth

- ▶ Lymph is most mobile between 71.6–105.8 degrees of Fahrenheit
- ▶ Body temperature is ideal with the use of other aids such as compression wraps

# Edema and the 3 stages of wound healing

## Inflammatory phase

- ▶ Usually lasts first 3–5 days post injury
- ▶ Edema is liquid soft and easy to mobilize and reduce
- ▶ Consists mainly of water and dissolved electrolytes
- ▶ Excessive edema can inhibit wound healing by decreasing arterial, venous, and lymphatic flow
- ▶ Goal: pain control, AROM in an elevated position, rest, ice and post op dressing

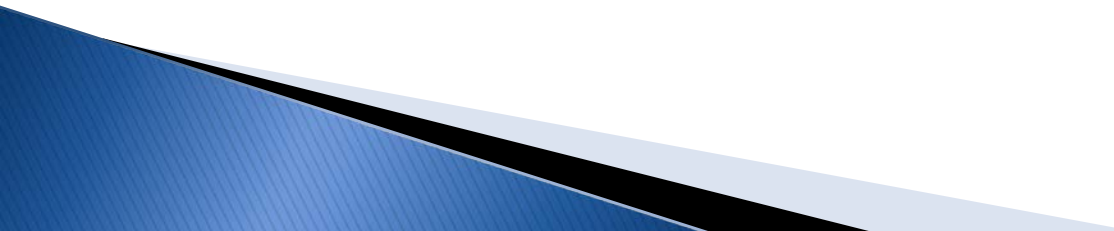
# Edema and the 3 stages of wound healing

## Fibroplastic or Proliferative phase

- ▶ Begins 3–5 days post and can last 2–6 weeks
- ▶ Fluid becomes more viscous from the elevated protein content
- ▶ Causes fibrosis and thickening of the tissues with subsequent shortening of ligaments/tendons
- ▶ Greater the edema or longer lasting the more extensive the scarring > greater pain, adhesions, disfigurement, and disability
- ▶ Promote AROM and tendon gliding

# Edema and the 3 stages of wound healing

## Maturation

- ▶ Initiated as fibroplasia ends
  - ▶ Edema is hard, thick and brawny as the result of connective tissue infiltration and fibrosis
  - ▶ May compromise arterial flow causing anoxia and impaired metabolic circulation
- 

# Now it's there...

## How do we measure it

- ▶ Volumeter
- ▶ Circumferential
- ▶ Visual

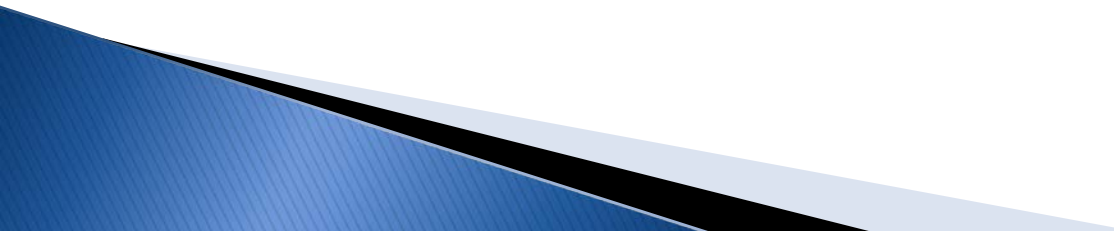


# How does a therapist treat it?





# Elevation

- ▶ Enhances venous and lymphatic flow by gravity
  - ▶ Should be started immediately after surgery
  - ▶ Entire limb should be slightly above the heart
  - ▶ Precaution taken with a replanted hand/finger
- 

# Massage

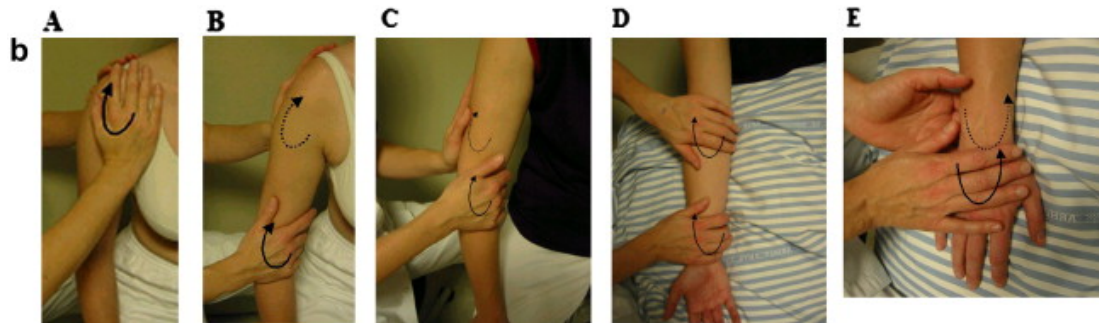
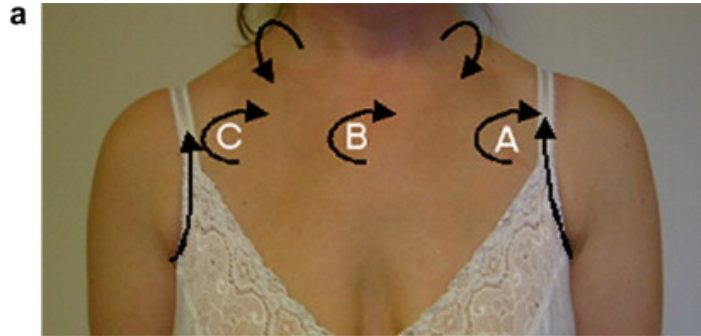
## Manual Edema Mobilization (MEM)

- Created by Sandra M. Artzberger in 1995
- Method of edema reduction based on methods to activate the lymphatic system

Key principles:

- light massage
- Exercise pre/post
- Massage is in a “clear” and “flow” pattern
- Reroutes around scars
- Home exercise program
- Bandaging when necessary

# Massage



# Compression



Coban

Edema gloves

# Compression



Hand wrap



Lymphedema wrap

# Kinseotape



# Electrical Modalities

- ▶ High volt pulse direct current (HVPC)
- ▶ Repels negatively charged proteins in the edematous interstitial spaces
- ▶ Suggested a fluid shift occurs
- ▶ Maybe beneficial in any of the three stages, however avoid muscle contractions in the inflammatory stage which may increase clotting time.

# In conclusion:

- ▶ Best treatment is prevention and early treatment
  - ▶ Enhancing arterial system, venous return, and lymphatic flow
  - ▶ Control of edema will optimize hand function
- 