

# Peripheral edema: causes, diagnosis and treatment with compression therapy



## Background

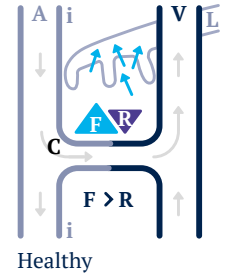
**Peripheral edemas** are very heterogeneous. Patients presenting with a swelling in one or more limbs are often **misdiagnosed** and not treated accordingly. This One-Pager describes different forms of edemas, their clinical features, and why **compression therapy is essential**.

## Causes

Peripheral edemas are of **systemic** or local origin. **Systemic edema** is caused by an underlying systemic disease (cardiac, renal, hepatic, endocrine, obesity). **Local edema** is caused by a primary or secondary failure of the vascular system in the limb (phlebedema & lymphedema; inflammatory, post-traumatic, arthrogenic, inactivity & orthostatic edemas). **Special case: Lipedema** (see below).

## Underlying mechanisms

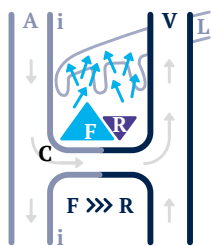
**Capillary fluid exchange** and **lymphatic uptake** are carefully regulated processes. In a **healthy subject**, filtration (F) is greater than reabsorption (R); excess fluid is taken up by the lymphatic system (LS). In **peripheral edema**, capillary fluid exchange and/or lymphatic uptake are dysfunctional; as a result, fluid accumulates in the interstitial space.



## Pathophysiology Underlying mechanisms of phlebedema, lymphedema & lipedema.

### Phlebedema

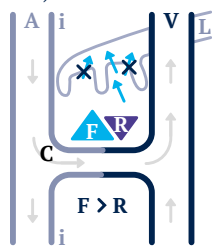
Localized swelling caused by chronic venous insufficiency (impaired venous return; venous stasis & hypertension).



- F >>> R:**
- The intact but oversaturated LS cannot take up all the excess fluid
  - Fluid accumulates
  - Edema

### Lymphedema (primary / secondary)

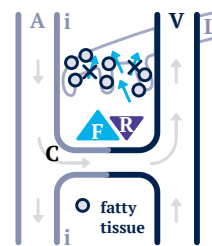
Localized swelling caused by a compromised lymphatic system. Primary: congenital; secondary: acquired (after surgery, cancer treatment etc.).



- Compromised LS:**
- The impaired LS cannot take up the excess fluid
  - Protein-rich fluid accumulates
  - Edema & fibrotic tissue

### Lipedema

Subcutaneous fat disorder primarily affecting the extremities. The symmetrical increase in fatty tissue is influenced by hormones.



- The fatty tissue can mechanically obstruct the LS:
- LS impaired
  - Fluid accumulates
  - Edema (lipolymphedema)



## Differential diagnosis Please note that peripheral edemas are usually of mixed etiologies.

	Phlebedema	Lymphedema		Lipedema
<b>Where</b>	Bilateral or unilateral	Usually unilateral; if bilateral, asymmetrical		Usually symmetrical
	Predominantly in ankle area and calf	Progression: distal to proximal (primary)	Progression: proximal to distal (secondary)	Supramalleolar, medial at knee, lateral hip area, feet spared
<b>When</b>	Increase over the course of the day, improvement if legs are elevated or overnight	Increase over the course of the day. In the initial stage, improvement if legs are elevated or overnight		No improvement overnight
<b>Onset</b>	Slow	Slow (primary)	Rapid (secondary)	Slow
<b>Feeling</b>	Soft, only hardened in the advanced stages	Hardened, soft in the initial stage		Soft, only hardened in the advanced stages
<b>Pain</b>	Painless	Painless, feeling of tension in the advanced stages		Pain on pressure or spontaneous pain
<b>Pitting</b>	Skin indent test positive	Skin indent test negative, only in the initial stage positive		Skin indent test negative
<b>Stemmer</b>	Negative	Positive (might be negative in the initial stage)		Negative
<b>Toes</b>	None	Square toes		None
<b>Skin</b>	Corona phlebectatica, eczema, brown skin discoloration, white atrophy, lipodermatosclerosis	Skin discolorations in advanced stage (primary)	Infrequent (secondary)	Pronounced tendency to develop hematomas



## Treatment plan

### Phlebedema

**Conservative:** compression therapy (usually circular knit compression garments).

**Interventional procedures:** vein stripping, sclerotherapy, thermal and mechanical endovenous ablation.

### Lymphedema

**Step 1 - Volume reduction:** complex physical decongestive therapy with MLD, compression therapy, skin care, physiotherapy.

**Step 2 - Maintenance therapy:** customized compression therapy (flat knit / adjustable compression wraps), supported by situation-dependent MLD.

### Lipedema

**Conservative:** customized compression therapy, weight stabilization, exercise, body self-acceptance, MLD (lipolymphedema).

**Interventional:** liposuction. A conservative therapy must first be exhausted without success before a liposuction should be considered.



## Compression therapy

### Beneficial effects

- ✓ Reduction & prevention of edema
- ✓ Enhancement of venous & lymphatic flow
- ✓ Reduction of signs & symptoms; wound healing
- ✓ Improvement & prevention of skin conditions
- ✓ Reduction of mechanical impairment & pain (lipedema)
- ✓ Increase of physical activity & tissue stabilization (lipedema)

### Mechanisms of action

Medical compression garments exert a controlled pressure on a limb, thereby improving the circulatory rate. Regarding edema reduction, compression therapy:

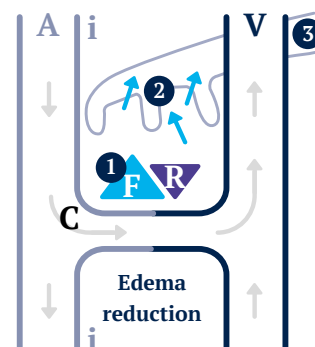
- 1 **Decreases filtration**
- 2 **Increases lymph formation** (interstitial fluid shift into the lymphatic system)
- 3 **Increases lymphatic flow** in functional lymphatic vessels (particularly in combination with exercise)



Circular knit, flat knit



Adjustable compression wraps



## Conclusion

- In **peripheral edema**, fluid accumulates in the interstitium due to a dysfunctional **capillary fluid exchange** and/or a compromised **lymphatic uptake**.
- Depending on the underlying cause of fluid accumulation, **different pathophysiological mechanisms** take place that are specific to the edema in question. **Individualized treatment plans** are therefore required in each case.
- **Compression therapy** is the **mainstay of treatment for the management of peripheral edema**. Beneficial effects include, among others, reduction & prevention of edema, enhancement of venous & lymphatic flow, reduction of signs & symptoms, and overall improvement in patient well-being.

## Take-home message

**Edema is not just edema!** Patients presenting with a peripheral edema of the limb(s) should be carefully assessed for the underlying cause. This is crucial in order to define the treatment plan accordingly.

Compression therapy is essential for the management of peripheral edema. It is vital in improving the lives of patients affected by peripheral edema.