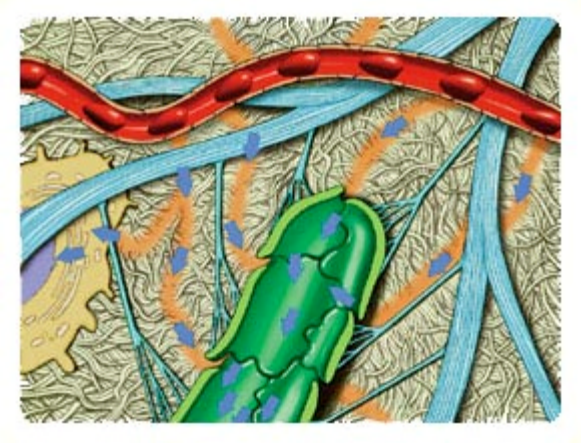
What is Lymphangiology?

Lymphangiology deals with diseases of the lymph vascular system as an organ of circulation and homeostasis. The lymph vascular system is divided into 4 functional parts:

- **Lymph** formation in the initial lymph vessels
- **Lymph** transport through the lymph collectors
- **Lymph concentration** and filtration in the lymph nodes
- **Transport of lymph** through the lymphatic trunks into the blood circulation

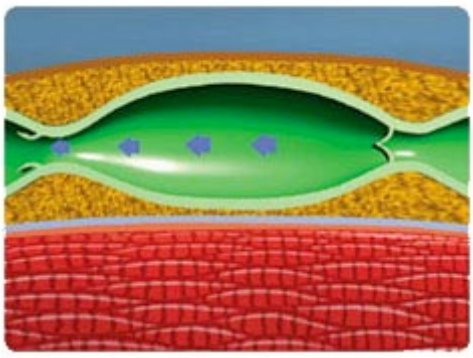


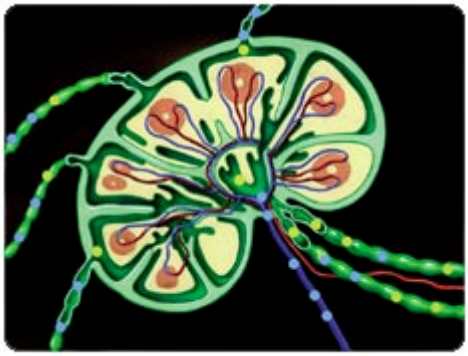
The most important elements of lymph formation are: Blood capillaries, interstitium and lymph capillaries.

- Substances are exchanged for the nourishment and cleansing of the body's cells in the area around the blood capillaries.
- The interstitium is build up of amorphic basic substance, of fibres and connective tissue cells. It is traversed by prelymphatic canals, in which tissue fluid is found.
- The lymph capillaries begin in the interstitium.

Lymph is made up from tissue fluid which enters the initial lymphatic vessels. Lymph moves from the lymph capillaries to the precollectors, and is then transported to the collectors.

The lymph collectors transport lymph to the regional lymph nodes. The pulsation of the lymph vessel walls provides the motive force which causes lymph flow.

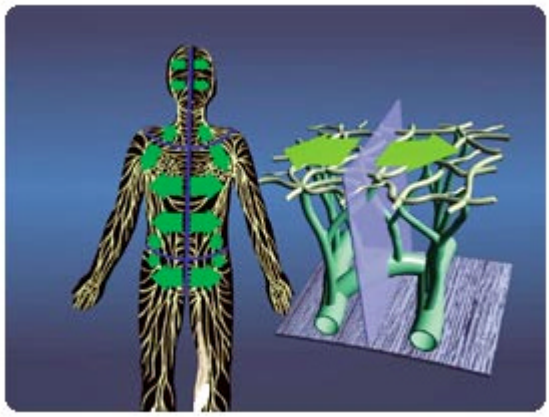




Lymph nodes are not only organs of the immune response system, they are also a part of the lymph vascular system. The composition of lymph is considerably altered at numerous lymph node stations until it reaches the venous angle via the lymphatic trunks and then enters the blood circulation (venous angle: the main lymphatic trunk in the chest enters a large vein).

Diseases or disturbances can occur at various sections of the lymph vascular system, whereby the formation of lymph, the transport of lymph or even both processes may be simultaneously affected.

The result is the congestion of a protein-rich fluid in the tissue, which is manifested as lymphedema or a collection of fluid in body cavities.



An ailing lymph vascular system cannot perform its task in volume regulation and homeostasis. The protein-rich fluid collecting in the tissue leads to an alteration of the basic

substance, the cell population and to an increase in fibrotic tissue. This is where lymphedema differs from other forms of edema which are the symptoms of various diseases.

Lymphedema is an independent, chronic disease of the skin, subcutaneous tissue and also of the internal organs. Untreated lymphedema progresses. It can occur in all regions of the body. The limbs are most often affected.
The pure form of lymphedema is based on a disease of the lymph vascular system. Lymphedema combination forms occur when another disease of e.g. the veins occur concomitantly.

We speak of primary lymphedema when the lymph vascular system is malformed. This may be a congenital defect, or develop later in the life of the patient.

Secondary lymphedema may be caused by various sources of damage to the lymph vascular system. In industrial countries secondary lymphedema is most often associated with therapeutic measures associated with cancer treament; in the tropics it is most often associated with an infection (Filariasis).

Regardless of which lymphedema form is present, it develops in stages:

- **Stage of latency**: After cancer treatment there is often a stage of latency of lymphedema. Swelling is not yet present, but the function of the lymph vessels has already been comprimised. This stage of latency may be maintained for the lifetime of the patient, or lead to lymphedema after a few months or years.
- **Stage I**: soft, pitting edema
- **Stage II**: Increasing induration and fat deposition
- **Stage III**: Extensive induration, elephantiasis

Some common combination forms of Lymphedema are:

- Peripheral lymphedema with lymphangiomas
- Klippel-Trénaunay syndrome with lymphedema
- Malignant lymphedema
- Phlebolymphedema
- Turner syndrome
- Lymphostatic protein-losing enteropathy with peripheral lymphedema
- Lipo-lymphedema
- Pretibial myxedema.