

Lymphedema

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(Pronounced: "lim-fe-de-ma", but in Europe "lim-feed-emma"): **LYMPHEDEMA** is the swelling and soft tissue changes that occur in the area of the body where injury has occurred to the lymphatic system. **LYMPH**=clear fluid that carries proteins and other materials back to the heart through the lymphatic system. **EDEMA**=swelling.

The Lymphatic System

The heart pumps blood out into the body through the arteries—similar to a series of hoses which become progressively smaller until they are more narrow than the smallest part of a feather. Once the diameter of the artery is the smallest it is called an arteriole. Once the blood reaches the arterioles it gets pumped out into the surrounding tissue space—"interstitial space or interstitium" (think of this as a holding pond). The arterioles connect to venules, which are smallest portion of the veins that get progressively bigger. The veins get larger closer to the heart. The veins or venous system carries the blood back to the heart.

In the tissue space surrounding the region of arterioles and venules, 90% of the blood is pulled back into the veins and returned to the heart. However, the holding pond has 10% of the fluid remaining which contains protein molecules from the blood that are too big to fit back into the veins. The primary job of the lymphatic system is to carry these proteins back to the heart where they can rejoin the circulatory system. The protein molecules cause a proliferation of scar tissue, which can harden and develop fibrosis, a significant hardness.

The lymphatic vessels are similar to the arteries in that they have muscles and contract or pump like arteries. Like veins, lymphatic vessels have valves that shut and help propel the lymph fluid back to the heart. The lymphatic collecting vessels connect to lymph nodes. Lymph fluid stops on the way back to the heart at the lymph nodes to clean the fluid and dispose of the nasty bits, working like a garbage disposal. This is part of the immune system keeping your body healthy. The last part of the lymphatic system is at the large veins below the collar bones where the lymph fluid is joined back into the veins and from there returns to the heart to rejoin the circulatory system and recirculate.

Causes of Lymphedema--injury to the lymphatic system

Most lymph vessels are just under the skin, therefore any trauma that damages the skin can cause trauma to the lymphatic system. For example, radiation to the skin, surgery that cuts through skin, significant trauma, infections, pregnancy, obesity, or surgical removal of lymph nodes can injure the lymphatic system. Congenital malformations of the lymph nodes or lymphatic vessels can also cause lymphedema. If lymph nodes are removed, swelling can occur in the area that typically drains lymph fluid to those lymph nodes. The arm or chest can swell if the lymph nodes in the armpit are removed. Even if no lymph nodes were removed but a patient with cancer receives radiation, this can be enough of an injury to the lymphatic system to develop lymphedema. A person who has surgery to a knee or ankle for example, can develop lymphedema especially if they have a congenital problem with their lymph nodes, such as too few or inefficient lymph vessels or nodes. They can also develop lymphedema if they already have chronic venous insufficiency. If a person has a healthy lymphatic system but has a significant trauma such as serious burns or a motorcycle accident and the skin is badly damaged, this can also lead to lymphedema.

Time frame for developing Lymphedema Lymphedema can develop any time following the injury to the lymphatic system. It can occur immediately following a surgery (especially for cancer if lymph nodes were removed) or many years later. Individuals with congenital problems with the lymphatic system can show signs of lymphedema around puberty. The maximum amount of lymph fluid your lymphatic system can transport is called your TRANSPORT CAPACITY. The amount of lymph fluid flowing in your body at any given time is known as your LYMPHATIC LOAD. As long as the lymphatic load remains below the transport capacity, no swelling will develop. With a decrease in your transport capacity (injury to your lymphatic system) any increases in the lymphatic load can overload the lymphatic system and lymphedema will result.

The lymphatic load can increase with any increase in the cardiac output (anything that makes your heart work harder). Activities such as repetitive motions, increased aerobic exercise, stress, airplane travel or elevation gain, or heat can increase the pumping of the heart, which increases the lymphatic load throughout the body. Additional injuries to the lymphatic system such as a simple bee sting, infection, or a fall causing acute swelling in a person with a decreased transport capacity can then lead to lymphedema. Transport capacity also decreases with age, so a person who had lymph nodes removed earlier may develop lymphedema due to aging. A person who has had injury to their lymphatic system should therefore always consider themselves "at risk" of getting lymphedema. By preventing further injury to the area with damaged lymphatics, such as protecting the left arm if the left axillary (armpit) lymph nodes were removed, you can reduce your risk of developing lymphedema. Avoid blood pressure cuffs, IVs, vaccinations, burns, pet scratches, insect bites, and gardening scratches, for example.

Infections The lymphatic system is also part of the immune system. The lymph nodes help to fight infections by destroying bacteria, cancer cells, and other nasty bits before they flow back to the circulatory system. With damage to the lymphatic system a decrease in the immune system in this region occurs leaving a person susceptible to infections. Cellulitis is an acute bacterial infection, which is typically identified by REDNESS, WARMTH, SWELLING, and PAIN especially when associated with rapid onset of FEVER, HEADACHE, and CHILLS. Cellulitis can be quite painful, can worsen lymphedema, and can require hospitalization.

According to Dr. Michael Földi, adequate treatment of lymphedema with appropriate treatment can prevent cellulitis. A study performed by Etelka Földi, M.D., showed that 30% of people with lymphedema have recurrent cellulitis. 90% of these people never had another attack of cellulitis as long as they had adequate treatment and were compliant with compression.

Treatment of Lymphedema Once lymphedema develops it can worsen without treatment. Individuals have lived with it for years and compensated by purchasing larger clothes to fit the swollen limb or simply adapted because adequate treatment was not available. Effective treatment for swelling problems utilizes Complex Decongestive Physiotherapy (CDP), now referred to as Complete Lymphedema Therapy (CLT). This technique uses 4 components: Manual Lymphatic Drainage (MLD) a massage technique that reroutes the lymph fluid to adequately draining lymph nodes; compression with specialized short-stretch bandages and later specialized compression garments or wraps; exercise; skin care; and significant patient education. CLT is varied on an individual basis but typically lasts 2-4 weeks (greater times are necessary for swelling that has hardened—fibrosis).