

Review of Dr. John Macdonald's presentation:  
Lymphedema and the Chronic Wound

Dr Macdonald's 85 slide PowerPoint presentation was filled with colourful graphics and punctuated by his dynamic style.

He started with a statement that "wound care staff and lymphedema therapists need to be intimately aware of each other!"

He gave a brief report on the history of research in this field: before 2001: Dr. Paul G Unna ~1928 and 1 report by Dr. Macdonald himself in 2001. Only after 2003 were more research projects published.

4 take away points:

1. Edema/lymphedema is a major impediment to wound healing
2. Smart compression removes edema and lymphedema (lymph stasis)
3. Smart compression is not like squeezing a tube of toothpaste
4. Smart compression demands short stretch bandages

The arterial, venous and lymphatic systems are all important. He reviewed them all but here are the specifics of the lymph system.

Lymphatic system has these main jobs/functions:

Every 24 hours moves 80-200 grams of protein.

Recent research shows that it carries 20+% of the fluid returning to the heart

Moves 2-6+ liters to the heart every 24 hours

Lymph is made up of "tissue waste material":

Fat	Mediator proteins – cytokines
Cells	Polysaccharides, Glycoproteins
Bacteria, Virus,	Fibronectin, Vitronectin
Cell residue	Water
Matrix metalloprotease (MMP)	

The Lymph system uses dynamic or active processes to move lymph fluid.

It is aided by the pumping of muscles, the pulsing of arteries, body movements and breathing.

But the lymph system has a little pump or heart in the lymphangion that also helps move fluid.

There are filtration and absorption differences along the way that are based on the concentration and composition of the fluids and the pressures on them.

Dr. Macdonald took special care to describe the difference between **edema** and **lymphedema**.

**Edema:** *Generally: an overloaded, but normal, lymph system. When net filtration exceeds lymph transport capacity.*

- 1) Passive hyperemia such as from cardiac or pulmonary issues, pregnancy, airline travel and inactivity/leg dependency.
- 2) Active Hyperemia from inflammation and allergy
- 3) Hypoproteinemia when the body cannot absorb protein (Malabsorption) or when there is not enough nutrition (malnutrition).
4. Renal Disease (limiting the removal of impurities)
5. Drugs

**Lymphedema:** *Generally: a transport system breakdown with edema and protein*

Lymphedema is the result of damage or malformation of the lymph system itself.

Has a high protein content along with lymph and water.

“Primary” Lymphedema is a condition when the lymph system does not develop correctly. Can present at birth, at adolescence or tardum, (age 35+).

“Secondary” lymphedema can result after infection, tumour, surgery, radiation, wounds, venous insufficiencies, trauma, neurological conditions that affect the muscle pump and filariasis (a worm/mosquito transmission route that affects 10.5 million people in warmer climates).

**Therapy Options:** Reduce the filtration rate or increase the transport capacity by adding compression. Short stretch compression bandages (or similar) are applied and exercises are done to increase the muscle pump. The muscle pumps and the bandage does not let the skin stretch, so the only place for the fluid to go is out the lymphatics. There are Law’s of physics that can be applied, such as Laplace’s’ law to help understand how much pressure is being exerted to the lymphatics when the limb is passive or actively pumping. The stiffer the wrap/garment/system the more effective the compression applied. There is a limit however, as very strong compression will reduce arterial flow. A light compression will actually enhance arterial flow, improve venous return, promote myogenic relaxation of the arterial wall and release vasodilators.

**Ulcer treatment:**

The main treatment target of compression in mixed ulcers is to prevent and reduce edema. Compression will improve the microcirculation and stimulation of endothelial cells, promote venous and lymphatic return and increase arterial flow. Doppler studies were done and the conclusions were that compression with inelastic bandages up to a pressure of 40mmHg: – does not lead to a measureable reduction of arterial blood flow -and will significantly improve venous pumping.

When fielding questions he noted that: 1) cellulitis should be treated with low pressure short stretch wraps and antibiotics. The wraps could be started 20 minutes after antibiotics. 2) diabetes requires short stretch wraps at low pressure. 3) ABPI of 0.5 is a relative contraindication and lawyer related. 4) DVT's should have compression applied within 24 hours.

**Warning:**

He warned that sustained bandage pressure should not exceed the ankle pressure or the arterial perfusion pressure.

The following was presented to the WHO on **Optimal Wound Care principles:**

Optimal Wound care principles are: enhance systemic conditions, protect the wound from injury, promote a clean wound base and prevent infection, and maintain a moist environment. Factors that would impede wound healing are: pressure, dryness, trauma, infection, necrosis or foreign body and lymphedema/edema.

Lymphedema and Wound healing requires: tissue gas exchange, optimal acid gas balance, recognition of bacterial dynamics, and cellular transport. (Slides showing research into the MMP levels of clients with wounds before and after compression showed a significant reduction in total protein!)

**“Inadequate lymphatic drainage of the ulcer along with variably damaged lymphatics of lipodermatosclerotic skin are responsible for accumulation of edema fluid aggravated by ‘toxic’ catabolic byproducts. This is a distinctly unfavorable milieu that restricts healing of a crural (upper leg)ulcer”**

O. Eliska, M. Eliskova; Lymphology  
34 (2001) 111-123

He concluded by showing photos of venous ulcers, Sickle cell disease ulcers, spina bifida dependent leg edema, diabetic ulcers and cellulitis. These photos were a part of a study by the University of Florida at a third world center where many skin grafts had been done in the past. The addition of compression to treatment protocols reduced the healing time and only 2/236 clients (0.85%) needed skin grafts compared to 80% previously.

Dr Macdonald runs a wound care center for the treatment of Lymphatic Filariasis in Leogane, Haiti, which he started after the earthquake. The 2010 earthquake was a catastrophic magnitude 7.0 Mw earthquake, with an epicenter near the town of Léogâne, approximately 25 kilometres west of Port-au-Prince, Haiti's capital. The treatment center welcomes donations of money and gently used garments.

<https://www.bringhopetohaiti.com>

Summary submitted Dec 8 2015 by Julie Jensen