

# **The Big Picture: Every thing you wanted to know about lymphoedema**

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## Summary

Information relating to the incidence of lymphoedemas post cancer treatment is variable due to a range of diagnostic criteria and variability in follow-up times.

About 30% of those treated for breast, reproductive and gastro-intestinal system, cancers will develop lymphoedema of greater or lesser severity most of them within the first 2-3 years after the surgery and or radiotherapy. Early recognition and reaction to tissue and limb changes and listening to your comments as a patient about how the limb or area feels are crucial if the onset and severity of the lymphoedema are to be controlled. In particular, an acknowledgement of your extent of surgery, radiotherapy, and wound management and arm dominance, age, skin condition weight and related risk factors must be made with attempts made to reduce controllable your controllable risk factors. Your role here is crucial! The management of issues such as high blood pressure by GPs and other specialists may help reduce lymph loads while simple matters like improving your skin care, undertaking exercise and activity can help improve lymph flow.

**The important point for you here is to create and maintain a gap between lymph load and transport. If the load is greater than the transport capacity lymphoedema will develop or worsen but if the reverse can be achieved then its progression will be halted and may even reverse.**

If you don't have lymphoedema but are at a high risk of its development then any advice should focus around what you can do. Involvement of a lymphoedema therapist at this stage may help with risk management and provide ideas and actions to help make your lymph flow better.

If you have lymphoedema, **its treatment should be targeted and sequenced** beginning most often with an intensive phase followed by a maintenance phase. Compression garments and

bandaging are still the mainstay of treatment, but there are compliance issues in hot regions, in these cases other options like kinesio-taping and water based programs can help.

You and your partner can have a significant role to play and can make inroads into managing the limb. For some of you it is not so much the problem of the size of the affected limb but of how the limb feels. Asking the health professional to help with these subjective issues is just as important as issues relating to the limb size. There are many new treatment options available for lymphoedema treatment only some of which are clinically trialled and the quality of information about them on the Internet is variable but a good lymphoedema therapist will be able to help you make some informed choices.

**Specific booklets about each type of lymphoedema (Primary, Secondary, leg, arm and breast) will be available at the end of the sessions after the meeting.**

## **Introduction**

It's often a surprise for both you and the health professional when a limb begins to show the early warning signs of lymphoedema or actually becomes swollen. It's difficult to predict the effects of surgery and/or radiotherapy on the lymphatic system and thus whether a limb will swell not only because of anatomical variation between individuals but also as a consequence of other prior events on the local area lymphatic system. However, as the bottom line, if the lymphatic load becomes greater than the lymphatic transport capacity then that area, whether it be associated with a small lymph collector, a whole lymphatic territory or the whole limb, will become swollen.

Some of you may also have had prior damage to their lymphatic system, for instance soft tissue injury, frozen shoulder or problematic hip joint and of course on top of this we have heart and blood vessel issues and thyroid problems, inflammatory events, heritable conditions from your parents and problems with fat deposition and its removal (called Lipoedema – more about that later!), although the latter are primarily confined to the legs.

Being aware of the non-lymphatic side of the problem and directing specific treatment towards them before dealing with the lymphatic system issues is important for you if we are to achieve the best outcome for the specific lymphatic system treatment, which focuses on reducing the load on the remaining lymphatic system and/or improving its transport capacity. (I can't emphasise the importance of this point too much!) Generally, your main role is in lymphatic load management while the lymphoedema therapist should have their main concerns with improving lymphatic flow and transport.

Once lymphoedema has developed there are no treatment or management miracles, thus prevention though early detection and risk minimisation is crucial. At the moment we do have the knowledge and tools undertake this but there is poor insertion into practice.

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Notwithstanding this, there are some strong emerging treatment options. Once the problem of lymphoedema or its risk is detected there must be ongoing good communication with the specialist

until you are discharged to the General Practitioner (GP), and then between the GP, the lymphoedema therapist, other members of the multi-disciplinary team and yourself to achieve optimal outcomes. **As hard as it sometimes is your compliance is critical if good outcomes are to be attained.**

### **The lymphatic system – what you should know about it**

The lymphatic system has three important roles: the uptake and clearance of the fluids and their contents that cannot get back into the blood vessels; the absorbance of fats (specifically long chain triglycerides – more about these later!) from the intestine and the mounting of a specific defence reaction to antigenic stimuli (germs).

The superficial lymphatic system is divided into a number of drainage areas (territories), separated from each other by watersheds. Each person is different however in terms of the number of major lymph vessels called collectors, their location and of course the number and location of the nodes into which they drain.

The majority of the larger lymph collectors are located above the skeletal muscle, (those muscles which help you move) although the deep lymphatic system of the limbs also have them. The collectors contain the very important pumping unit of the system, called the lymphangion (these are like mini hearts). They normally pulsate at 6-10 beats per minute but can be encouraged to beat faster if the lymphatic system receives an additional load or when some medications are given. If the lymph collectors from one territory are unable to drain the fluids and its contents, a swelling occurs in that area whether that be a part of the forearm, thigh or (if there are many territories involved) the whole limb or organ that the lymphatics drain.

The superficial system takes on a very important role when the deeper system at the roots of the extremity or within the chest or tummy areas are damaged by surgery, radiotherapy (or some other event such as peritonitis when an appendix bursts).

There are bottlenecks of the lymph collectors in the legs (at the inner ankle and knee as well as

the groin) and in the arm at the elbow and armpit. High external pressure, soft tissue damage (with following fibrosis – hardening of the tissues) or inflammation/infection in these areas can mean a poorer outcome in terms of lymphoedema management unless alternate pathways can be opened, usually my carefully planned Manual Lymphatic drainage.

When dealing with the lymphatic system the big picture needs to be kept in mind as any current or prior event along the lymphatic drainage pathway will influence your lymphoedema risk and outcomes of treatment. These pathways can be long – for instance lymph from the legs, groin, tummy and left chest and left arm and left side of the head drains into a vein near your left shoulder, while that from the right chest, right arm and right side of the head drain into a vein near your right shoulder.

The distant drainage points of the lymphatics into the blood vessels (veins mostly), mean a whole-body assessment approach can often provide answers to difficult questions about sites of potential disruption to lymph flow, and thus direct and determine treatment options.

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## **Lymphoedema**

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There are many differing opinions and guidelines regarding the definition of lymphoedema and of how to assess its presence and of the effect of treatment on it. Some sound international guidelines are those of the Lymphoedema Framework “Best practice for the management of Lymphoedema document and the International Society for Lymphology, consensus for “The diagnosis and treatment of Peripheral Lymphoedema”

“Lymphoedema” occurs when the transport capacity of the lymphatic system is reduced (through its malformation, or surgery/radiotherapy) but when the lymph load (which is determined by the amount

of fluids and their contents which leave or are removed by the blood vessels) is within a normal range. If the lymph load is high it can mean problems with the vascular system (hypertension, high pressure in the veins due to heart failure/congestive cardiac failure) or issues with infection. When the lymph load is high and a normally functioning lymphatic system cannot handle it is called “Oedema”. However there is a more serious situation which often needs to be dealt with and that is when the lymphatic system’s transport capacity has been reduced and at the same time there is an increased lymph load. This is has been termed “Safety Valve Failure” and everything possible must be made to reduce lymph load to within normal range. I’ve talked about what some of these strategies are above.

***When the lymphatic system fails it can result in:***

- Progressive accumulation of fluids together with an increasing concentration “bad molecules” in it which can cause more inflammation and more problems.
- Reduced tissue oxygen levels.
- Increased distances between the the blood and lymphatic vessels
- Normal cells in the tissues not doing what they should be doing
- Excessive deposition of fat in the area of slow or poor lymph flow

While the development of lymphoedema is a continuum, (whose rate of progress varies between individuals), it can be divided into two phases, the “latent” or “hidden” phase, when subtle changes have occurred which often only the you will notice (which can often be missed in an assessment), and the clinically manifest phase, when there is a distinct circumference and volume difference. The term “lymphoedema” is applied to the latter although there are still significant debates about the criteria for it.. Never the less Lymphoedema of the extremities is a swelling of the tissues above the muscles — there are few if any changes below it of course it is a different situation in the groin, tummy and chest areas where we are dealing with only the deep lymphatic system.

## **Clinically manifest lymphoedema**

The term clinically manifest usually means a circumference difference of 2cm or more in nominated positions, or a volume difference of 200 ml or more, or a percentage difference between the limbs. although there is by no means total agreement about this.

However in making these comparisons good sense indicates the need for an allowance to be made for arm dominance. This can mean a 1cm circumference difference (especially over the biceps) and up to 100 ml volume difference.

Lymphoedema circumference (and thus volume differences) are best measured with a tape measure accurately placed using anatomical reference points and measuring usually at 10cm intervals up the limb.

There are a couple of international consensus documents on definitions and on best practice for measurement and assessment

## **Development of clinically manifest lymphoedema**

Again while the figures are variable that the literature suggests that on average, most leg and arm lymphoedemas become clinically apparent within the first 2-3 years after the intervention. Review of risk factors and reaction to them in this period is crucial if the development of lymphoedema is to be prevented or its severity minimised. ..

### ***Important point***

If you have no clinically discernable limb swelling (measured by limb circumference differences) but feel that the limb feels different (heaviness, tension, bursting pains) , then you may have a limb in the latent phase of lymphoedema. Detecting subtle changes using tools such a Bio-impedance Spectroscopy and initiating an appropriate form of treatment of management at this stage may help prevent the limb swelling later on.

## **Types of lymphoedemas**

Lymphoedema has many causes and some are infrequently encountered. They are broadly divided into primary and secondary.

### **The impact of underlying primary lymphoedemas and their hereditary lymph transport impairment**

A primary lymphoedema is a consequence of poor formation of the lymphatic system resulting in a reduced lymph transport ability.

These are mainly confined to women and then predominantly to the lower limbs. There are three basic groupings. Those present at birth are called Nonne Milroy and is often associated with other problems with the blood vessels.

Those which present during the puberty years are called Lymphoedema praecox (often called Meige) appears at puberty while those which present in later life around 40 yrs or so are called Lymphoedema tardum. As with all forms of primary lymphoedema, their onset depends on the delicate balance between lymph load and lymph transport. When body mass or hormone levels change this may be enough to tip the balance and precipitate lymphoedema. Of course other interventions such as surgery, activity, infection and a myriad of other events and situations may do the same but then we have a mixture of underlying primary with an overlying secondary lymphoedema. **Being aware of the family history is thus very important when surgery/radiotherapy of the lower body/groin is proposed as these patients may only have a small reserve transport capacity in their lymphatic system and a small change in load may precipitate clinically manifest lymphoedema.** Primary lymphoedemas comprise 3-10% of all lymphoedemas.

### **Secondary lymphoedema**

This form appears when the lymphatic transport capacity from an area is reduced by surgery and/or radiotherapy as part of the treatment for cancers. The number of lymph collectors damaged depends on the original number and location of these vessels and on the extent of the surgery.

The ability of the remaining system to handle any fluid load is influenced by postoperative events such as the healing, location and direction of the scar, seroma duration and magnitude, and especially any wound infection. So you need to recall these if you are talking to a therapist or specialist who is trying to help you with your lymphoedema.

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## **Other reasons for a swollen limb**

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Not every swollen arm or leg or part will be due to a lymphatic issue, and it's important to be able to have the non lymphatic system issues dealt with by other experts as they may increase the risk of later developing lymphoedema or of making it worse if it's already present. I'll not go into these in detail but just outline them here.

### **Increased leakage from the blood vessels**

When there is an increased leakage from the blood vessels (or poor re-absorption **them**) oedema may occur. The swelling appears similar to lymphoedema, although generally oedemas display as warmer and more coloured than a lymphoedema limb, which is often cool and pale (unless infected).

Recognising and dealing with the range of reasons for the leakage from or poor absorption into the blood vessels and the additional load caused on the lymphatic system are very important.

If you have or think you have any of the following ideally you should have an appropriate health professional deal with them first, even if you think the lymphatic system is normal or near normal in its functional status:

- High blood pressures. (Hypertension)
- Low blood colloidal osmotic pressure. (Nutritional)
- Injured or inflamed blood vessels. (Phlebitis)
- Structurally weak capillaries and blood vessels (you bruise easily).
- Raised central venous pressure. (Cardiac failure)

However, when both the lymphatic and vascular systems are compromised in their function, the problem can be much more serious, especially if the cardiovascular loading component cannot be well controlled, leading to a swelling called phlebo-lymphoedema and often a more rapid progress of the lymphoedema.

### **Thyroid dysfunction**

When the thyroid is dysfunctional (generally hypo active), many large sticky like molecules (called mucinoid like substances or glycosoaminoglycans) may accumulate in the dermis. These high molecular weight substances attract fluids but the tissues can be somewhat gelatinous in their feel. This is called myxoedema. The appearance is similar to lymphoedema but the skin is dryer, rougher, often cooler and paler.

If there are any suspicions of an underactive thyroid, its normalisation will help hold and possibly reverse the associated tissue changes. The most common form of myxoedema is the pretibial form (appears on the front of the shin),

### **Metabolic disorders of formation and deposition of fatty tissue**

These disorders present as lipoedema. Generally the small blood vessels and lymphatics have structural weaknesses being due to micro-aneurysms of these vessels. Lipoedema and myxoedema can be easily distinguished from lymphoedemas in that generally there is no reduction in the lymphatic transport capacity (unless in the latter stages.. A look at the affected areas (generally lower legs) will reveal pain on indent pressure and a tendency of the tissues to bruise easily and discomfort generally with any pressure garment or tight clothing.

The swelling of lipoedema generally stops at the ankle the legs are often painful, bruise easily and the Stemmer sign (the ability to pick up a fold of skin at the base of the toes or fingers) is most often negative. Lipoedema is commonly misdiagnosed as lymphoedema, although in its later stages there may be fluid accumulations.

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## **Incidence and Prevalence of lymphoedema**

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These rates are very difficult to determine due mainly to the lack of an agreed definition of lymphoedema and through a range of variable measurement strategies to determine its presence or absence. In addition a range of risk factors strongly influence incidence figures, leading to large variation.

The prevalence of leg lymphoedemas is significantly influenced by other issues such as papillomati (lumps on the skin); poor wound healing, ulcers, etc all of which are significant risk factors irrespective of the nature of the surgical/radiotherapeutical intervention.

Lymphoedema of the arm after treatment for breast cancer also varies widely, again depending on follow-up time and definition and varies from 0-40%. Again generally there is a correlation between incidence and the extent of surgery and whether radiotherapy was given and its area.

Over an above the issue of the arm or leg being swollen at least another 30% of patients suffer from problems of heaviness, tension bursting pains, range of movement problems, impact on daily living and quality of life.

Lymphoedemas are generally slow to progress (unless an infection is involved) and first develop in the ends of the arm or leg or in the inner upper thigh or upper arm territories, thus making these sites a worthwhile first point of examination along with the fingers/toes. Catch it early and its easier to deal with

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## **Risk factors**

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These have not all been well established by epidemiological studies and the fact that some factors are

difficult to identify. The higher established risk factors are the extent (level) of nodal clearance in the axilla or groin, with more nodes removed representing a greater risk, and radiotherapy to the root of the extremity.

***Factors that are not so well established but are likely to be important are:***

- The number and duration of seroma drains (linked to the risk of infection).
- Tethering of vessels/structures in the tissues.
- A family history of limb (particularly lower limb) swelling.
- Obesity.
- Skin integrity.
- Side of the surgery (dominant or non-dominant limb).
- Level of use of the limb.

***Known factors that reduce transport capacity are:***

- Surgery and radiotherapy.
- Fibrous tissues as a consequence of the progression of lymphoedema.
- Body mass in the form of excessive amounts of fatty subcutaneous tissues.
- Lack of variation in tissue pressures due to immobility or lack of activity.
- Too much pressure on a small area, especially at the root of an extremity as might occur with a bra or underwear or tight clothes

***Known factors that put an increased load on the lymphatic system are:***

- High capillary blood pressures.
- Injured blood vessels.
- Structurally weak capillaries and blood vessels.
- Raised central venous pressure.

- Increased numbers of active blood capillaries.
- Infection.
- Sunburn
- Heating of the skin
- Superficial blood capillary dilatation.
- Poor quality skin care.
- Not warming down after strenuous exercise.

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### *Early Detection*

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Its crucial to be able to recognise your risk factors (and know how to remove or reduce them), and to detect and respond to the subtle tissue changes detected. Ideally some form of simple measurement of the condition would be beneficial. It is becoming clear however that perhaps one of the best means of the early detection of sub clinical lymphoedema (as well as for the impact of treatment on clinically manifest lymphoedema) is Bio-impedance Spectroscopy (BIS). In some studies it has been shown to detect subtle changes in tissue fluids up to 10 months prior to the problem being able to be detected by other means , so you can start treatment earlier and earlier treatment is generally simpler and more effective.

Recognition of risk factors and of their remediation or reduction will mean control over the lymph load even in the face of a poorly functioning lymphatic system, thus reducing risk of lymphoedema precipitating or worsening

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### **Treatment and management options**

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Generally with lymphoedema, treatment is what the health professional or lymphoedema therapist will undertake while management is what you the patient, your partner or carer will be able to do. In

broad terms treatment will be directed at improving lymph transport/flow while management will be directed at reducing lymph load.

## **Major aims of treatment**

### ***Reducing lymph load***

The major strategies here revolve around: improving the structural integrity of the vascular system, reducing high blood pressure, reducing elevated venous pressures, improving the skin as a barrier, encouraging better wound care and rapidly responding to infection, reducing body mass and the use of support garments.

### ***Increasing lymph transport***

These strategies can be partitioned into lymphostimulatory (aimed at increasing lymph flow) and lymphogenic (aimed at encouraging the formation and development of new lymph vessels)

Strategies that increase lymph flow are aimed at increasing the entry of extracellular fluids and their contents into the lymph capillaries and improving the flow of lymph along the larger lymph collectors. The higher the load into a lymph collector the more forcefully it will contract so getting the fluids into them (even if they are not totally functional) is important.

The very simple way to improve lymph flow is to ensure that there are optimal pressure variations within the superficial (epifascial) tissues which is the site of the lymphoedema. There are many ways of facilitating this ranging from simple movement, to exercise programs through massage, vibratory treatments and electrical stimulation of the musculature of the body and lymphatics.

Most often there should be an intensive initial treatment phase followed by a less intensive

maintenance phase. No particular set or sequence of treatments will work for every one and most will respond differently. Treatment is best often staged. Generally the outcomes are better when one deals with the non lymphatic or lymphatic loading issues first (high blood pressure, heart failure issues failure, obesity, diet etc) then deal with issues that may be preventing lymph drainage (soft tissue trauma, surgical and radiotherapy scarring) — you cannot easily move fluids through significantly fibrosed areas

Appropriate treatment will be determined by an accurate initial assessment. Treatment effect can be assessed by appropriate follow-up measurements with perhaps the simplest being BIS and you reporting back to the health professional.

Generally, treatments will involve one of more of the following modalities.

### ***Antibiotic therapy***

In view of poorly functioning specific and non-specific defence systems when your lymph nodes have been removed and when you already have lymphoedemas and the rather high frequency of occurrence of cellulitis either prophylactic antibiotics or at very least a rapid response to a suspected infection is essential.

### ***Exercise machines***

It is reasonably clear that any variation in tissue pressures particularly in the epifascial compartment will help in the loading of the lymphatic system as well as in lymph transport. There are a range of exercise/activity promoting machines/aids which may help facilitate these actions and this help reduce a lymphoedema limb. Not all have been clinically trialled. However a low-impact exercise machine made by a group called Hsin Ten for home use for lower leg lymphoedemas has been clinically trialled and it has shown a significant effect in helping to reduce the symptoms and swelling of lymphoedema. This machine mimics exercise and provides elevation while passively moving the lower body. The mechanism is through variation in tissue pressures in a way similar to the other

exercise and movement programs for lymphoedema

### ***Aromatherapy***

Lymphatic drainage massage combined with aromatherapy may have a benefit. Essential oils such as lavender have evidenced antibacterial properties. Tea-tree oil has similar properties. There are a range of small trials in progress in this area.

### ***Benzopyrones***

Experimental studies have shown stimulation of macrophages and the destruction of bacteria as well as improvement in lymphatic system function. Examples of benzopyrones are Paroven and Lymphodran. Paroven seems to be particularly useful when there are symptoms of pain, heaviness, aches, etc, associated with underlying vascular factors. Recently there has been some clarification of the reasons for adverse outcomes from some benzopyrone (Loedema) treatment which are related to poor CYP2A enzymatic activity but the consensus is that the effectiveness of these and related groups in lymphoedema treatment is limited and needs further high quality scientific investigation.

### ***Compression bandaging***

Compression using low-stretch/inelastic bandages slows fluid entering the tissues and can maintain any previous reduction. The correct pressure and pressure gradient is essential. Bandages are applied after lymphatic drainage massage and worn overnight for 5-10 days.

Reductions can be maintained by using a compression garment. Repeat sessions may be necessary at 6-12-month intervals if the limb cannot be well controlled by other techniques.

Bandaging must be done by a trained professional although partners of patients can be taught the technique. The greatest danger is too much pressure or a tourniquet effect on an area of the limb.

### ***Compression garments***

These also help maintain any reduced fluid levels in the tissues. Selecting the correct compression is crucial for good control. Care must be taken to ensure they do not make the condition worse, which

may occur if they exert a tourniquet effect on the limb.

Garments come in made-to-measure and off-the-shelf forms. It usually wise to have a pair of garments. They may last from 3-6 months depending on use, your skin and use of creams.

Garments seem to work better with a mild exercise regimen, and a good compression garment can be beneficial if worn on a long air flight, however there is a range of variable evidence which indicates that individual circumstances may greatly determine outcomes, whether they be positive or negative. A lymphoedema therapist, knowing more intimately your details can be very effective in advice and treatment at this level...

### ***Compression pumps***

A large range of devices are available that supply a sequential external compression force or wave. They have between one and 12 or more chambers. Their aim is to vary the external pressure, helping fluids move into and along the lymph collectors. One danger of their use is pushing fluids into the area of the groin if lymphatics are incompetent and if the fluids are not first cleared by lymphatic massage, although evidence on this is anecdotal. There are some very strong positive and negative views regarding compression pumps, their roles and their effectiveness

### ***Diet***

Diets rich in long-chain fatty acids or triglycerides will mean a higher load on the lymph vessels in the abdominal area. This may slow lymph flow from the lower limbs and, in cases of a compromised lymphatic system, may exacerbate lymph clearance.

Retrograde flow of this lymph into the vessels draining the reproductive organs (the lymphatic territory of the medial thighs) is possible, sometimes culminating in chyle-filled papillomatous lesions or tags, which leak the fatty lymph.

Additional fatty tissues place a greater load on the lymphatic system because there is more tissue the system must drain. The pressure of these tissues on the lymph collectors may reduce their transport ability.

### ***Diuretics***

Most of the lymphology literature indicates diuretics to be useless for lymphoedema per se, but they have acknowledged benefit if there is an associated oedema or in the case of rapid-onset malignant lymphoedema. Rapid withdrawal of diuretics in lymphoedema patients who have been wrongly prescribed them is not recommended as significant swelling may then occur.

### ***Elevation***

For early stage (pitting) lymphoedemas, the value and simplicity of elevation should not be underestimated. Elevation can facilitate movement of fluid from a limb along the functioning lymph vessels.

It works best when combined with deeper inspirations and gentle contraction of the muscles. This variation will help the additional extracellular fluids move into the lymphatics and along them. An early stage lymphoedema may improve by 5-8% on elevation.

### ***Exercise***

It is without doubt that some form of exercise will help a patient at risk of or with lymphoedema. There may as well be some benefits in terms of cancer survivorship but that will be dealt with elsewhere in this book. While the lymphatics pulsate normally about 6-10 times per minute, lymph flow is enhanced if the skeletal muscles are contracted and relaxed intermittently. This moves the fluid from between the cells into the lymphatics where the inherent pulsing carries the lymph towards the nodes.

Exercises do need proper planning and most importantly, after any exercise, make sure you warm down slowly. What is the right level of exercise? There is no correct answer. It is best to start with a low-level program and work up. As an example of high-level exercise which does not appear to have any adverse effects on women who have had breast cancer are the Dragon boat racing groups. There are strong movements now again to re-introduce exercise and activity programs back into the lives of

those at risk of and with lymphoedemas.

### ***Hydrotherapy***

The external water pressure in hydrotherapy supports the limb and has a squeezing effect, which supplements the action of the muscles.

There are many programs across the world, with some such as the Encore program widely run through the YWCA targeting women with breast cancer who have arm problems. Many public pools and gyms have mild exercise and limb mobility programs. Any water based exercise seems to have benefit as long as there are warm up and warm down procedures and if the water temperature is not too warm

### ***Laser***

There is an increasing recognition of the potential role of laser but still there have been only a good few clinical trials of low-level laser To date there has been only one double blinded crossover trial of low level laser. Experimental evidence however is widespread and generally indicates a systemic photo stimulatory effect as well as specific local effect on cells called macrophages and fibroblasts. The wavelength, duration and timing of treatment seem to be important to gain best outcomes. Laser may also help lymph vessels grow and it's been shown to make them pump faster or more effectively when their function has been compromised. Clinical evidence shows removal of fluid and a softening of the tissues

### ***Lymphatic massage***

There are many forms of massage and many different schools of thought on what works best for lymphoedema patients. For many of these forms the evidence is anecdotal although or recent some high quality clinical trials have been conducted as well as quantitative evaluations of the impact of treatments on individuals No matter what the technique, the principles of lymphatic drainage are

based around four main areas. To improve the uptake of excessive extracellular fluids and its contents into the lymphatic capillaries, to facilitate flow of this fluid along lymph collectors, to help vary tissue pressures so these event outcomes are optimal and to open anastomoses to bypass blocked areas of the lymphatic system.

Lymphatic drainage massage is gentle and always involves the movement of fluid from the more distal sites to previously emptied proximal sites. Lymphatic drainage is usually combined with inelastic bandaging and fitted support garments although in hot areas lymph taping can be used/

There are many schools of manual lymphatic drainage training. It is wise to seek treatment from a trained practitioner, be they a massage therapist or physiotherapist. Local lymphoedema support groups can indicate who is in the local area. The common names applied to this form of massage are manual lymphatic drainage or complex lymphatic therapy and complex physical therapy.

### ***Massage pads and massage devices***

A range of massage devices are available for use in the home, many of which have not been clinically trialled so its often a difficult decision to advise patients with lymphoedema or at risk of it about which or what might be best for them. Generally speaking any form of vibration (as long as it's not of a high frequency) can be beneficial for the lymphatic system. As per massage (a slow form of vibration), massage pads or units change the tissue pressures helping to load excessive fluids and their contents into the lymphatics and then along them, to be cleared hopefully into the exit points of the lymphatic system into the blood vascular system. The selection and recommendations for use of the above aids is best managed by a qualified lymphoedema therapist.

### ***Skin care***

Generally, if you have poor lymphatic function you will have dry scaly skin; this seems to be related to poor lymphatic and perhaps altered blood inflow and outflow. Due to a slowed lymphatic function and due to the removal of lymph-nodes at the root of extremities those limbs are at higher risk of

infection should barrier of the skin be breached. Any non-allergenic skin creams or Sorbolene are appropriate although there is some question about the absorbance of these petroleum based creams compared to vegetable based ones. The frequency of application depends on need. Some creams may reduce the life of support garments. Generally it seems that creams administered after a shower or bath and the use of bath oils generally lead to softer more complaint skin, and thus one which should be a better barrier to bacteria.

### ***T'ai Chi and Qi Gong***

These mild forms of exercise are ideally suited to older people. They are particularly beneficial for those with upper limb problems for which there is some reasonable evidence. The exercises facilitate a change in muscle pressures that are believed to help the extracellular fluids enter the initial lymphatics and then help the lymph move along the collectors.

The link with respiration is important because the negative intrathoracic pressure helps establish a pressure gradient between the extremities and the larger thoracic vessels. A clinical trial has shown this to be effective in patients with post-mastectomy lymphoedemas.

### ***Other treatments***

There are many other conservative treatments (such as kinesio taping, magnetic therapies, ultrasound, microwaves, vibration, autologous lymphocyte injection, electrical stimulation of lymphatics and therapist controlled tissue massage units, That they are not discussed above does not mean they do not work and in fact for most there are a range of levels of evidence for their efficacy.

There is also a range of surgical techniques, including microsurgical correction, the removal of lymphoedematous tissues by excisional operations, and liposuction. (the later of which is gaining strong acceptance when conservative therapies fail)

Research into many of the lymphoedema treatments is still in its infancy and often quality trial results are not available.

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## How do you know when treatment is working?

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Reversing a longstanding lymphoedema is a difficult and slow process. The reason stems from the changes in the cells, their numbers and in the materials they produce as well as the numbers of blood and lymph vessels.

Long-duration lymphoedema is often characterised by the build-up of hard and inflexible fibrotic tissues, which generally do not allow good drainage of fluids and mean that treatments such as massage do not work to their full potential.

Whatever the treatment, the first change you may notice is that the limb feels better. This may be reduced heaviness, less tension or fewer pins and needles. These improvements are associated with reduction in fluid in the affected tissues

Along with this (but most often a little after) you might be able to detect that the tissues feel a little softer. This means that some of the collagen fibres are being removed either by the treatment directly or by stimulating the body to remove them.

These changes will often come before you can see a change in the size of the limb and are very important signs that the treatment is working.

### ***What is a good result?***

A result is good if you can halt the progression of the lymphoedema, as generally it will progress and worsen unless there is some form of effective intervention. A better result is if the limb gets smaller but for some if the limb feels more comfortable that is just as important, rather than reducing in size.

No one can predict how quickly a limb will change but generally those that are softer will respond more quickly.

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