



Understanding the Lymphatic System, your Lymphoedema risk and what you can do to make a difference

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About me

- Director, Lymphoedema Clinical Research Unit, College of Medicine and Public Health, Department of Surgery
- Australasian Editor "Lymphatic Research and Biology" (USA)
- Lead Editor "Journal of Lymphoedema" (UK),
- Editor "Lymphology" (USA), "Phlebology" (USA);
- Co-director International Lymphoedema Framework (until 2019)
- Board/Scientific Advisory Member Union Internationale de Phlebology
- Member scientific Committee Vasculab
- Board member Australian/New Zealand College of Phlebology
- Advisory member: World Alliance for Wound and Lymphoedema Care
- Executive Member International Society of Lymphology
- President 22nd International Society of Lymphology Congress
- Patron Lipoedema Australia
- Patron Lymphoedema Support Group of South Australia
- Patron Lymphoedema Association of Australia
- Member ENCORE advisory committee
- Member Australian Lymphoedema Association Research Committee



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Lets start by stimulating your lymphatic system!

Take a couple of deep breaths!
 While breathing in open your arms
 Now breathe out and bring your arms back to your chest

Figure 1.




a. person in the starting position: person standing with arms at the sides
 b. when the arms reach full extension the breath is held
 c. the arm muscles are relaxed and the arms move back to the starting position



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Why we must pay attention to the lymphatic system

- The lymphatics are a sewer – it must flow!
- Good lymph flow is needed for cell health
- Slow lymph flow means more fat deposits
- Reduced lymph flow means more infections
- Our immune responses are poor when lymph flow is poor



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Blood-Tissue-Lymph systems and their Interfaces. Where it's all at!



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Overview of lymphatic system drainage

Think, assess and act holistically



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Why the big picture?

We need to "empty the buckets" first!

Create space for lymph and its contents to flow into

Its what many of our therapies attempt to do

And its what patients, partners or carers can do !

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General parts of the lymphatic system

General drainage areas are called

Lymphatic Territories (or lymphotomes)

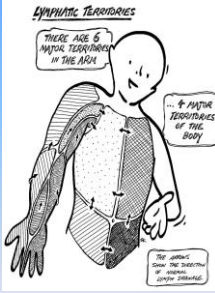
Each Lymphatic Territory separated by boundaries called

Watersheds





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Lymphatic territories of your arm

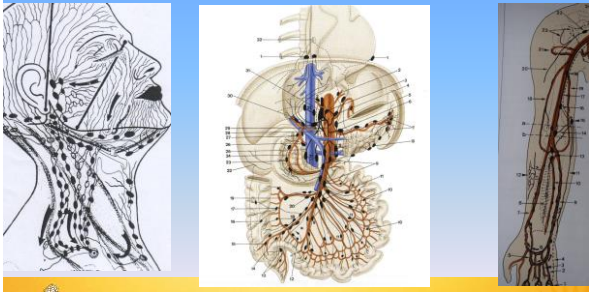



These are stylised pictures and no one's territories are exactly like this!



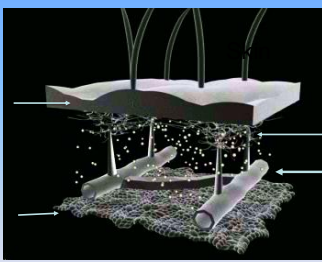
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Lymphatics – they are all over our body and complex systems

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Organisation of the superficial lymphatic system (between your skin and muscles)




Skin surface

Deep Fascia

Lymph capillaries

Lymph collectors

Muscles are below this fascia

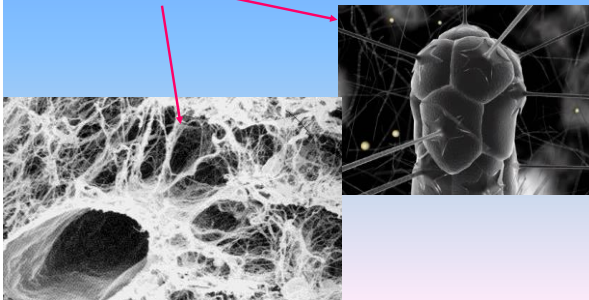



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Functioning of the lymphatic system:

We must help fluid and contents enter them

Supporting Fibres

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Functioning of the lymphatic system



KEY POINT

Accumulated fluids must be helped **to enter + move along** lymph vessels

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Factors which determine LYMPH LOAD

Blood Capillary Pressure
Blood Vessel and Capillary Leakiness
Big Molecules (Proteins) in Tissues
Number of Active Capillaries
Fat types in your diet



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Factors which determine LYMPH FLOW

LYMPH LOAD

Rhythmicity of the lymph collectors
Activity of nearby muscles
Variation in Chest/Tummy pressures
Pressure exerted by surrounding structures
Pressure exerted by applied compression



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Your lymphatic system

- It's
 - **Low pressure** (not like blood pressure)
 - **Small volume** (2-4 litres per day)
 - **Slow flow and slow acting**
- But
 - **Essential** for
 - a good **immune response**
 - good **health of your cells and the tissue**
 - **controlling swelling**



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About the volumes of lymph

From a normal arm the amount of lymph leaving it in a day is about 100 mls!

That is about 5 mls per hour for the arm

If you have a wound infection in the arm or poor cuticle care or other skin issues this volume may double!



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Basis of Lymphoedemas

Primary

Deficiency/poorly formed lymphatics

Secondary

Surgical removal

Surgical/Radiotherapy damage

Parasite linked blockage

Internal/external tumor blockage

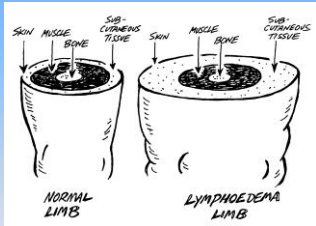
In each case there is reduced

Lymphatic Transport



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Lymphoedema—most of the visible changes occur superficially



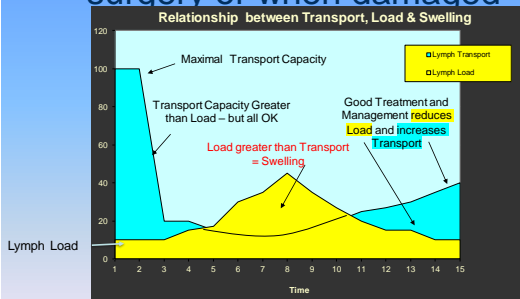
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Not every one will develop lymphoedema after treatment for breast and other cancers

Its about 20% for those who have had many lymph nodes removed and radiotherapy and about 3% for those who have only had a few nodes removed.

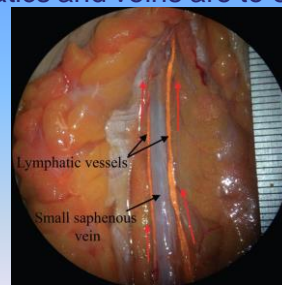
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The lymphatic system after surgery or when damaged



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Look at this picture: Notice how close Lymphatics and veins are to each other



Pan WR, le Roux CM, Levy SM. Alternative lymphatic drainage routes from the lateral heel to the inguinal lymph nodes: anatomic study and clinical implications. ANZ journal of surgery. 2011. Jun;81(6):431-5

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Veins and lymphatics are close (and do similar things) But problems with veins can mean problems for lymphatics

Carry-over of diseases/disorders/damage which reduce lymph transport capacity or add to load

- Phlebitis - Lymphangitis, lymphadenitis
- Fragility - Excess leakage large molecules
- Thrombi - Blockage (external pressure)
- Stripping - Destruction of adventitial Lymph V's
- Ligation - Accidental ligation collectors
- Sclerotherapy - Accidental sclerosis of lymphatics
- Harvesting - Destruction and removal of collectors (CABG)

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Assessing risk is important!

For those who don't have lymphoedema but are worried about getting it or if you want to be pro-active



Our risk assessment forms for arm and leg lymphoedemas are available - email us - use them in association with your therapist

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RISK ASSESSMENT ARMS

TICK the boxes which best apply to "AT RISK" arm.


| EVENT/SITUATION | Score |
|--|-------|
| Whole of Breast Removed (Mastectomy) | 2 |
| Part of Breast removed | 1 |
| More than 10 nodes removed from armpit | 3 |
| More than 2 but less than 10 nodes removed from armpit | 2 |
| 1 or 2 nodes removed from armpit | 1 |
| Radiotherapy to armpit area | 3 |
| Radiotherapy to chest/breast area | 2 |
| Fluids drained from wound more than 1 week | 2 |
| Infection at the wound site | 2 |
| More than 2 infections (redness) in the limb per year | 3 |
| One infection (redness) in the limb per year | 2 |
| Heaviness, tightness or tension in the limb at times | 2 |
| Limb feels different as the day progresses | 1 |
| Frequent cuts/scratches to the limb | 2 |
| Dry skin | 2 |
| OTHER PROBLEMS WHICH MAY ADD TO RISK | |
| Frequent long distance air traveler | 1 |
| Previous or current other injuries to limb/shoulder | 1 |
| Surgery was on side of dominant hand | 2 |
| Generally experience high stress levels | 2 |
| Generally have high non controlled blood pressure | 2 |
| Thyroid gland activity is not normal and not medicated | 1 |
| "At risk" limb is used for repetitive actions | 1 |
| Often carry heavy loads for long periods using "at risk" arm | 1 |
| Smoking is currently part of my life | 1 |
| Body weight is a little high (overweight) | 2 |
| Body weight is very high (obese) | 3 |
| Swelling was present in limb prior to surgery | 1 |

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RISK FACTORS which contribute to lymph load

- **Skin quality** – barrier function
- **Blood pressure** – when high
- **Strength** of small blood vessels (important in lipoedema)
- **Infection** of wounds, cuts and scratches
- **Weight**
- **Fats** (long chain) in diet
- **Venous system dysfunction** – (its also a drainage system) if its not working there is increased lymph load

Knowing these allows you and us to modify/control them!



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To Ensure your therapist/Health Professional is well informed

Provide an accurate history about your

- Family History**
- Medical History**
- Surgical History**
- Current Medications**

This will help them make a better diagnosis based on this information



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Why is telling everything important ?

It may show other reasons for the limb issues

- Thyroid Problems - Myxoedema
- Vascular Problems- Phleboedema
- Blood Pressure/heart Problems- Oedema
- Genetic, metabolic disturbances – Lipoedema
- Liver/kidney disease or dysfunction

(Each of these may be present underlying a lymphoedema)

Activity, occupation, BMI may also impact limb size and changes significantly



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Your Diagnosis

It can be made more objective and accurate by measuring impact of structural/functional changes using:

Bio-impedance, Tissue Dielectric Constants, Tonometry, Indurometry, Perometry etc

BUT
These are clinic based





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Important simple measurements



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Something you and a Therapist can assess
The Stemmer Sign

Positive Stemmer Sign – Skin fold cannot be picked up

It means excess superficial fibrosis in the area

You can use it in any lymphatic territory!

Knowing this can allow targeted treatment





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Something you and a Therapist can assess
The Pitting test




Thumb is pressed into any lymphatic territory for ~ 30 or more seconds.

Residual indent means **fluids present**



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You may be able to use - tele health and apps – talk to your therapist about them

You can record garment use, circumferences using Apps like Lympha Track and provide details remotely to health professionals




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You can also learn more online about assessment – HELP Online: An Australian based program



<https://instituteoflymphoedema.com.au/>



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Key treatment/management areas

- Compression (Bandages, Garments, Wraps)
- Negative Pressure
- Lymphatic Drainage techniques
- Lymph taping
- Skin Care
- Activity/Exercise/Breathing
- Diet (Anti-inflammatory, MCT)
- Weight Management
- Water based programs








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Simple actions can **help** lymph flow

- Deeper breathing techniques
- Gentle isotonic/isometric muscle movement – General movement, self or partner massage, massage pads, electrical stimulation etc
- “Emptying the buckets” before donning or doffing a garment or wrap
- Ensuring low tummy lymph loads prior to and during sleep (fats etc in diet)

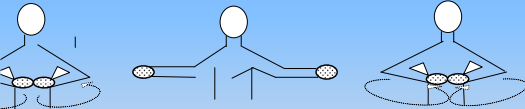


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Breathing (diaphragmatic) patterns

Coordinated arm exercise & deep breathing + rest breaks

Figure 1.



a. starting position: person starts taking a deep breath in whilst moving the arms slowly & gently outwards

b. when the arms reach full extension the breath is held in. All the arm muscles are then tightened.

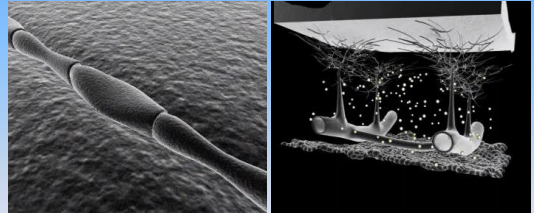
c. the arm muscles are relaxed and the arms move back to the starting position whilst the breath is exhaled out.

Variation in thoracic and abdominal pressures

Lymphology 2005, Journal of Lymphoedema 2006

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When our muscles contract or our tissues are moved it helps lymph loading & flow



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Aqua Therapy

- All forms of water based activity/exercise are good as they



- Help vary tissue pressures
- Provide graded external compression
- Support the body and tissues
- Pressure varies as move in different ways
- ENCORE program has such activities



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But some situations may **slow** lymph flow!

- Bloating
- Constipation
- Fat in the tummy area
- Shallow Breathing
- Constant external pressure in wrong place – Bras and underwear for example



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Remember: Normal Lymph Flow:

- From an ARM is about 5 ml per hr. (~ 100 mls per day)

It does not take too much effort to make changes to these flows!

Small changes can make a big difference

Being confident in knowing what to do is # 1!



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Key Messages

- Ask for Early Identification of changes which have occurred in your limb
- Request early intervention
 - Targeted and sequenced treatment
- Know your role and how your partner and carer or others can help you
 - You can seek Independence for management
- Think, Assess, Treat, Manage Holistically



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Important points to help you live life well with your lymphoedema

- **In the Maintenance phase** – take more control
- **In a partnership, explore the treatment options** and ask and see what is likely to work for you
- **Know what you want**
 - ? Reduction in size, ? Improvement in how limb feels, ? Better ability to undertake activities of life, ? Improved function
- **Know what you can (will be able to) do**
- **Do only one thing different at a time (then you really know what works)**
- **Try before you buy !**

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Examples of Good Web sites

- Australasian Lymphology Association (AUS)
 - www.lymphoedema.org.au
- British Lymphology Society (UK)
 - <https://www.thebls.com>
- Canadian Lymphoedema framework (CAN)
 - <https://canadalymph.ca/>
- National Lymphodema Network (USA)
 - www.lymphnet.org
- International Lymphoedema Framework
 - www.lympho.org

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Think holistically- in partnership



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Thank you for watching and listening

I hope it can help you to be more confident in what you can do to make a difference



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We will have time for your questions after my presentation after morning tea

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