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# 8TH INTERNATIONAL LYMPHOEDEMA FRAMEWORK CONFERENCE



NLNet  
Netherlands Lymphoedema Network  
for Research and Education

[WWW.2018ILFCONFERENCE.ORG](http://WWW.2018ILFCONFERENCE.ORG)

## Compression materials in chronic edema








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# Capillary filtration rate(CRF)

- Is seen as the standard for assessing tissue oedema
- Oedema develops as a result of an imbalance between fluid outflow(filtration of serous fluid out of the capillaries) and the lymph transport, not venous capillary reabsorption!
- The higher the filtration rate, the more rapidly oedema develops.
- edema is due to an imbalance between CFR and lymph drainage(dynamic-, mechanic- and safety function insufficiency

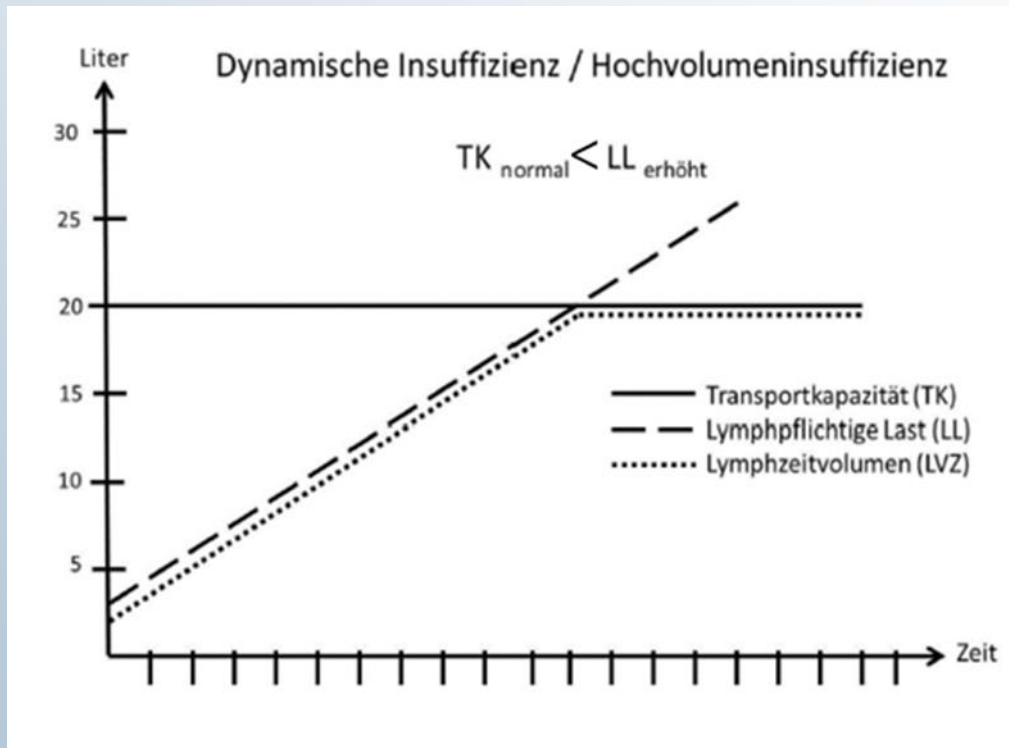
# lymphatic insufficiency

mechanic	dynamic	insufficiency of the safety function
TC 	TC    normal	TC 
LL    normal	LL 	LL 
LTV 	LTV 	LTV 

# insufficiency

	<b>dynamic</b>	
	TC <b>normal</b>	
	LL 	
	LTV 	

# Dynamic Insufficiency



High volume = dynamic



agents

- CVI C<sub>3</sub>
- Hypoproteinemia
- Inactivity
- Pulmonary edema
- Premenstrual syndrom

# insufficiency

<b>mechanic</b>		
TC 		
LL <b>normal</b>		
LTV 		

# Mechanic Insufficiency

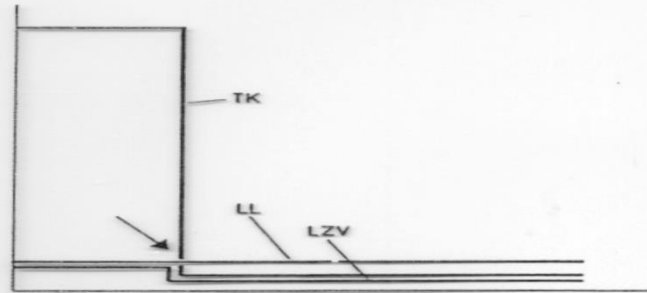


Abb. 3/23: Wenn die Transportkapazität des Lymphgefäßsystems (TK) unter das Niveau der normalen lymphpflichtigen Last absinkt (Pfeil), entsteht eine mechanische Insuffizienz, ein Lymphödem.

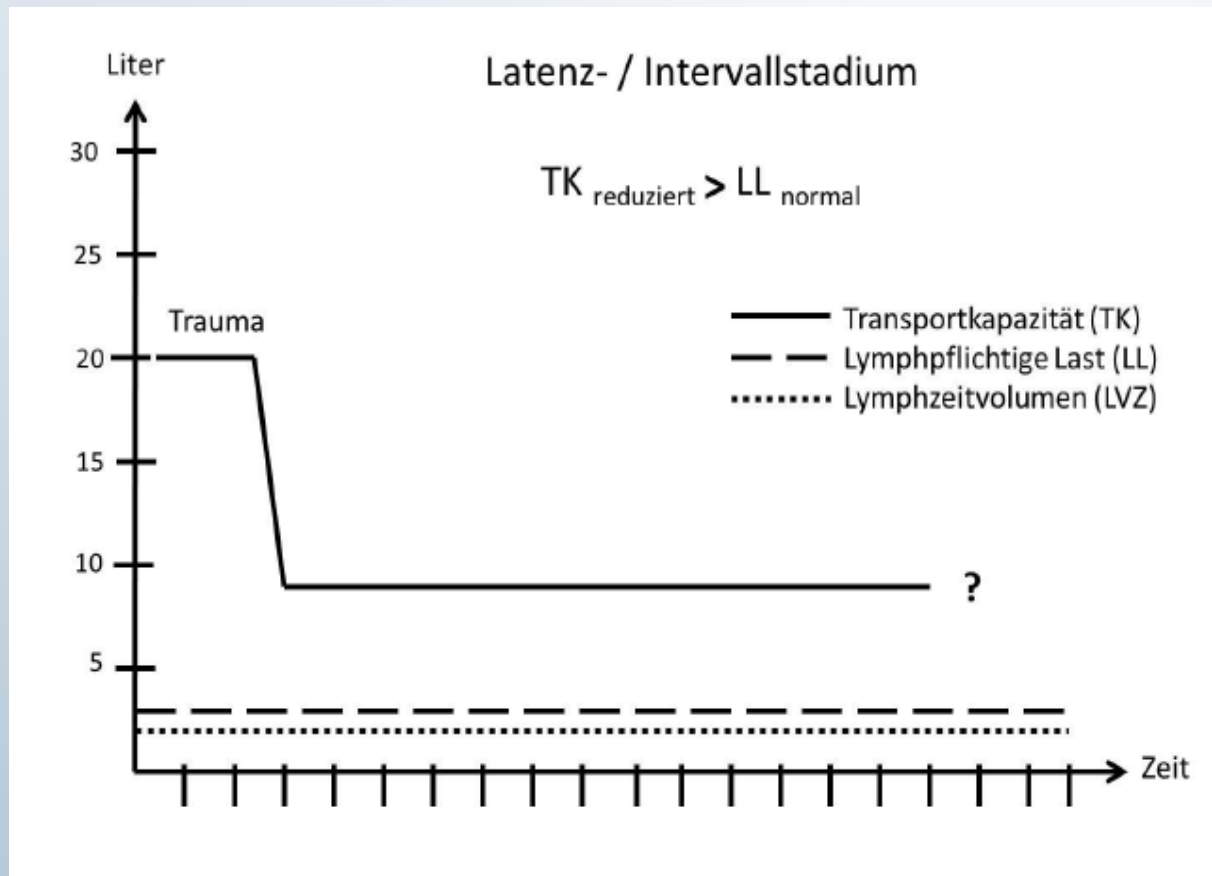







agents

- Primary LE
- Secondary LE

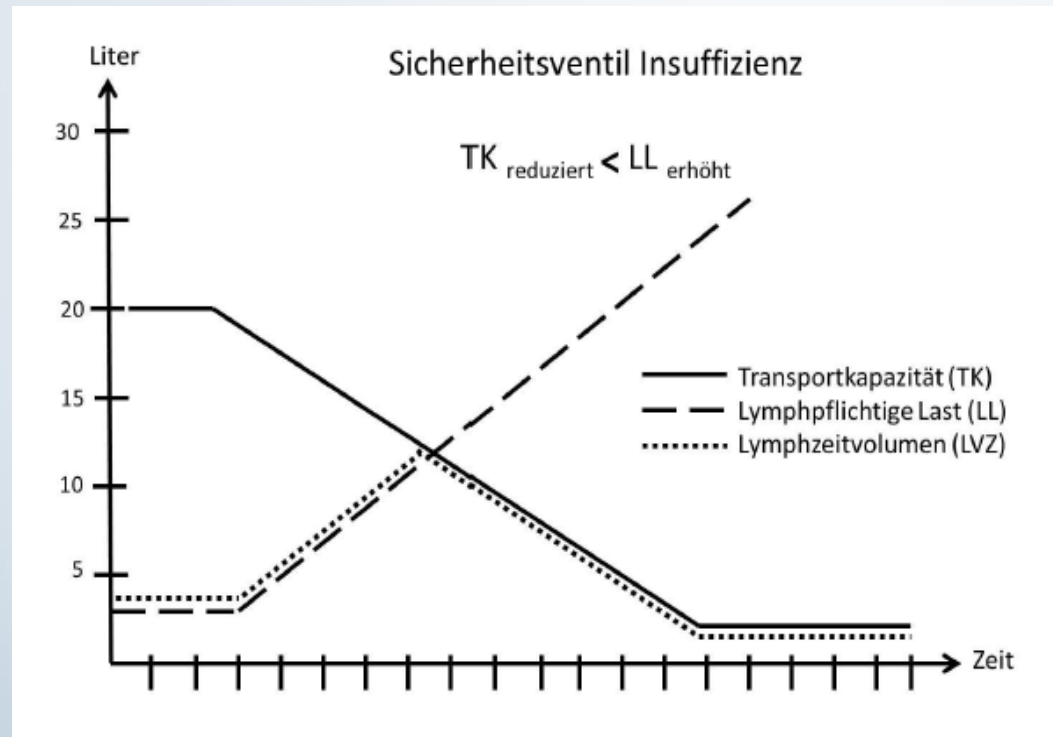
# Latent lymphedema $TK \downarrow \geq LL$



# Insufficiency

		<b>Safety function insufficiency</b>
		TK 
		LL 
		LZV 

# Safety function insufficiency



agents

- Acute inflammation
- CVI C<sub>4</sub>-C<sub>6</sub>
- Lipolymphedema(untreated lipedema after 15 and more years)
- Idiopathic cyclic edema

# Why compression?

- Reduction of capillary filtration rate(CFR)
- Shift of fluid into non-compressed parts of the body
- Increase of lymphatic drainage(passive and active by muscle contractions)
- Increased lymphatic contractions
- Reduction of dilatation
- Better valve function
- Improvement of the venous pump
- Breakdown of proteoglycans

# Kinds of compression

- **Bandages**
- **Stockings**

# Bandages for edema reduction

- Long stretched
- Short stretched
- Ultra short stretched(Unna boot)
- Velcro devices



# Material of bandages

- Polyamides(PA, Nylon®, Perlon®)
  - Resistant against aging, insects and rot, microorganism, mothproof,
- Elastan(EL, Lycra®)
  - 85%PU. High elastic, high resistant(acids, alkalis, oil, fat, aging, light and tempearture)
- Cotton wool
  - Low static charge, boil-proof, sterilizable, elasticity 40%
- Elastodiene(ELA, natural rubber)
  - Natural latex, high elastic extensibility, unstable against fat, temperature and many chemical substances
- Viscose
  - Regenerated cellulose fiber, moisture content of 5-15%



# Kind of compression stockings

- **Round knitted**
- **Flat knitted**

# Round knitted


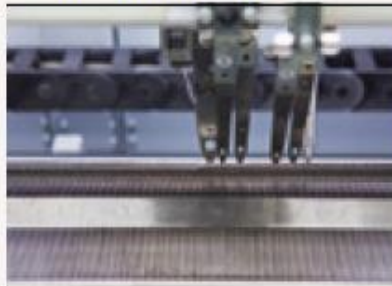
- one-and two-sided circular knit, seamless, machine-formed, with at least one entangled and one inserted elastic thread in every other course: the round-knit stocking has limitations in its shaping. Thus, extremities with very small circumferences and extreme changes in circumference can not be supplied with round-knit stockings.

# Flat knitted

- **Flat knit compression garments** exert constant pressure on the arm or leg during the maintenance phase. They do not creep into skin folds, which could lead to constriction and is made to measure to suit the circumference of the arm or leg.



# The Difference

Difference	Round-knit compression garments	Flat-knit compression garments
Fabric	<ul style="list-style-type: none"> <li>Knitted on a round cylinder</li> </ul> 	<ul style="list-style-type: none"> <li>Knitted in flat rows</li> </ul> 
Number of threads & shape	<ul style="list-style-type: none"> <li>Constant number of threads in each row</li> <li>Shaped by variable thread size &amp; pre-tension of the woven thread</li> </ul>	<ul style="list-style-type: none"> <li>Variable number of threads, this means increase and decrease of threads in one row is possible</li> <li>Shaped by variable number of threads woven</li> </ul>
Seam	<ul style="list-style-type: none"> <li>Seamless</li> </ul>	<ul style="list-style-type: none"> <li>With seam</li> </ul>
Stretch	<ul style="list-style-type: none"> <li>High flexibility, lower wall stability</li> </ul>	<ul style="list-style-type: none"> <li>Low flexibility, high wall stability</li> </ul>
Woven thread	<ul style="list-style-type: none"> <li>Expansion: high (approximately 800 %)</li> <li>Not covered</li> </ul>	<ul style="list-style-type: none"> <li>Expansion: low (approximately 200 %)</li> <li>Covered</li> </ul>
Pressure	<ul style="list-style-type: none"> <li>High resting pressure</li> </ul>	<ul style="list-style-type: none"> <li>High working pressure</li> </ul>
Effect	<ul style="list-style-type: none"> <li>Effect on vessels (veins)</li> </ul>	<ul style="list-style-type: none"> <li>Primary effect: increased tissue pressure</li> <li>Secondary effect on all vessels</li> </ul>

# Material of stockings

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- Cotton wool
  - Low static charge, boil-proof, sterilizable, elasticity 40%
- Elastodiene(ELA, natural rubber)
  - Natural latex, high elastic extensibility, unstable against fat, temperature and many chemical substances
- Viscose
  - Regenerated cellulose fiber, moisture content of 5-15%
- Microfiber
  - Polyamide and polyester,very low weight10.000-100.000 m weigh 1g!(Tactel®, Trevira finesse®)





# Conclusion I

- Chronic peripheral oedema is seen commonly in medical practice but the controlling role of the lymphatic in the development is not appreciated and consequently management is often inappropriate.
- It is important to consider and treat serious underlying systemic conditions such as heart failure, nephrotic syndrome and cancer but once these are excluded a chronic edema-directed treatment programme should be introduced.

# Conclusion II

**Dynamic insufficiency:** local poor edema

- Compression with roundknitted stockings for reduction of CFR

**Dynamic insufficiency** with generalized edema:

- treat the agent as hypoproteinemia or hormonal dysbalance

# Conclusion III

mechanic insufficiency: local protein rich edema

Treatment in two phases

- Phase I: compression bandages non elastic or elastic
- Phase II: compression stockings in most cases flat knitted

# Conclusion IV

Safety function insufficiency:

Treatment in two phases

- Phase I: compression bandages non elastic or elastic
- Phase II: compression stockings round or flat knitted

**Thank you  
for your  
attention**



Franz-Josef Schingale