

Role of compression before and after liposuction

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Compression

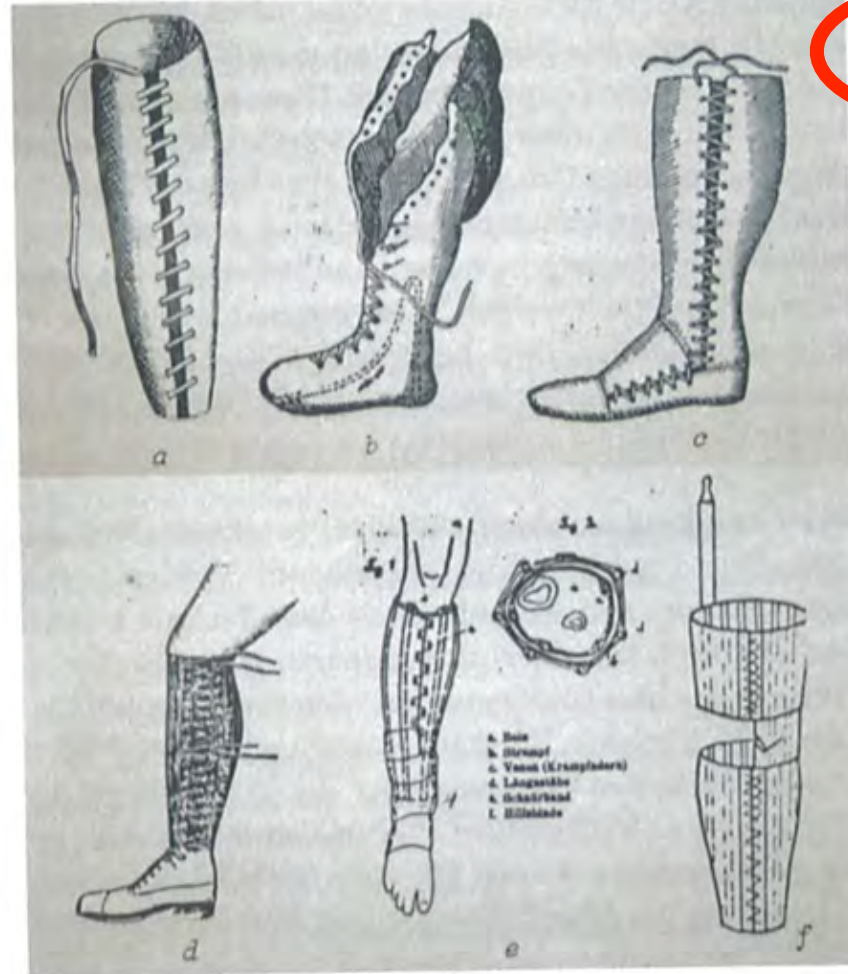


ABB. 1.4

Schnürstrümpfe:

a) Hofer 1790

b) Burger 1849

c) nach Zimmermann,
Burger 1849

d) Murphy 1909

e) Stephan 1909

f) Stephan mit
Oberschenkelteil 191

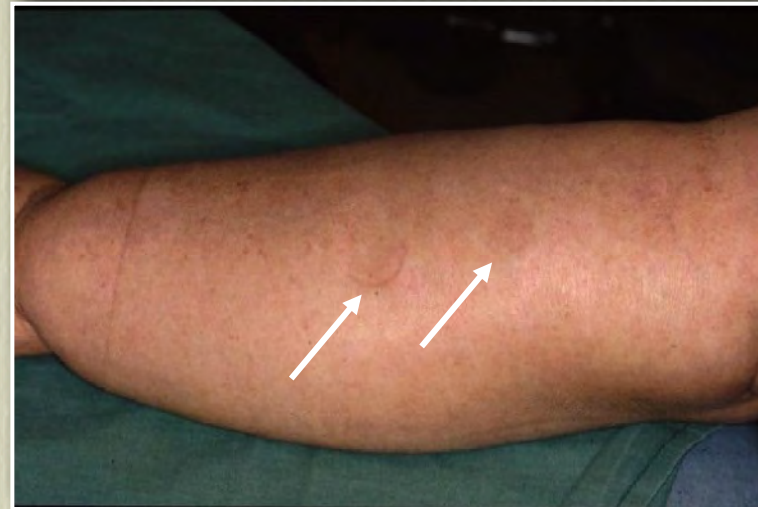




Pitting

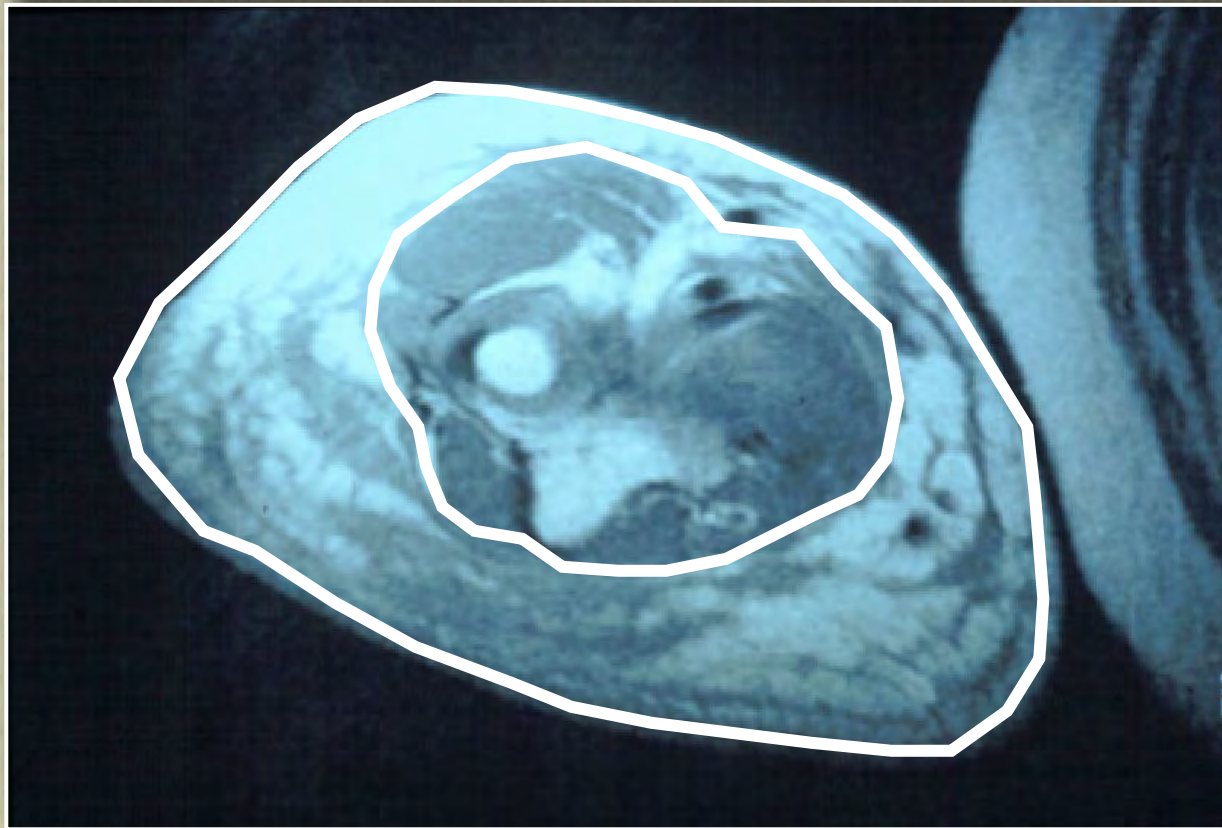


Conservative treatment



Liposuction

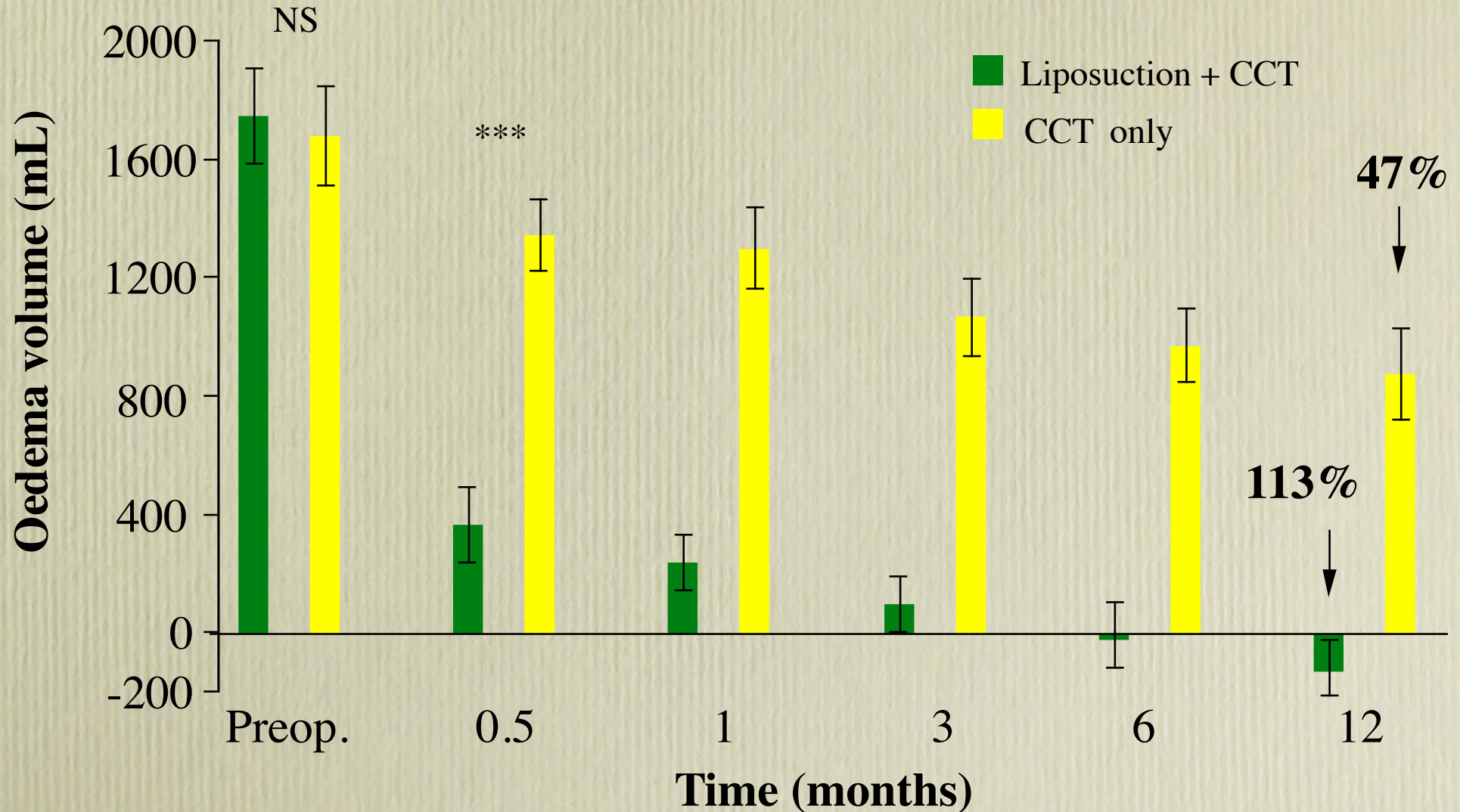
MRI



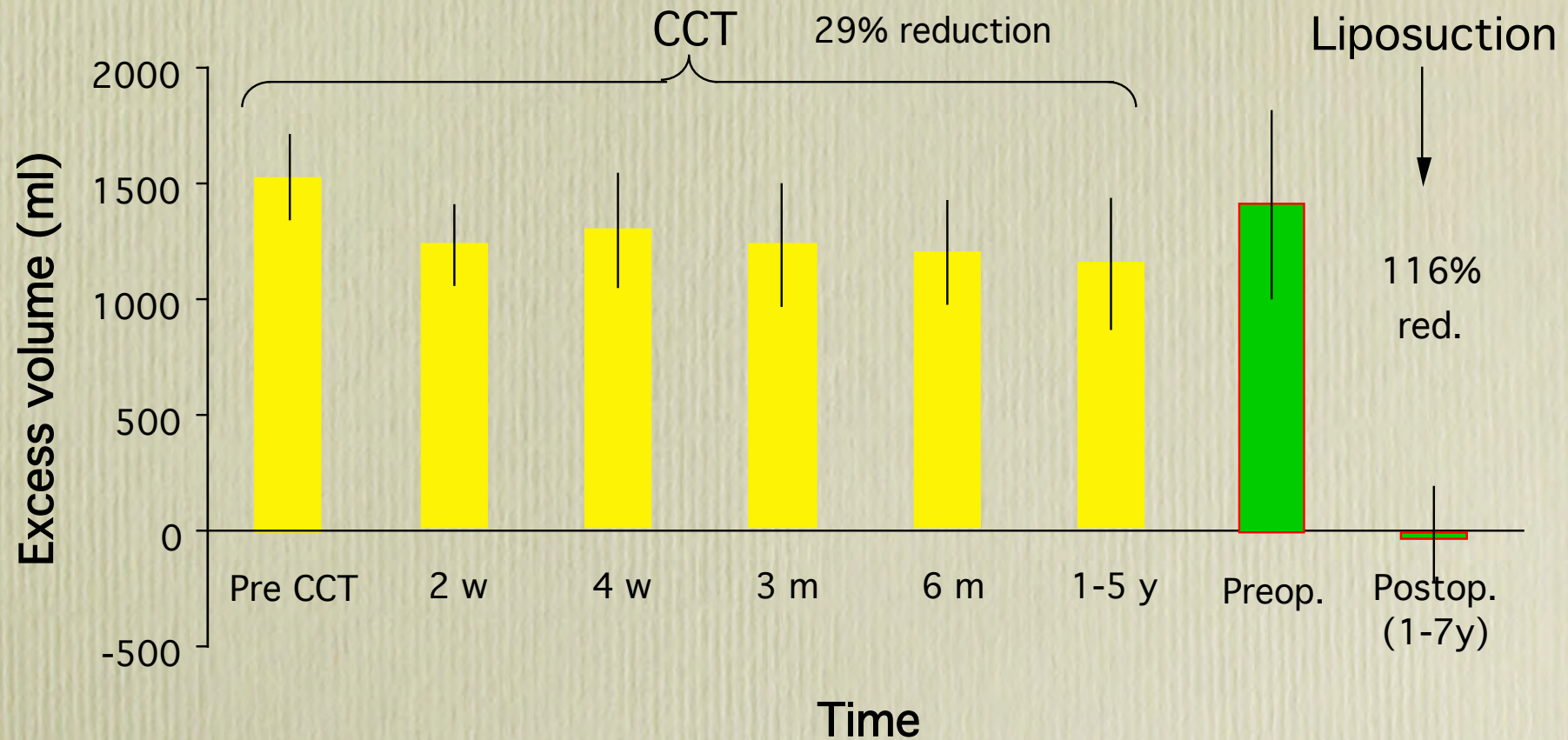
Preop.

Liposuction vs compression

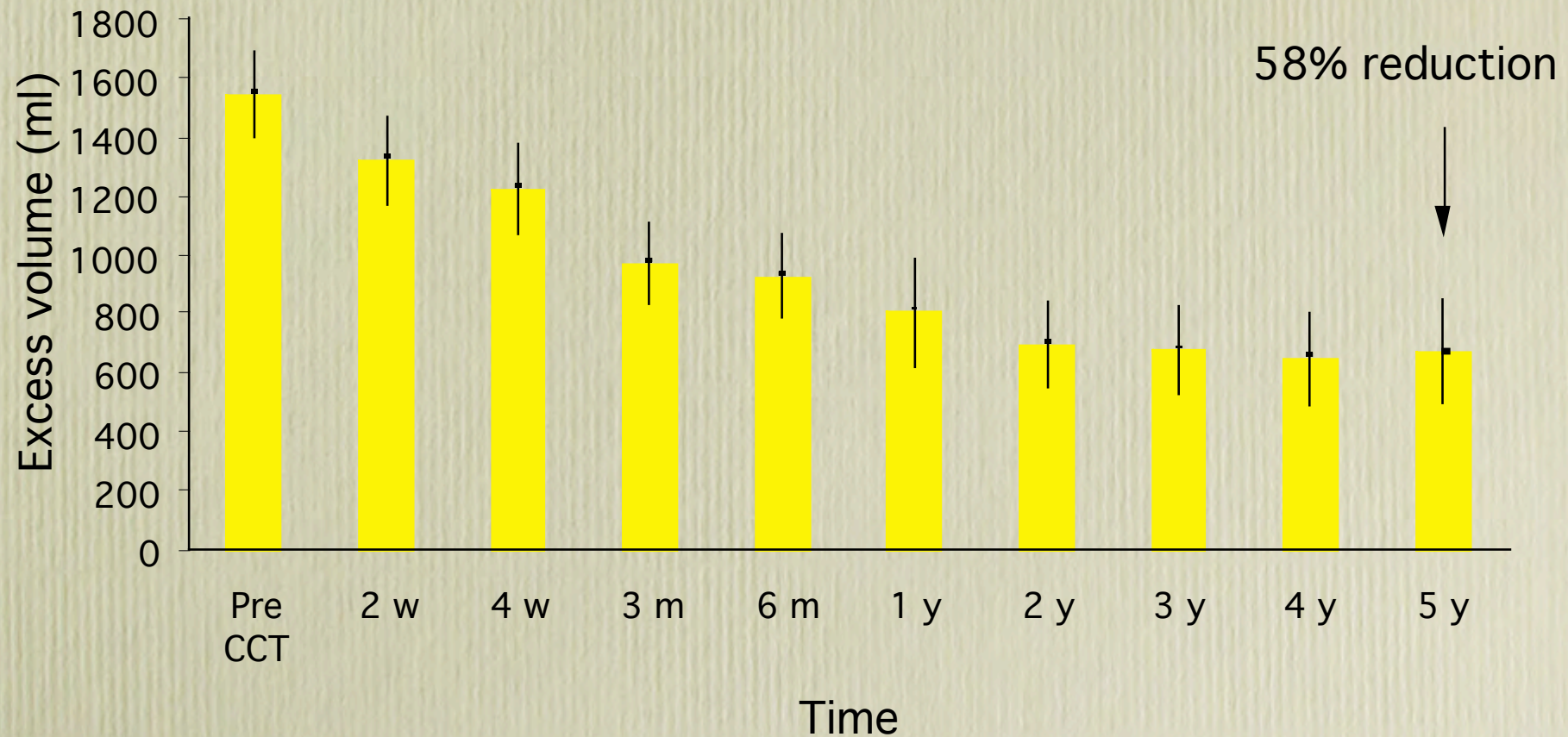
14 matched pairs



CCT Followed by Liposuction and CCT (n=5)

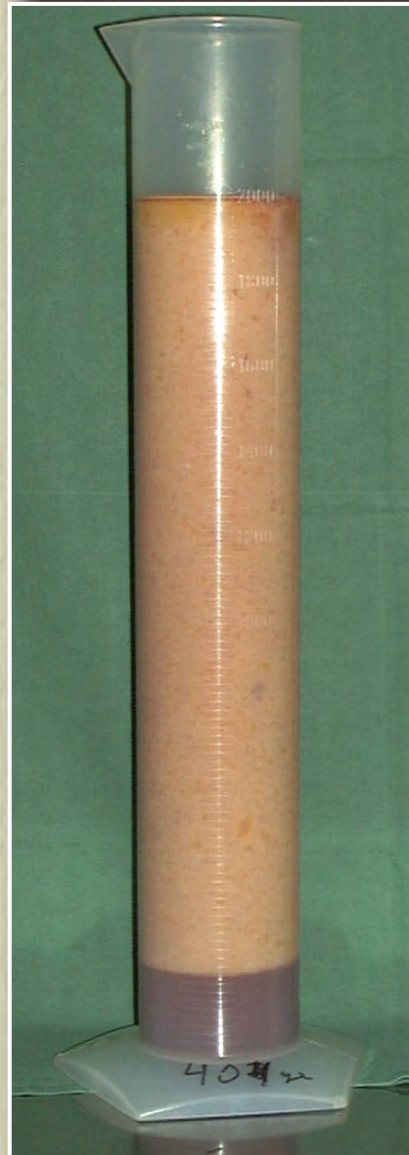


CCT only - 5 years' follow-up (n=8)





(Ref: Dr. C-H Håkansson, Dept of Oncology, Lund University Hospital)



Aspirate

90-100% fat!

VR-CT

Volume Rendered CT

II patients



Right lymphedematous arm



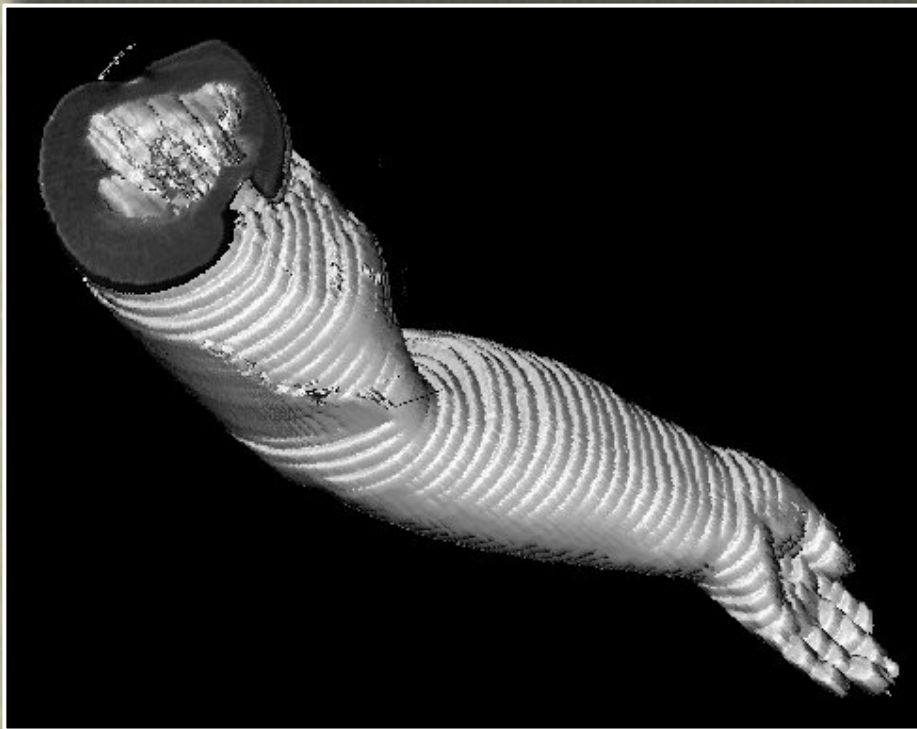
Left normal arm

Preop. Δ fat volume 1321 ml

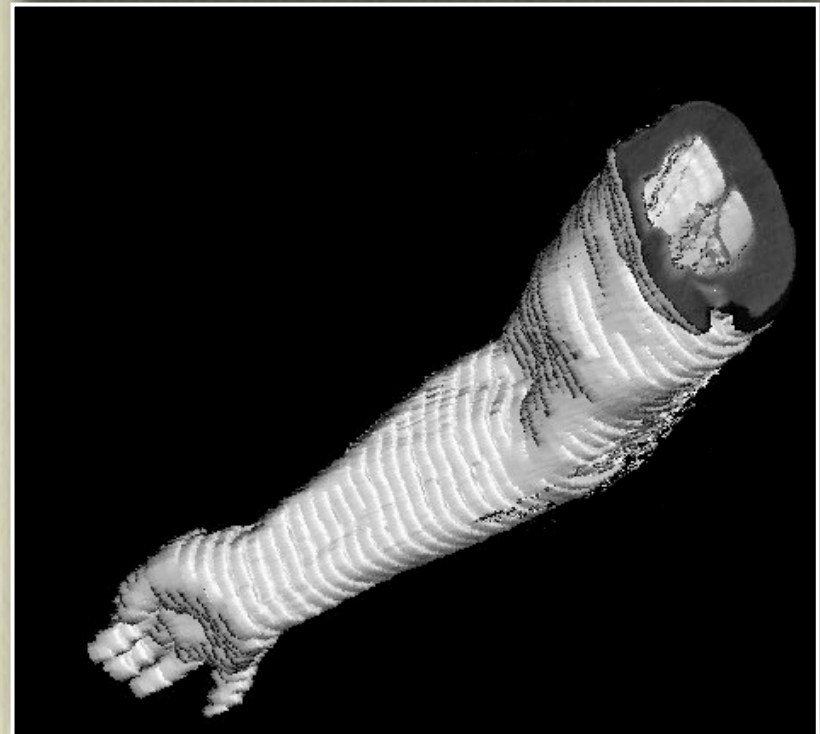
VR-CT

Volume Rendered CT

II patients



Right lymphedematous arm



Left normal arm

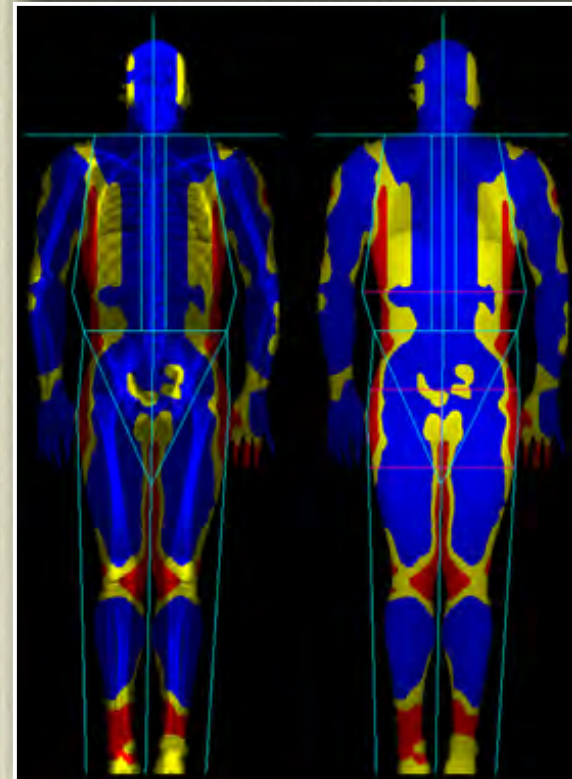
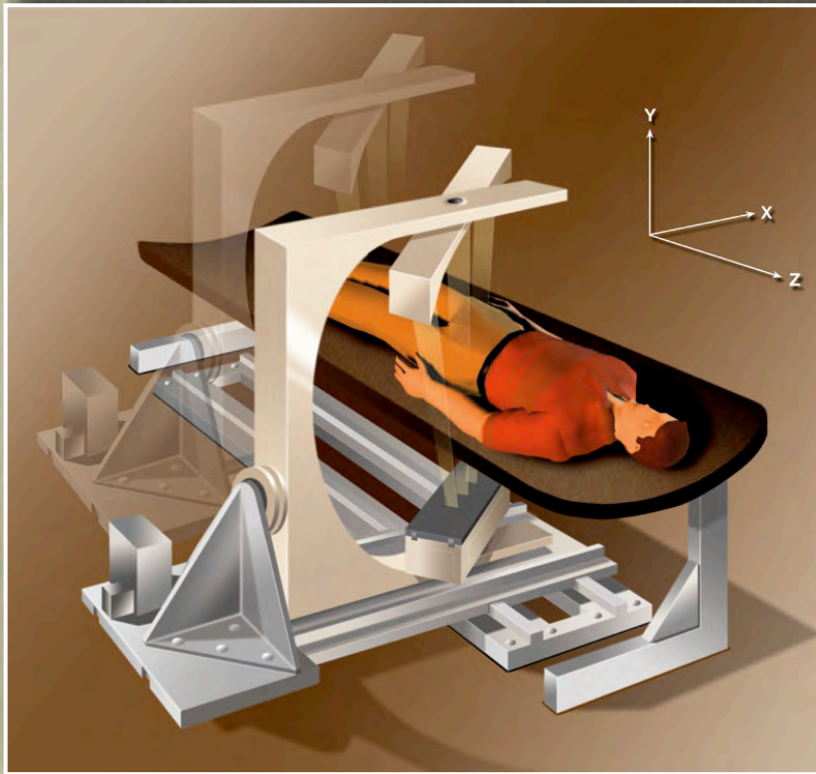
Preop. Δ fat VR-CT volume 1317 ml

Brorson et al. Lymphat Res Biol 2006

81% more fat in the lymphedematous arm

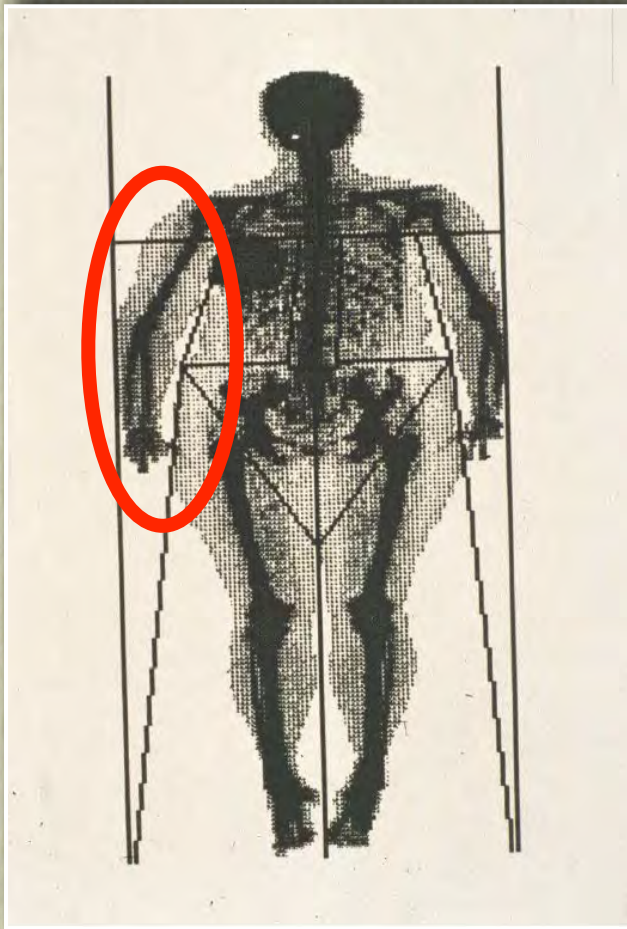
Method

DPX-L, version 3.2 Lunar, Madixon, WI

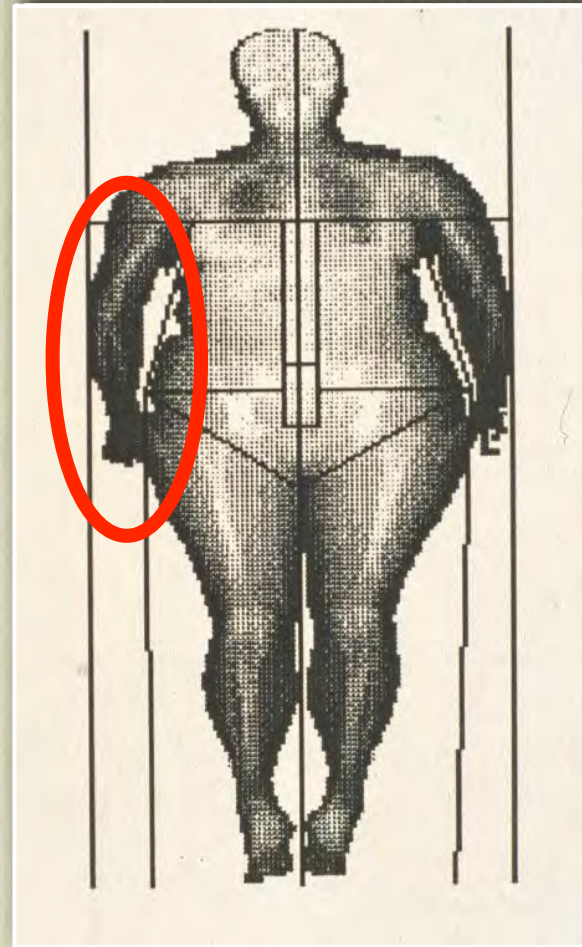


DEXA

Dual Emission X-ray Absorptiometry (n=18)

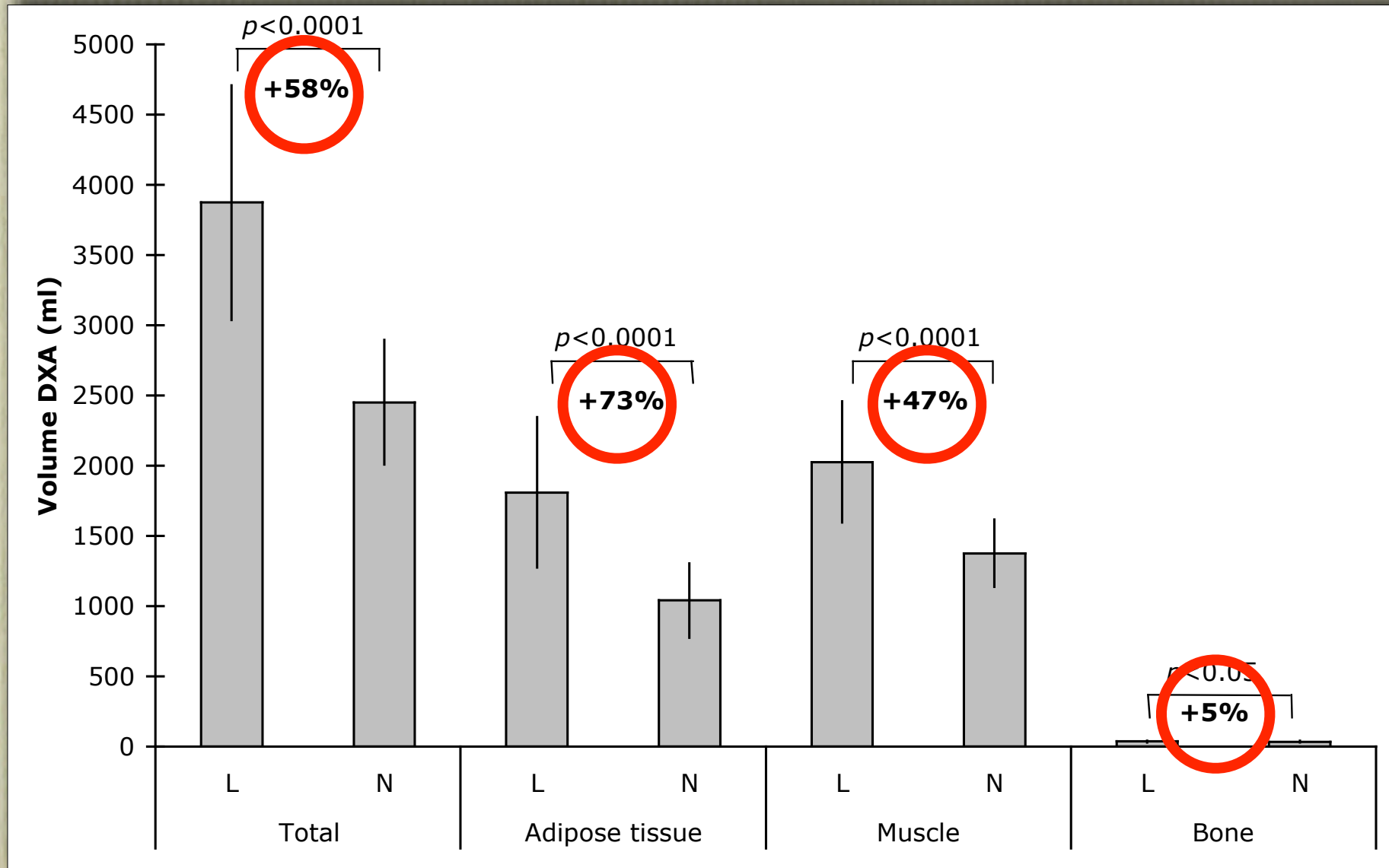


Preop. Δ fat: 510 g

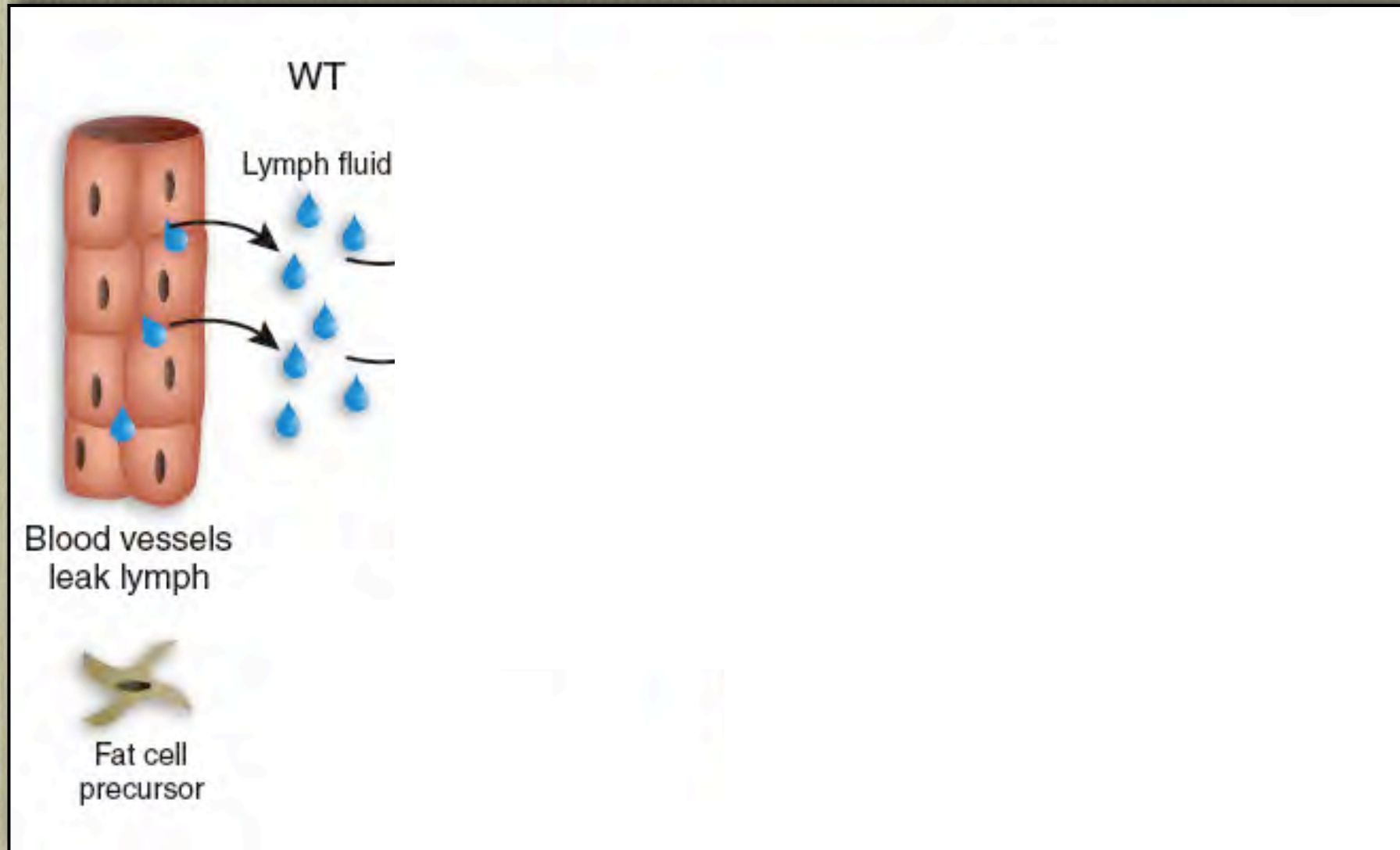


1 year postop Δ fat: -138 g

Excess tissue volumes



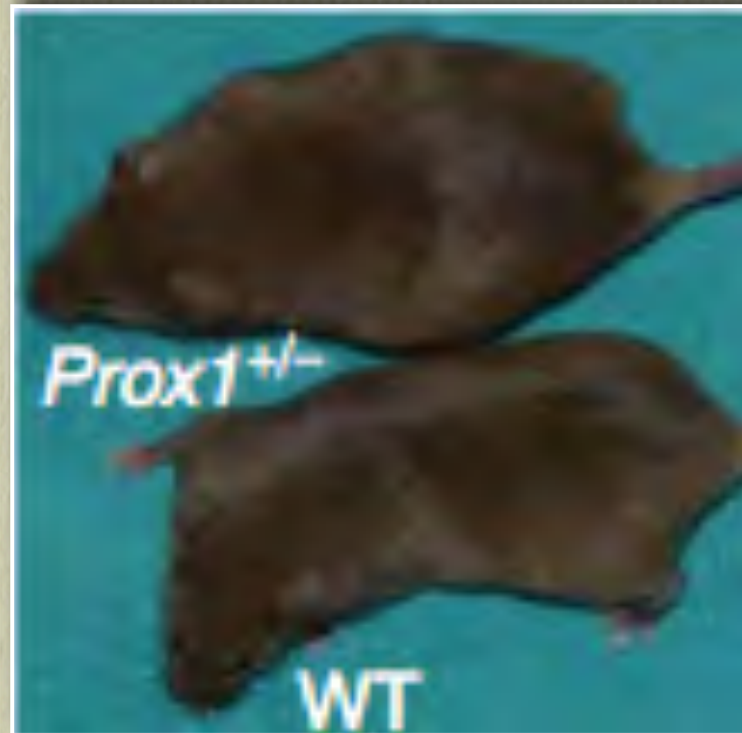
Lymph makes you fat!



Harvey NL et al., Nature Genetics 2005; 37: 1072-81
Schneider M et al., Nature Genetics 2005; 37: 1023-4

Lymphatic vascular defects promoted by *Prox1* haploinsufficiency cause adult-onset obesity

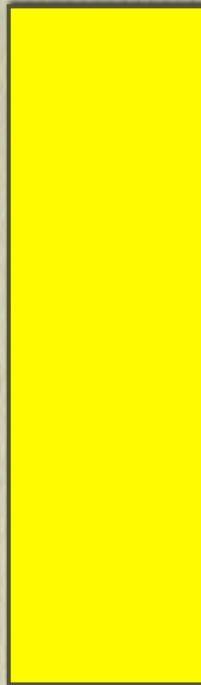
Natasha L Harvey¹, R Sathish Srinivasan^{1,5}, Miriam E Dillard^{1,5}, Nicole C Johnson^{1,5}, Marlys H Witte³, Kelli Boyd², Mark W Sleeman⁴ & Guillermo Oliver¹



What is a lymphedema?



lymph?



fat?



lymph/fat?

Inflammation
Up-regulated genes



Excess fat deposition

Goal

Remove excess fat

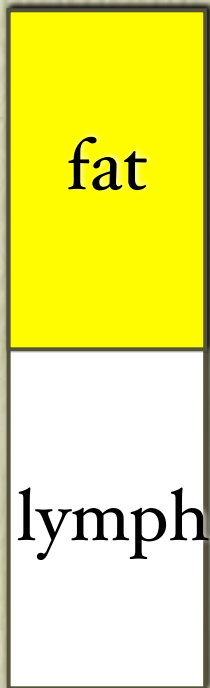


Liposuction

Complete reduction

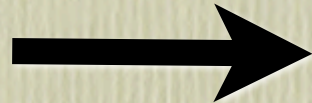
Goal

pitting edema

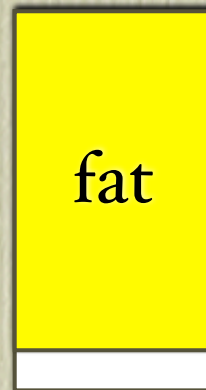


lymph/fat

bandaging

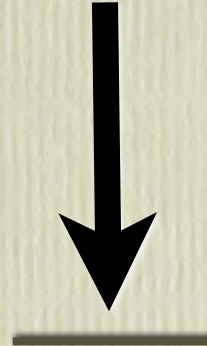
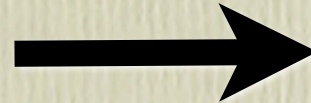


non-pitting edema



fat

liposuction



complete reduction



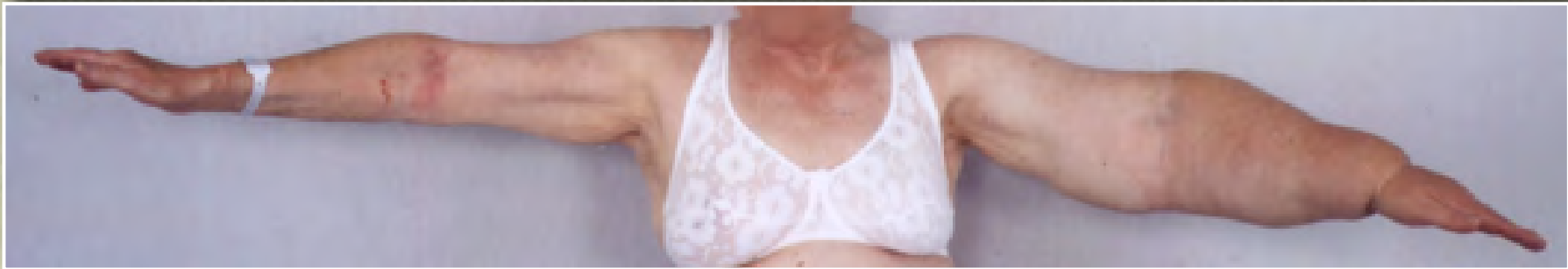




Garments are worn 24/7 and changed every morning to a washed and shrunk garment.

The used garment is washed to be used the following day, and so on.

Results



Preop. 3 100 ml

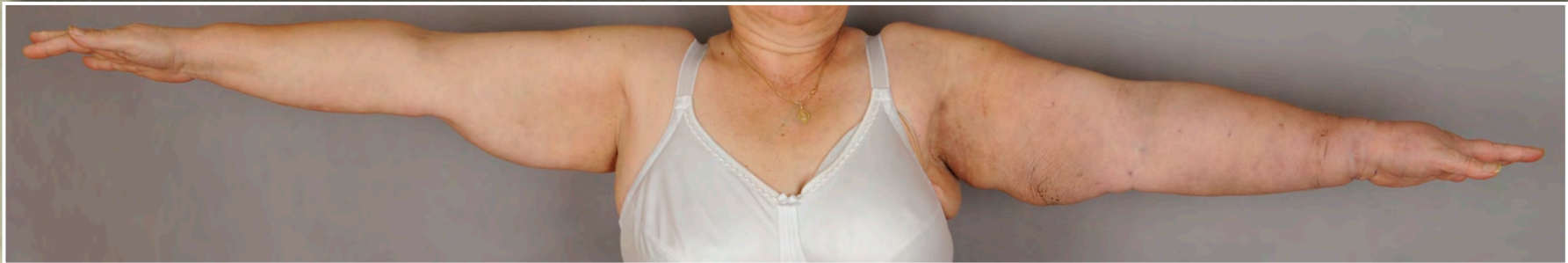


1 year postop.

Results



Preop. 4 235 ml

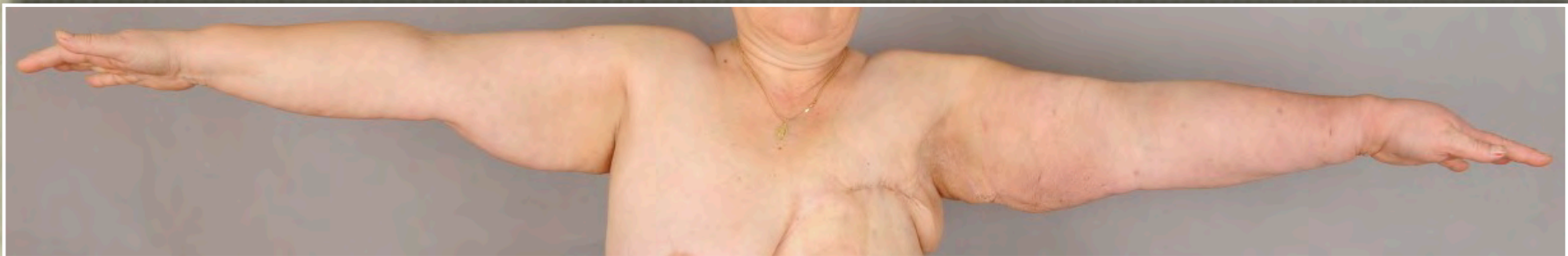


1 month postop. 905 ml (79% reduction)

Results



Preop. 4 235 ml

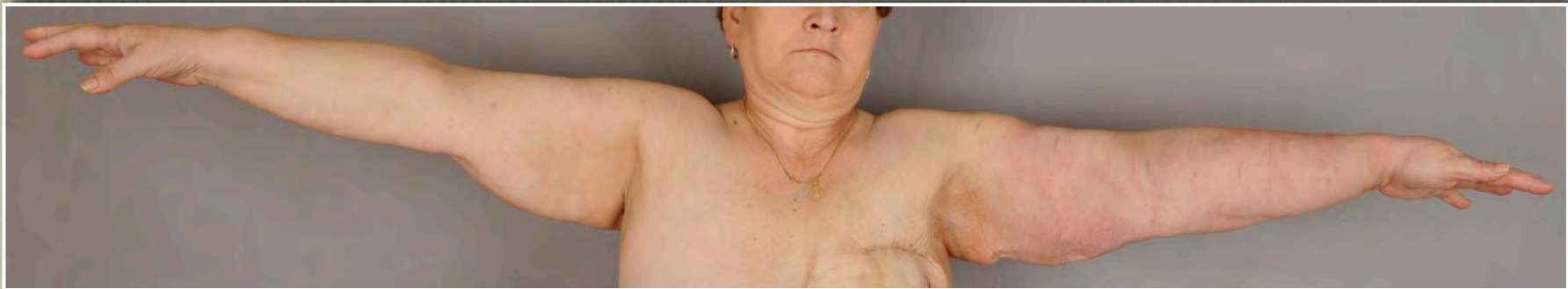


3 months postop. 340 ml (92% reduction)

Results



Preop. 4 235 ml

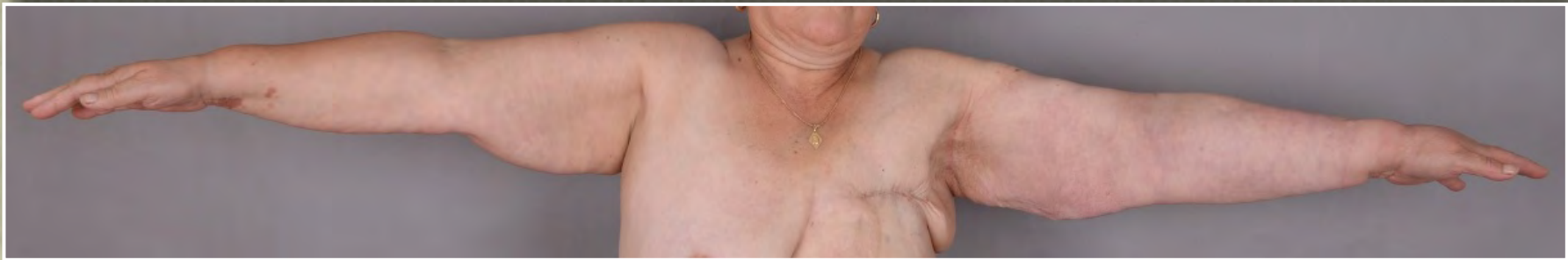


6 months postop. 195 ml (95% reduction)

Results



Preop. 4 235 ml



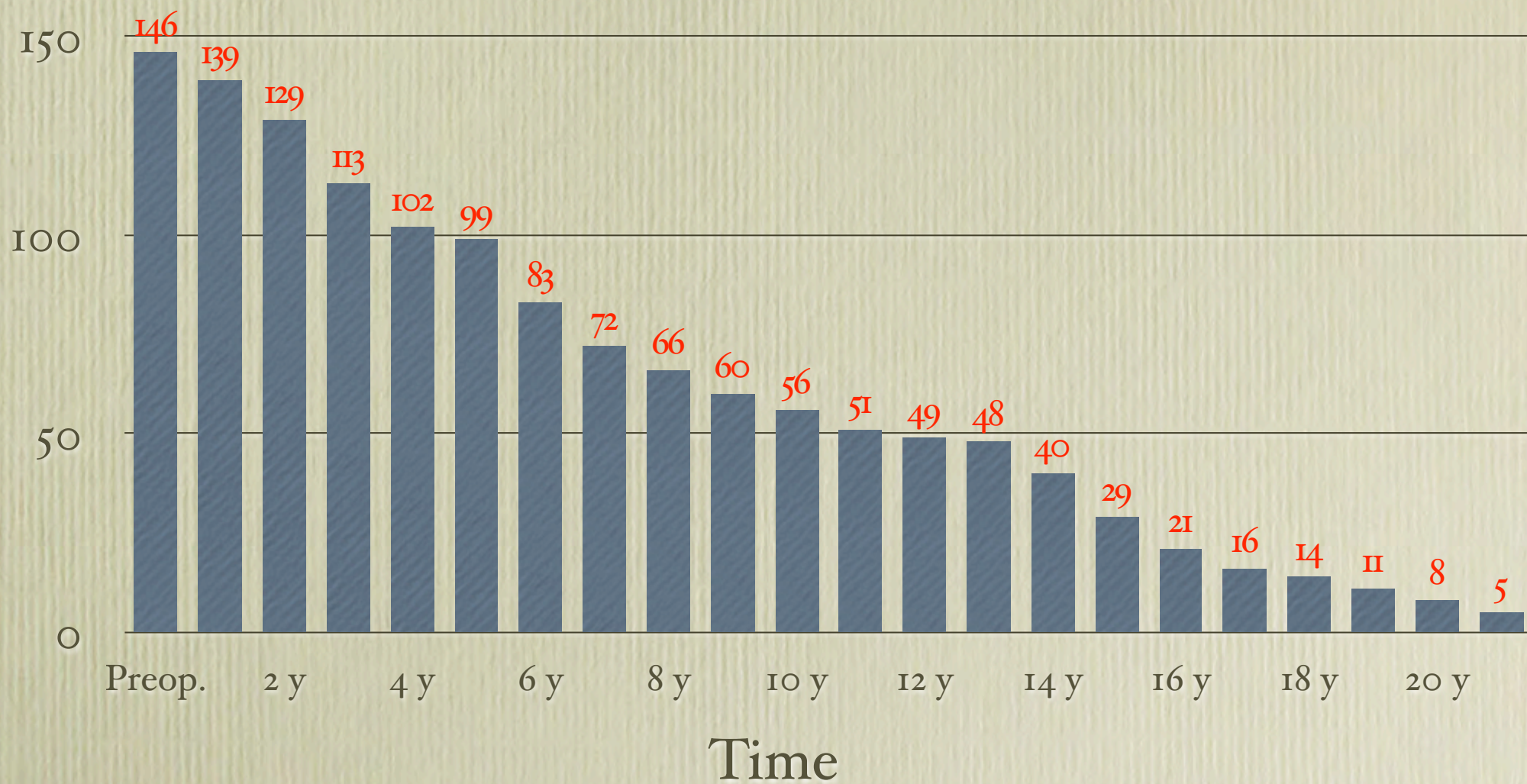
12 months postop. 100 % reduction

Volume measurements

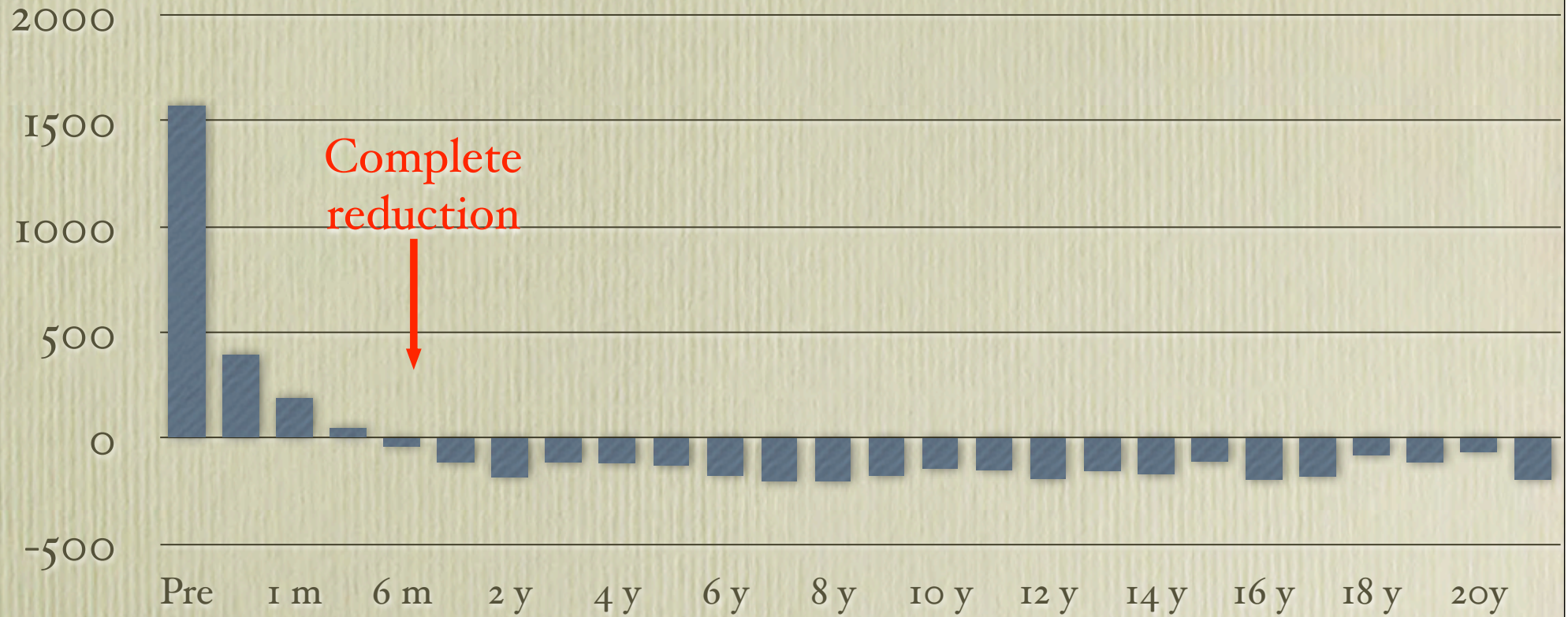


Preoperative excess volume
1 568 ml (545-4 235)

Follow-up

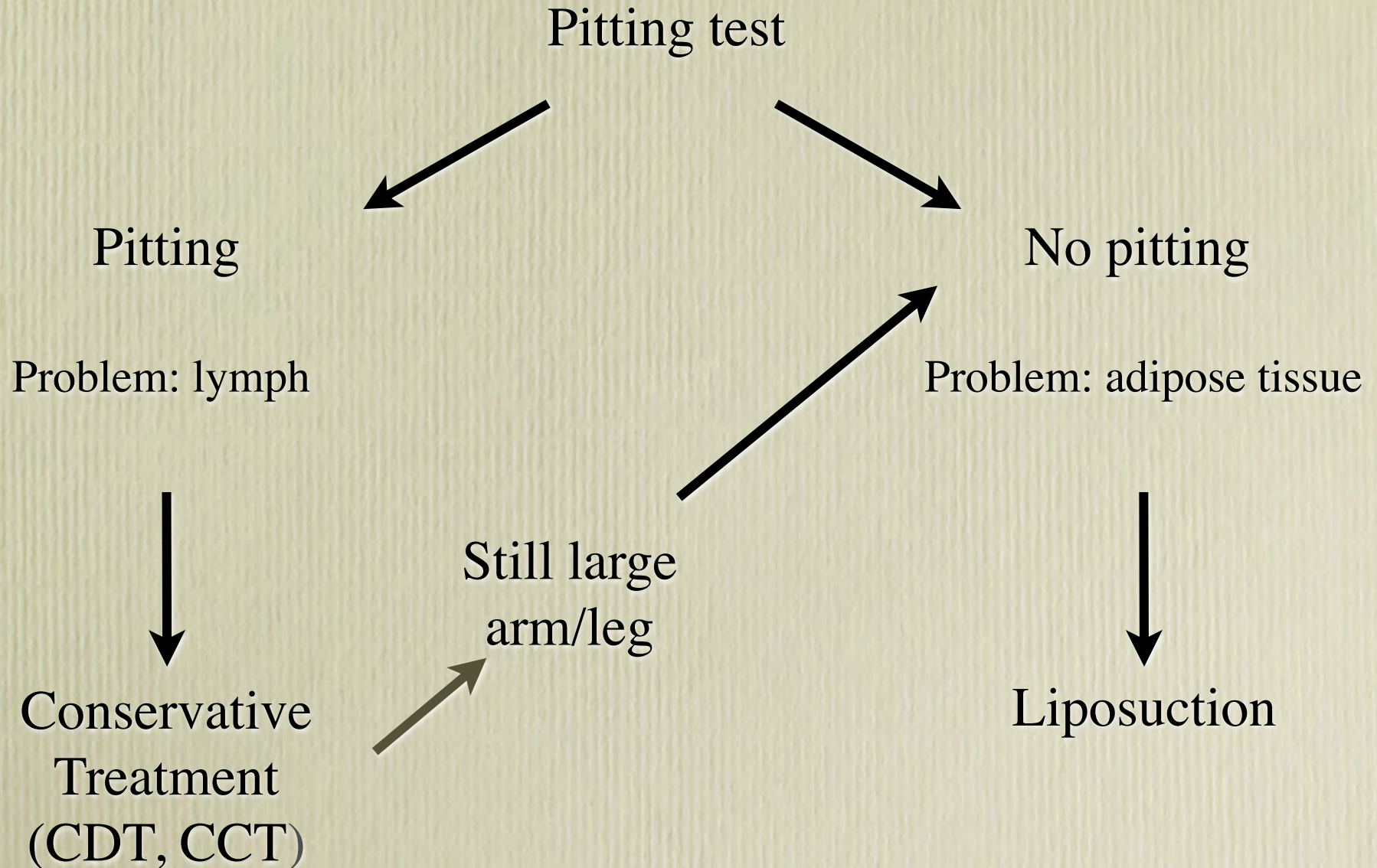


Excess volume reduction (ml)



Time

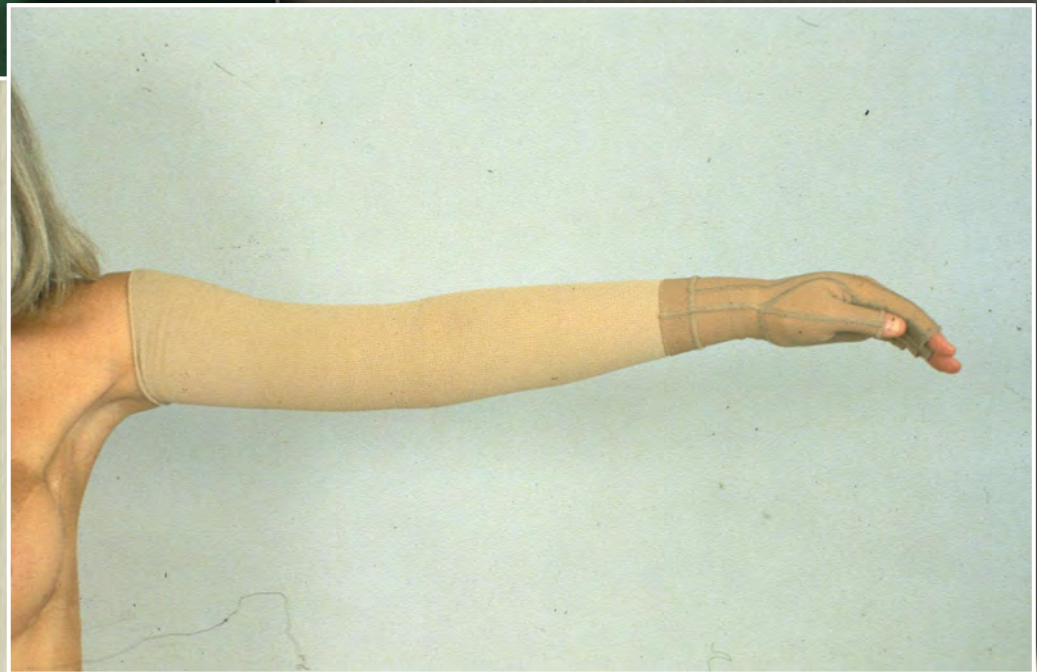
Classification



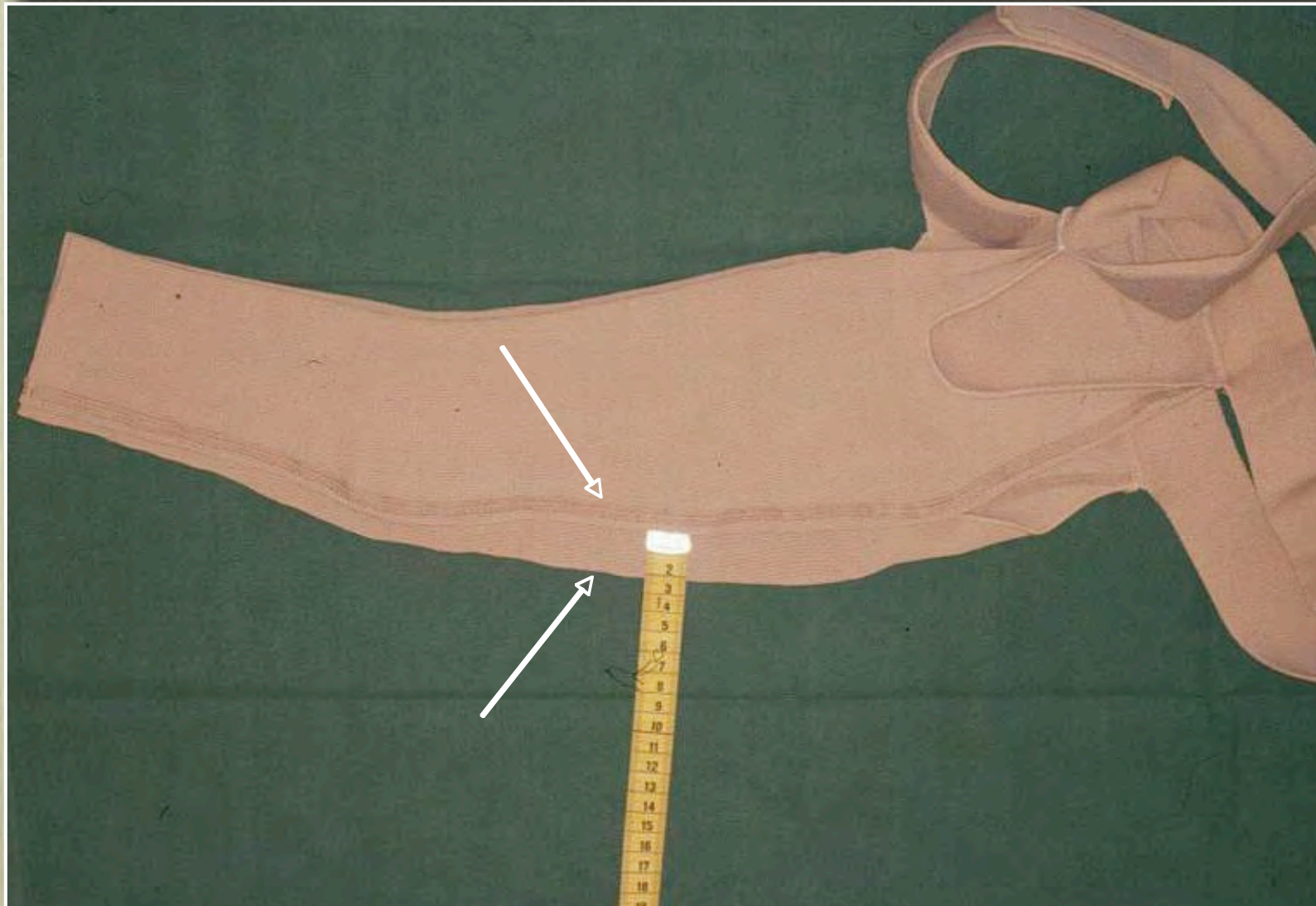
Controlled Compression Therapy (CCT) with flat-knitted garments

- simple
- economic
- efficient
- no need for maintenance therapy





The effect of washing



Controlled Compression Therapy

CCT

Controlled Compression Therapy

- we do not use bandaging
- we do not use manual lymphatic drainage (MLD)
- we do not use pumps

Controlled Compression Therapy

- measurements are taken on the healthy arm 2 weeks before surgery (= template)
- gradually take in the garment by the team or by the patient herself, or
- frequent renewals of garments
- initial frequent check-ups: 0.5, 1, 3, 6, (9) 12 months
- then at 1,5 years and after 2 years only once a year

How does CCT work?

How does it work over time?

Analysis of 4 patient cases step by step

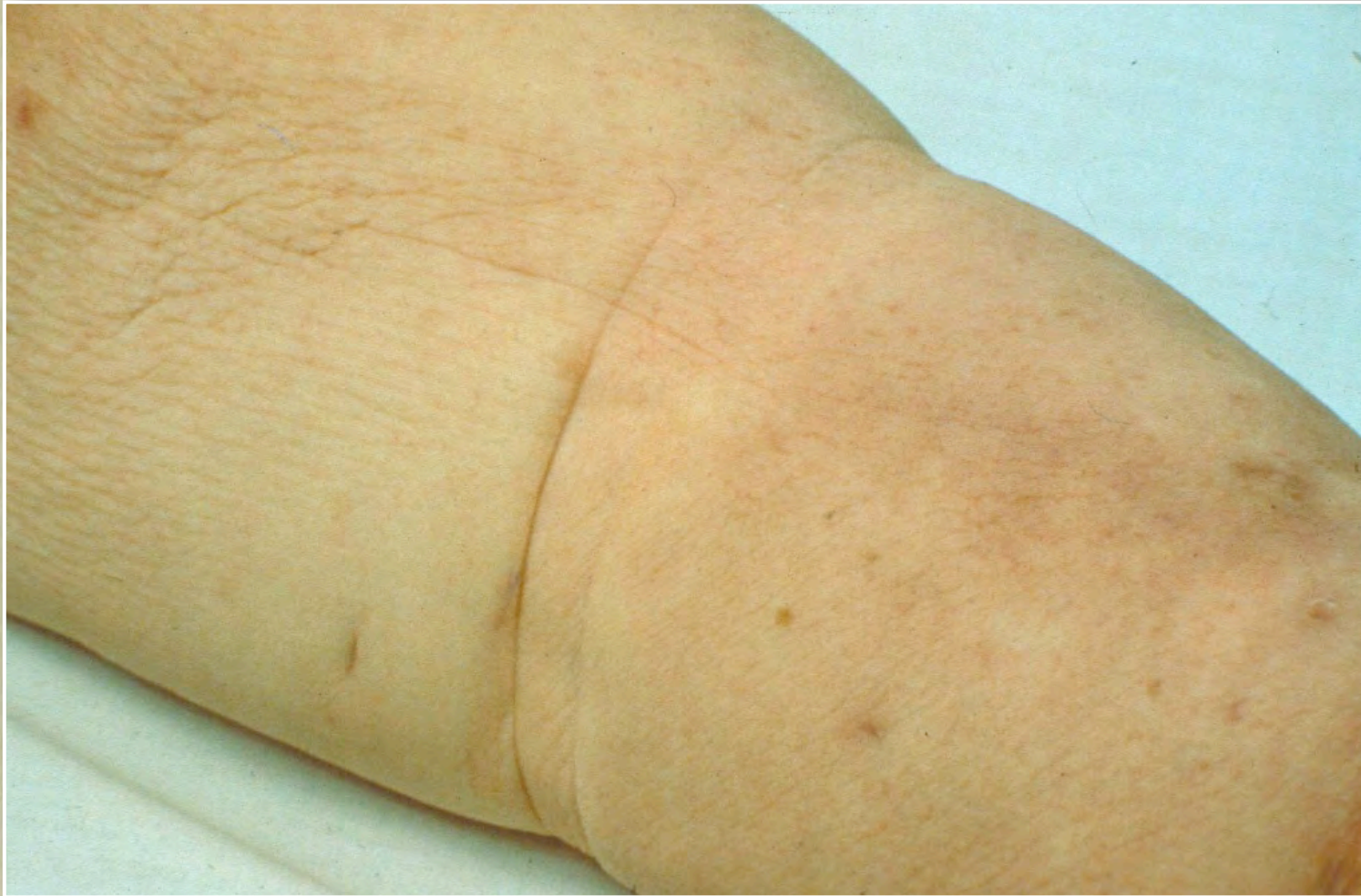
How can compression be increased?

- decrease circumferential measurements of garments
- take in existing garments
- multilayer
- increase compression class
- amount of garments

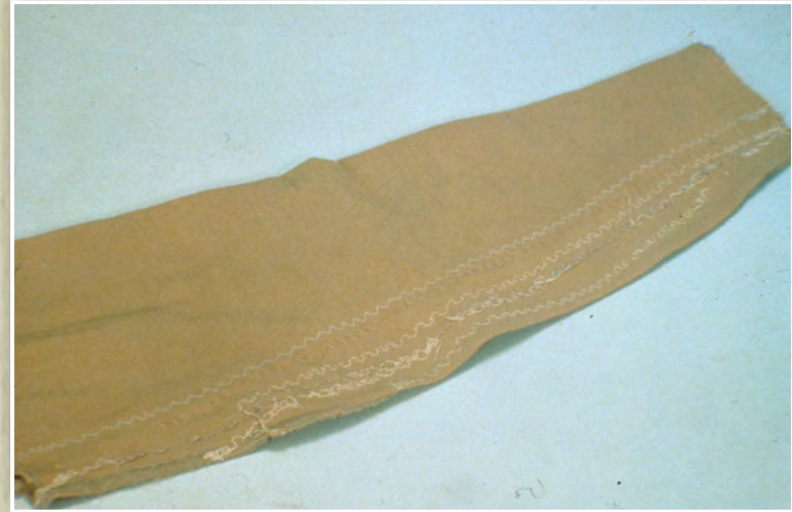
Decrease circumferential measurements of garments



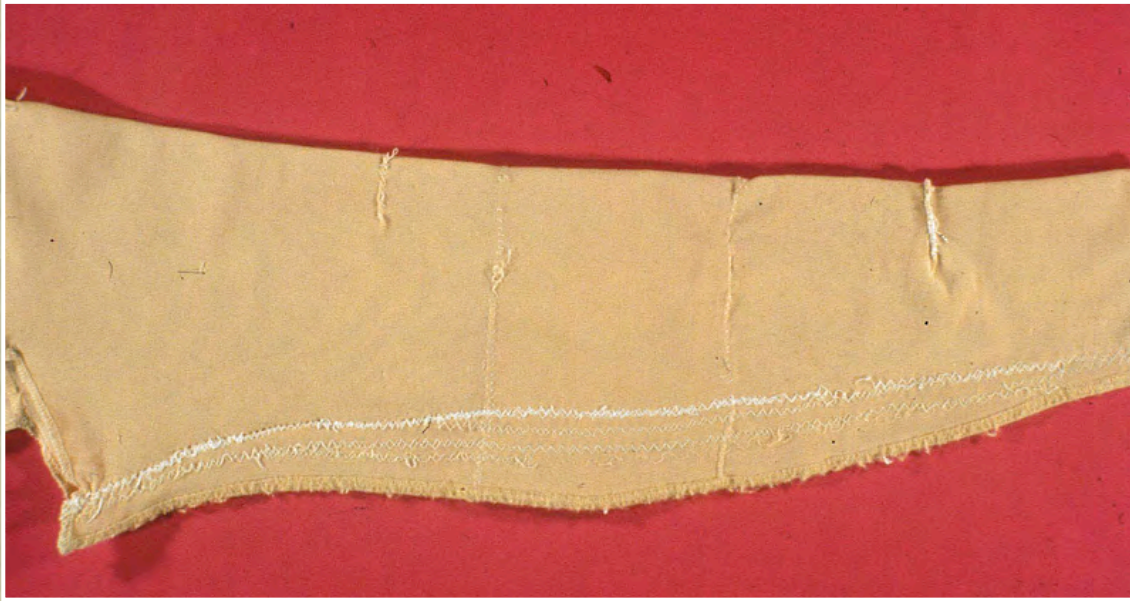
Decrease circumferential measurements of garments



Take in existing garments



Take in existing garments



Multilayer



How can compression be increased?

- decrease circumferential measurements of garments
- take in existing garments
- multilayer

How can compression be increased?

- decrease circumferential measurements of garments
- take in existing garments
- multilayer
- increase compression class
- amount of garments

Preoperative measurements

Arms - CCL II

Legs - CCL II and III

CCL I: mild 15-21 mm Hg

CCL II: moderate 23-32 mm Hg

CCL III: strong 34-46 mm Hg

4 patients

- Age: 18 – 69 years
- 3 females, 1 male
- Duration: 2 - 27 years
- 2 primary, 2 secondary

Patient A:

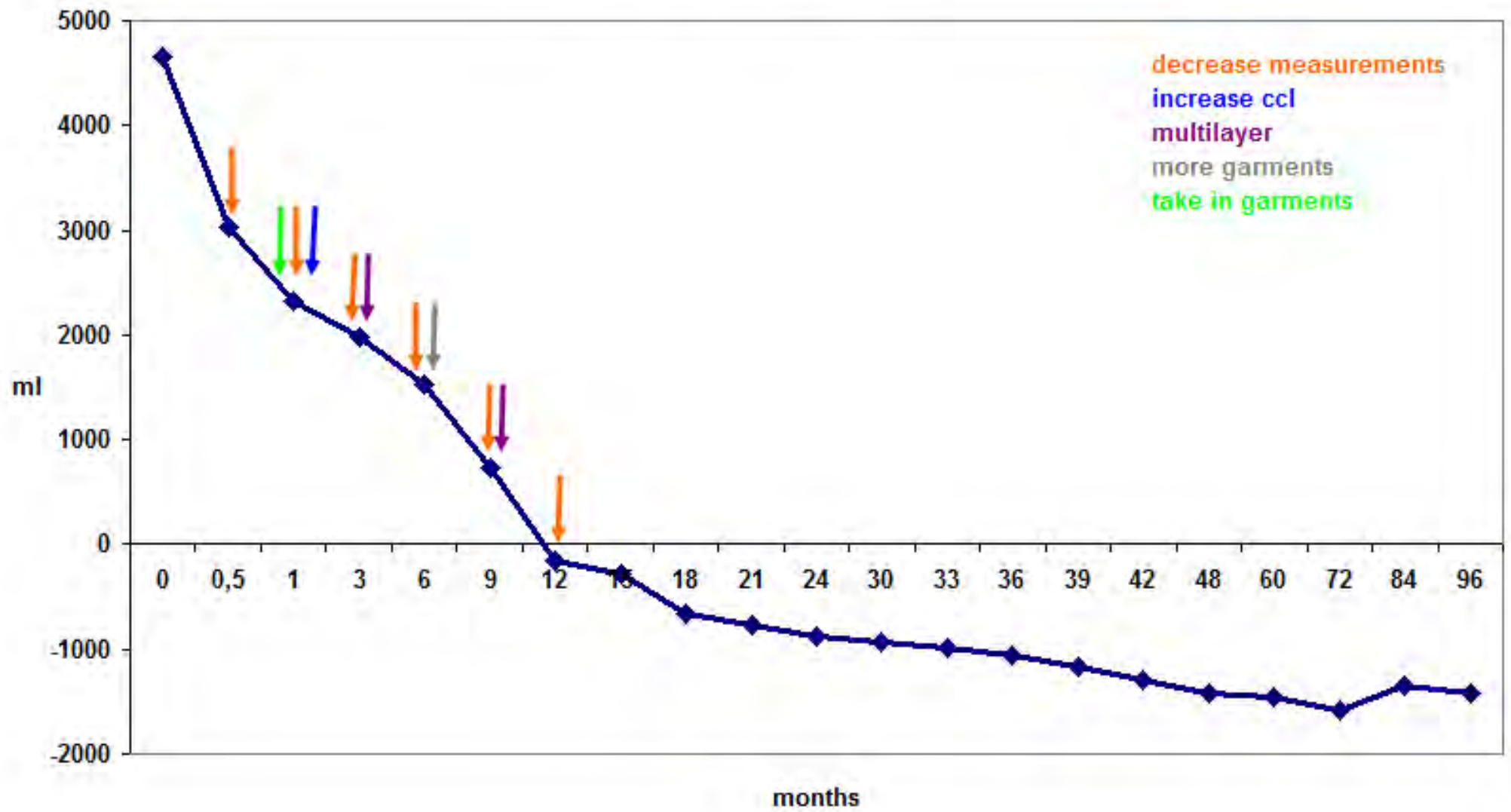


Preop. 4 655 ml

Patient A

- Male
- Born 1945
- Secondary lymphedema since 27 years
- Retired
- Physically active: skiing, working on the house

Patient A Excess volume





Preop. 4 655 ml



4 years postop. - 1 420 ml

Patient B

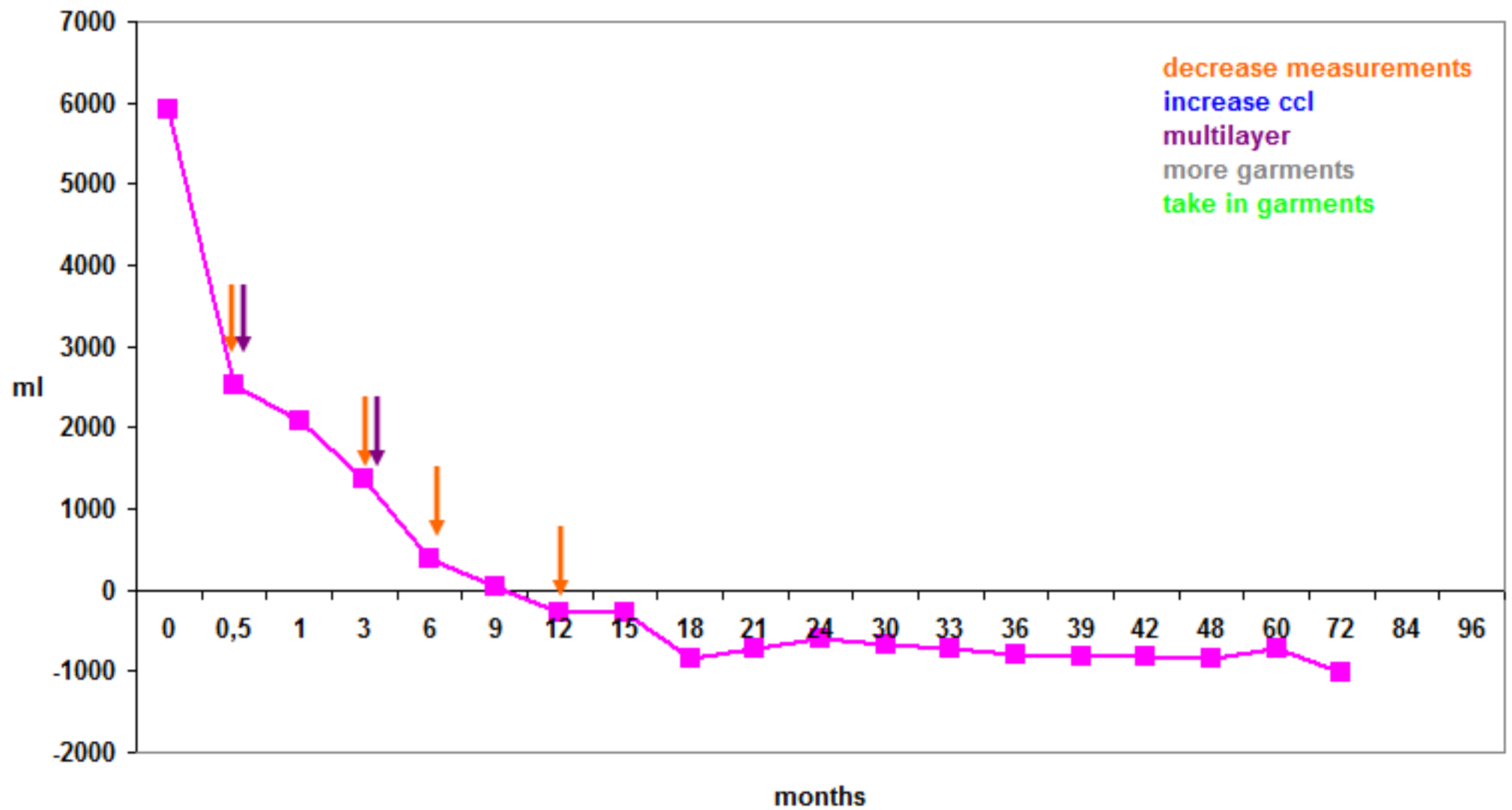


Preop. 5 925ml

Patient B

- Female
- Born 1940
- Secondary Lymphedema since 9 years
- Retired
- Intellectual interests: art, reading

Patient B Excess volume



Patient B



Preop. 5 925ml



3 years postop. -795 ml

Patient C

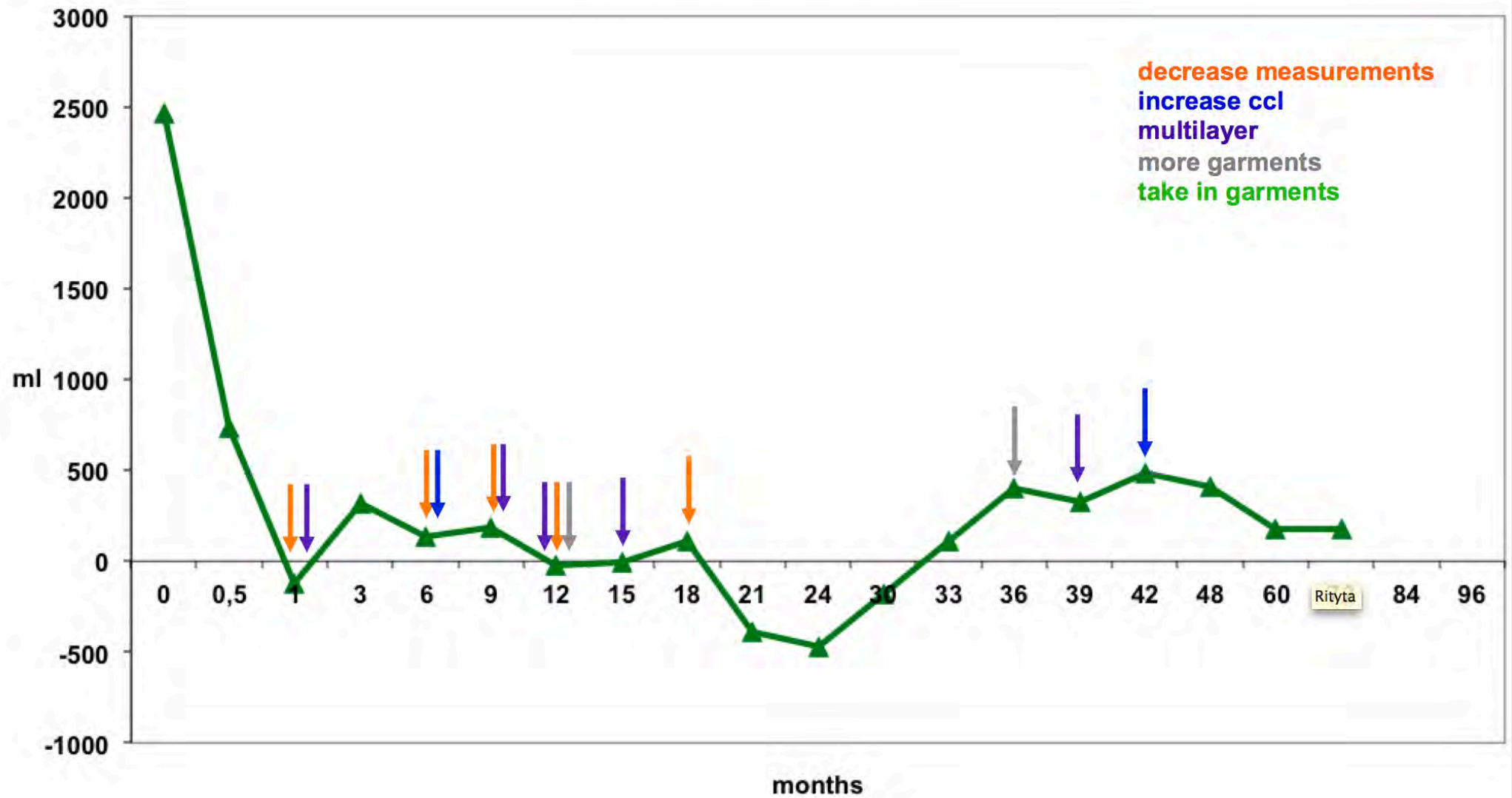


Preop. 2 555 ml

Patient C

- Female
- Born 1951
- Primary lymphedema since 23 y
- Works full time in an office
- Physical active life: jogging, aerobics, skiing

Patient C Excess volume



Patient C



Preop. 2 555 ml



6 years postop. 180 ml

Patient D

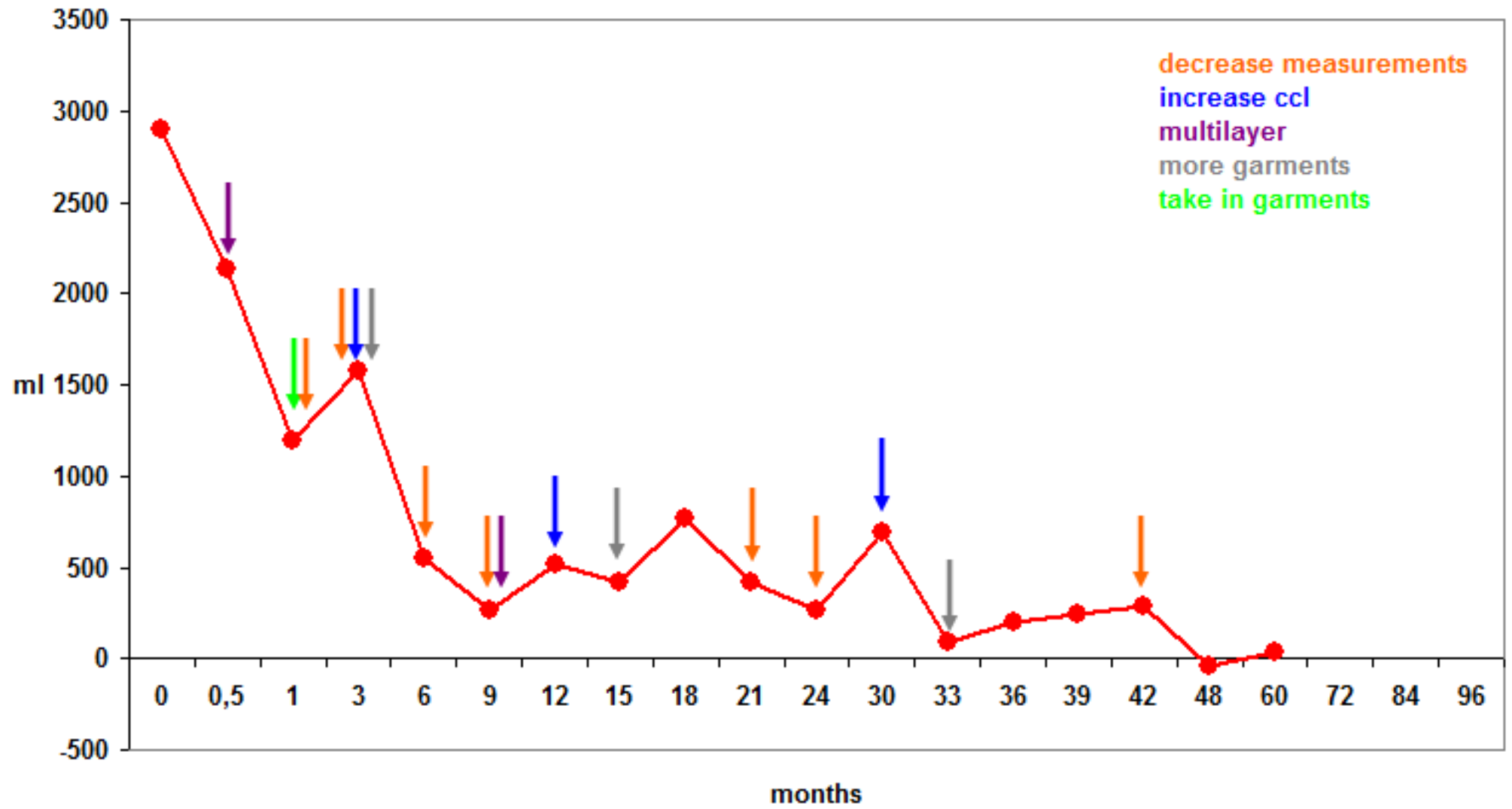


Preop. 2 900 ml

Patient D

- Female
- Born 1991
- Primary lymphedema since 2 y
- Student
- Physical active life: riding, dancing

Patient D excess volume



Patient D



Preop. 2 900 ml



4 years postop. -40ml

- A: 4 set/6months (born 1945)
- B: 3 set/6 months (born 1940)
- C: 7 set/6 months (born 1951)
- D: 9 set/6 months (born 1991)

Incidence of cellulitis

130 patients with postmastectomy arm lymphedema

76 patients had cellulitis preop.

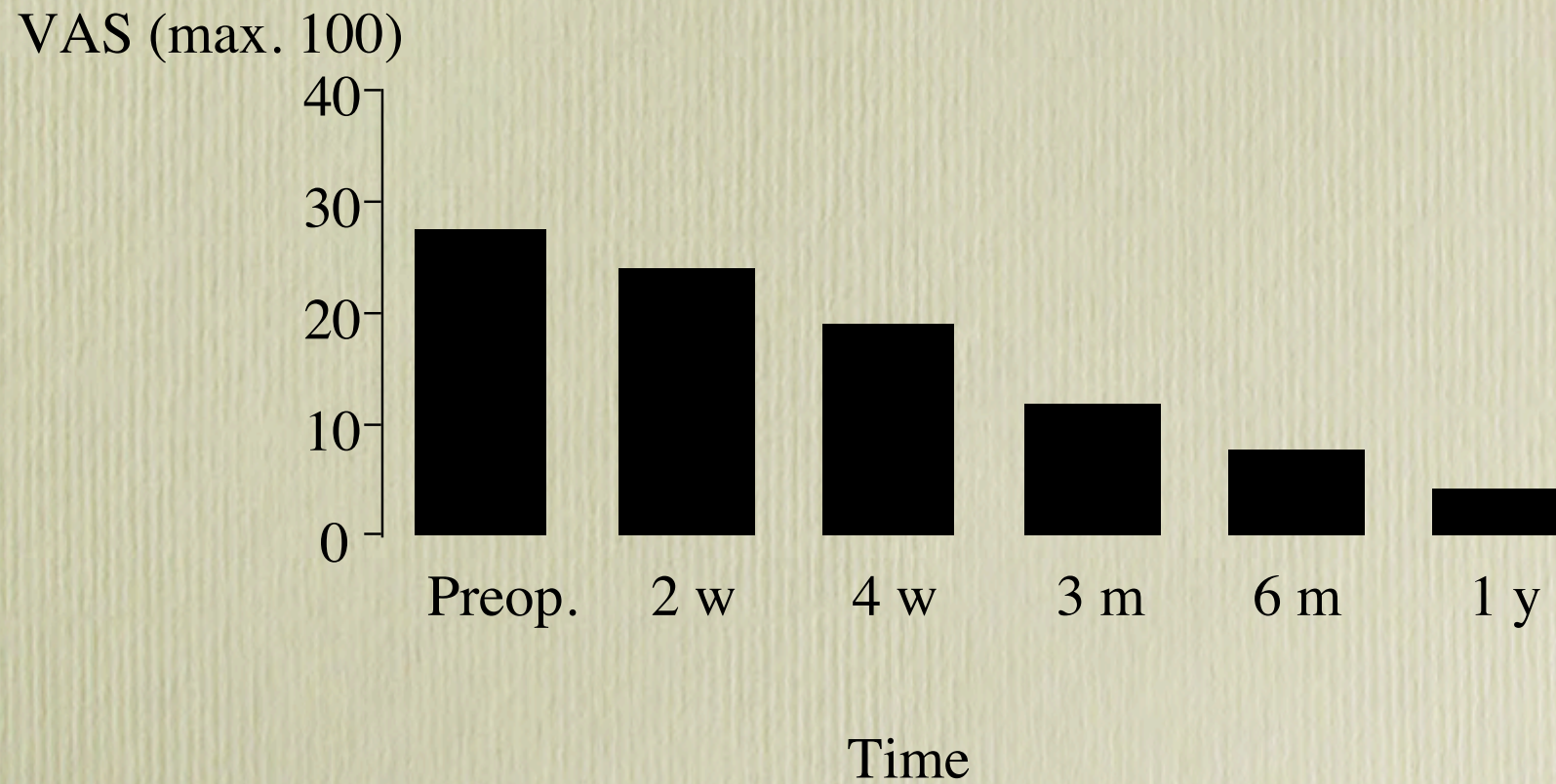
19 patients had cellulitis postop.

Preoperative = 0.47 (534 bouts/1147 observation years)

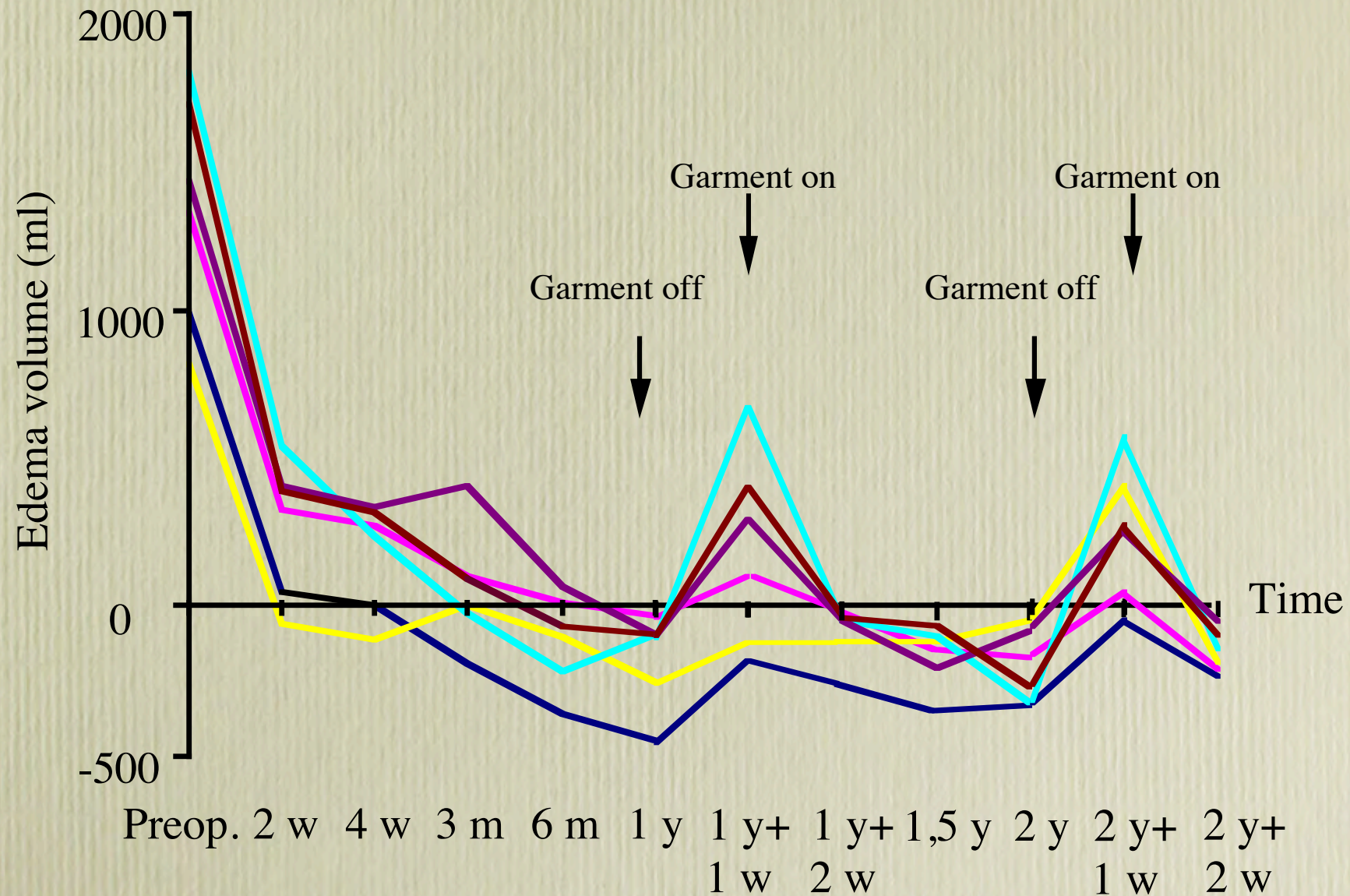
Postoperative = 0.06 (60 bouts/983 observation years)

87 % reduction ($p < 0.001$)

Pain



Compression garment removed - what happens?



Top 10 ways to control edema

- compression
 - compression
 - compression
 - compression
 - compression
- compression
 - compression
 - compression
 - compression
 - compression



Liposuction works on legs as well



Preop. 14 310 ml



7 years postop.

Results



Preop. 14 310 ml



8 years postop.

Preop.



14 310 ml

After CCT



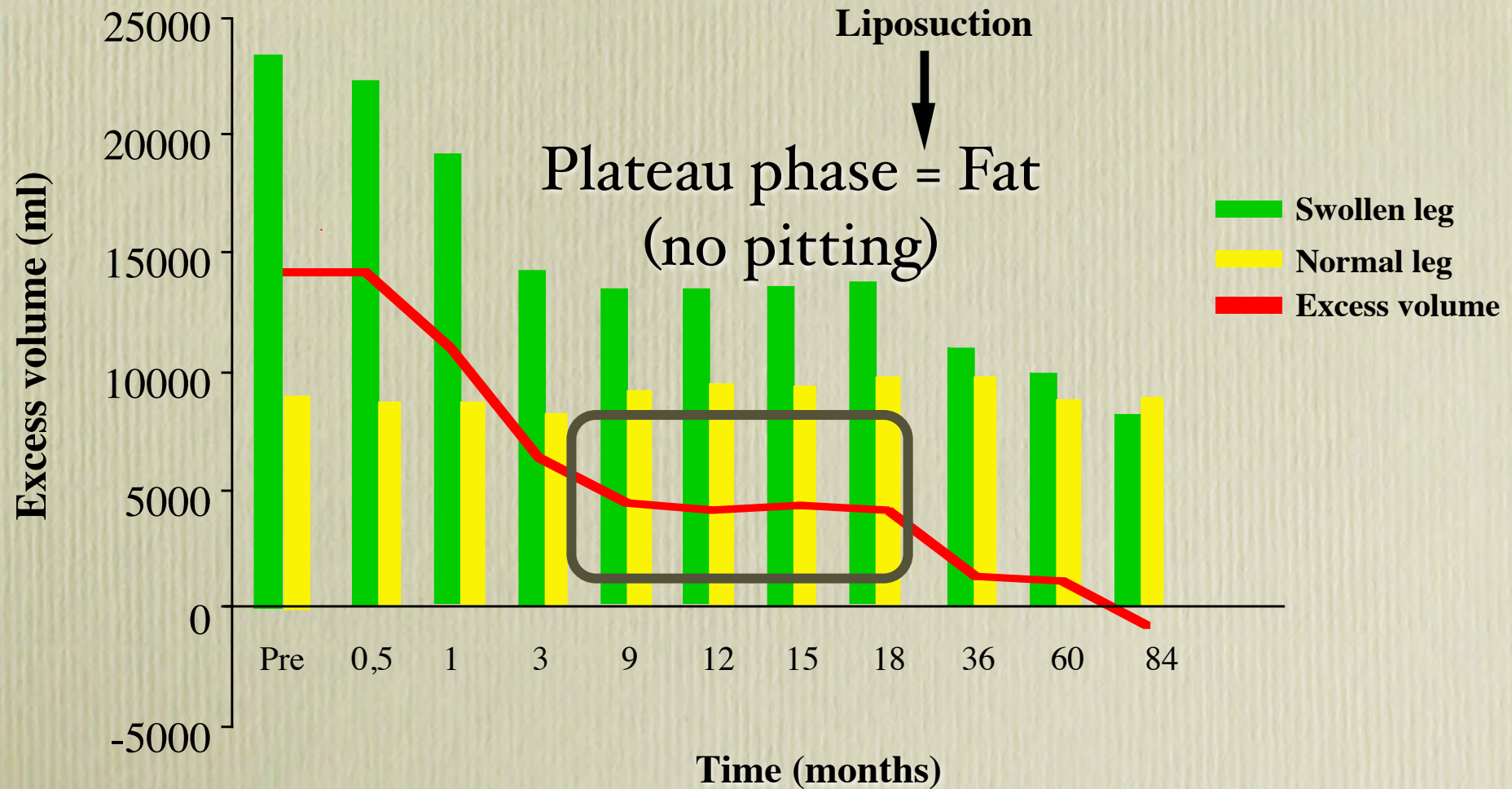
4 170 ml

After liposuction



-865 ml

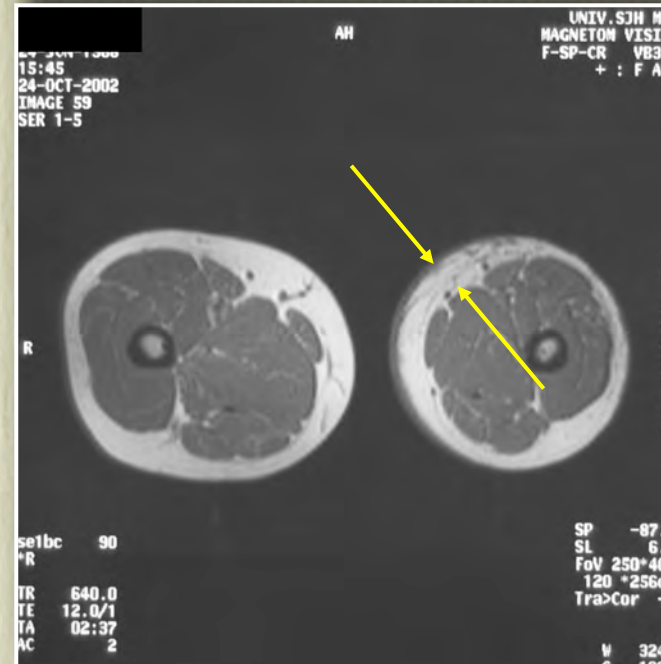
Controlled Compression Therapy (CCT) + Liposuction and CCT



MRI



Before liposuction



After liposuction

Primary lymphedema



Preop. 6 630 ml



2 years postop.



10 years postop.

Secondary lymphedema



Preop. 7 070 ml



6 m postop -445 ml

Secondary lymphedema



Preop. 7 070 ml

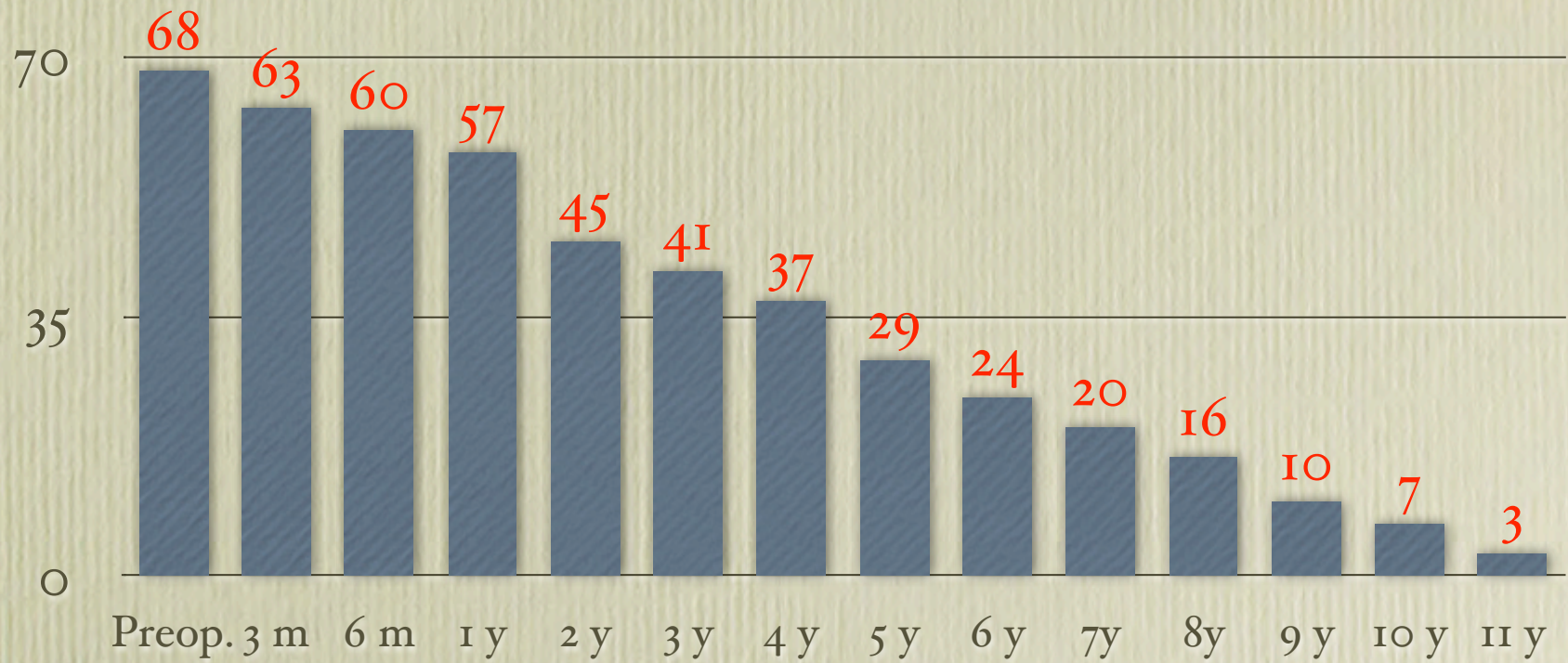


6 m postop -445 ml



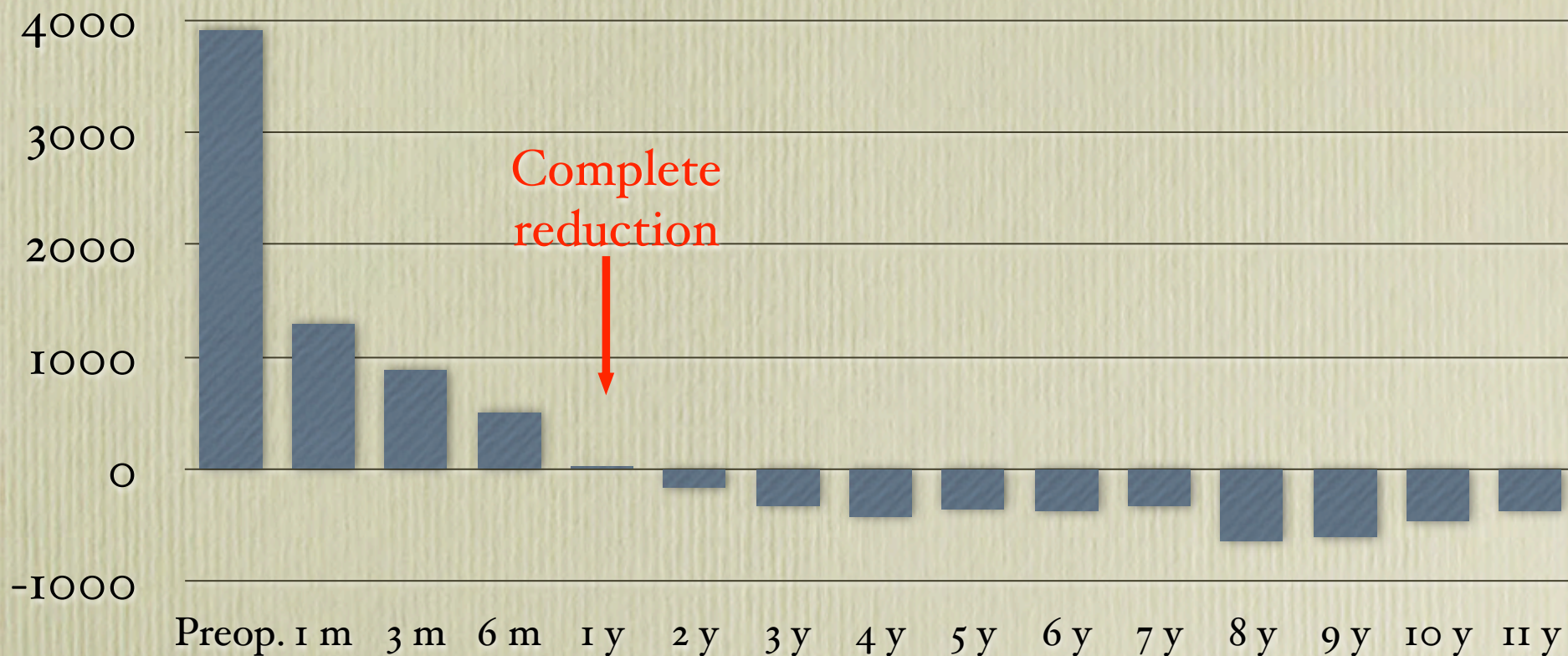


Follow up



Time

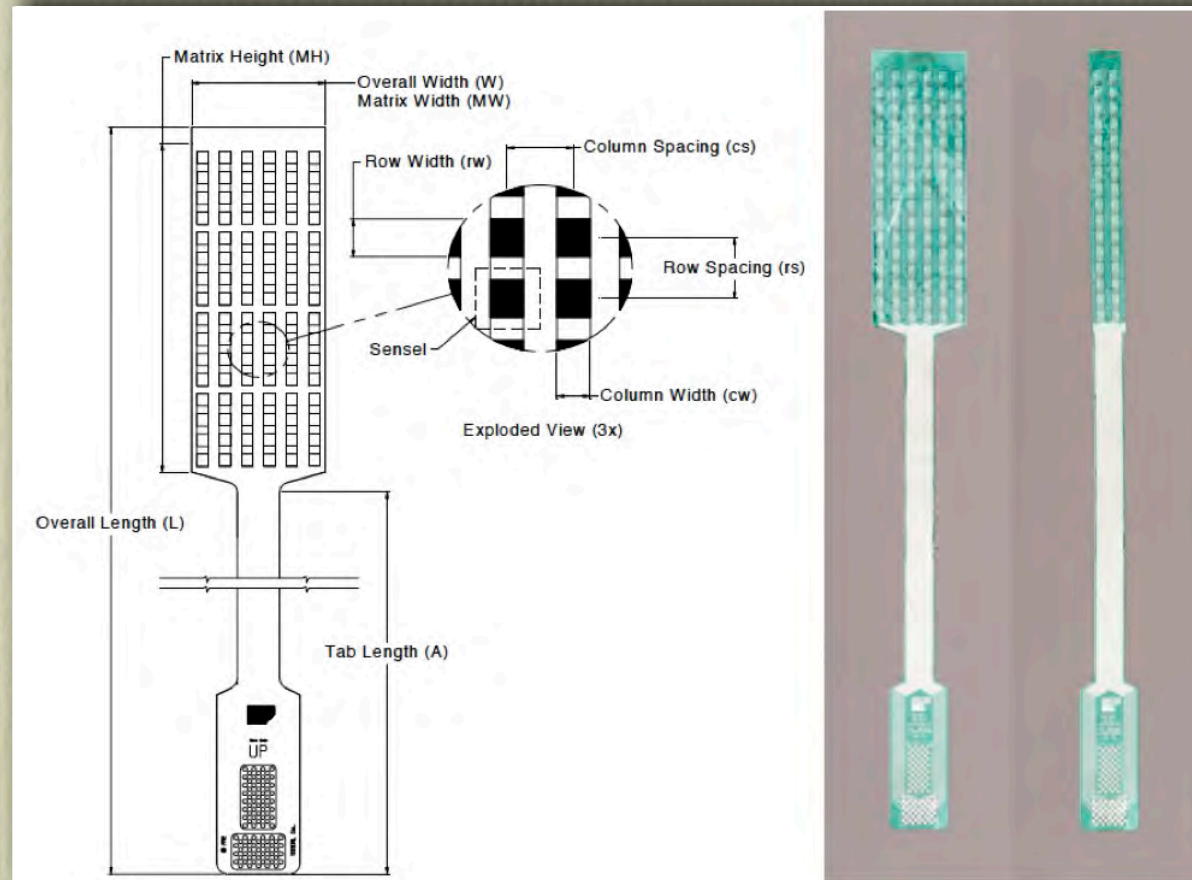
Excess volume reduction (ml)



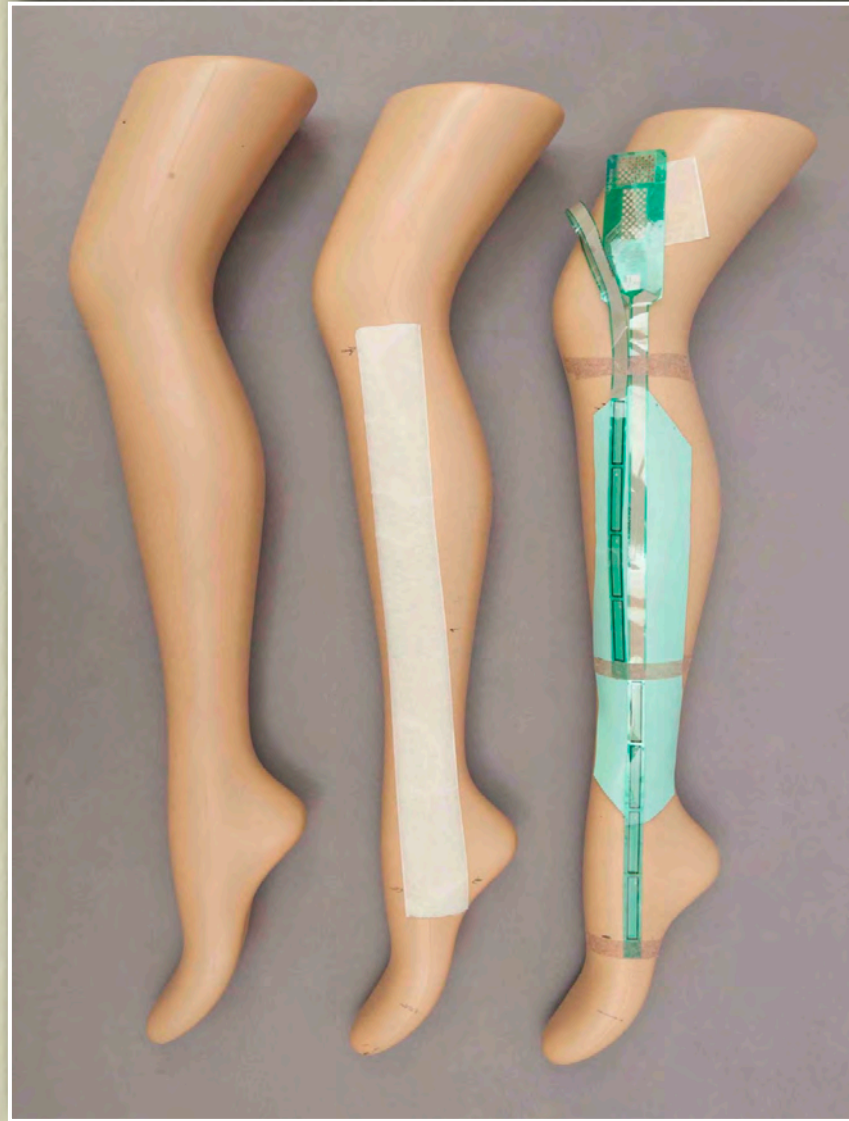
Time

Current research

Measuring pressure under compression garments using Tecscan Type K-scan



Current research



Current research

LYMPHATIC RESEARCH AND BIOLOGY

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Development of a Pressure-Measuring Device to Optimize Compression Treatment of Lymphedema and Evaluation of Change in Garment Pressure with Simulated Wear and Tear

Håkan Brorson, M.D., Ph.D., Emma Hansson, M.D., M.A., Ph.D., Erik Jense, M.D.,
and Carolin Freccero, M.D., Ph.D.

Arin K. Greene
Sumner A. Slavin
Håkan Brorson
Editors

Lymphedema

Presentation, Diagnosis,
and Treatment

 Springer

Teamwork!!!





Preop. 12 350 ml



6 months postop.



Thank you for your attention!