ICC - Compression session
May 14, 2015

elastic stockings or inelastic bandages for ulcer treatment

Giovanni Mosti; Lucca; Italy

DISCLOSURE:

NO CONFLICT OF INTEREST

leg ulcers

31.619 patients

- venous 47.6 %
- mixed 17.6 %
- arterial 14.5 %
- other* 20%

65,2%

*vasculitis, pioderma gangrenosum, infections, neoplastic, drug induced

Körber A, Klode J, Al-Benna S, et al..**Etiology of chronic leg ulcers in 31,619 patients in Germany analyzed by an expert survey.** J Dtsch Dermatol Ges. 2011 Feb;9(2):116-21.

differential diagnosis of leg ulcers

a venous pathophysiology, alone or combined with arterial disease, occurs in about 65% of leg ulcers

the main pathophysiologic mechanism is ambulatory venous hypertension

therapeutic procedures

every therapeutic procedure must reduce the ambulatory venous hypertension

this can be done by:

- surgery (flush ligation and stripping, deep vein surgery, CHIVA)
- endovascular procedures (LASER, radiofrequency, foam sclerotherapy)
- compression therapy

compression therapy

compression can normalize AVH by narrowing/occluding the vein system

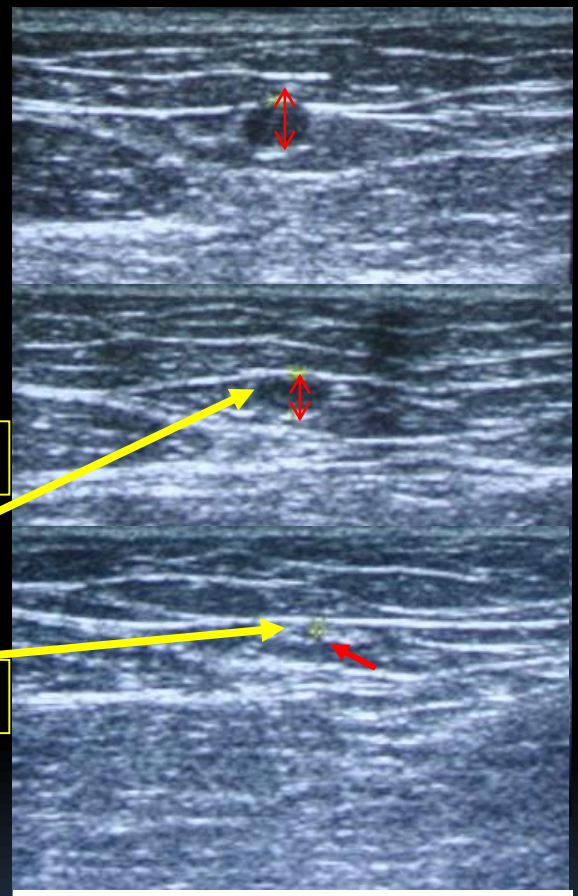
narrowing/occluding the vein system is the only way to:

- reduce venous reflux
- increase venous pumping function

which are the main hemodynamic determinants leading to AVH

which pressure to narrow/occlude veins?

courtesy of Prof. H. Partsch



20-25 mm Hg in supine position
50-60 mm Hg in sitting position
70 mm Hg in standing position

Partsch B, Partsch H. Calf compression pressure required to achieve venous closure from supine to standing position. J Vasc Surg. 2005; 42: 734-738.

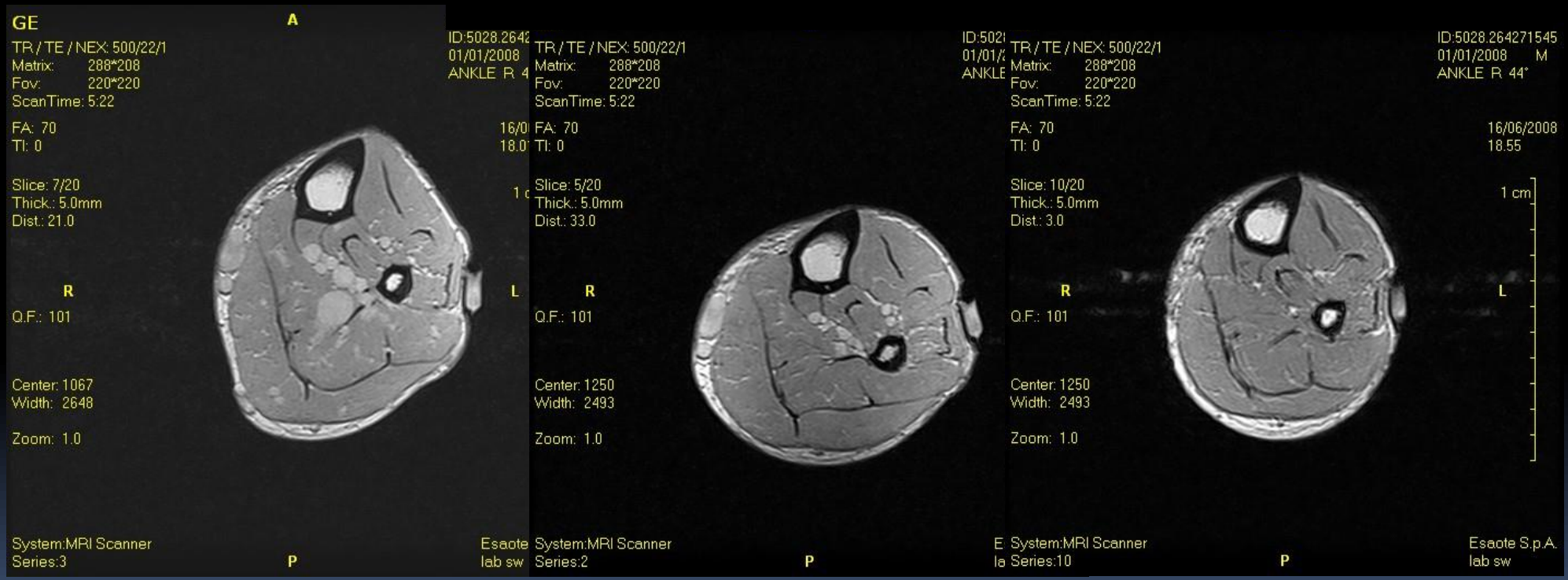
which pressure to narrow/occlude veins?

standing position

tilting NMR; Esaote; Genoa; Italy

Rosidal mobil

Rosidal sys

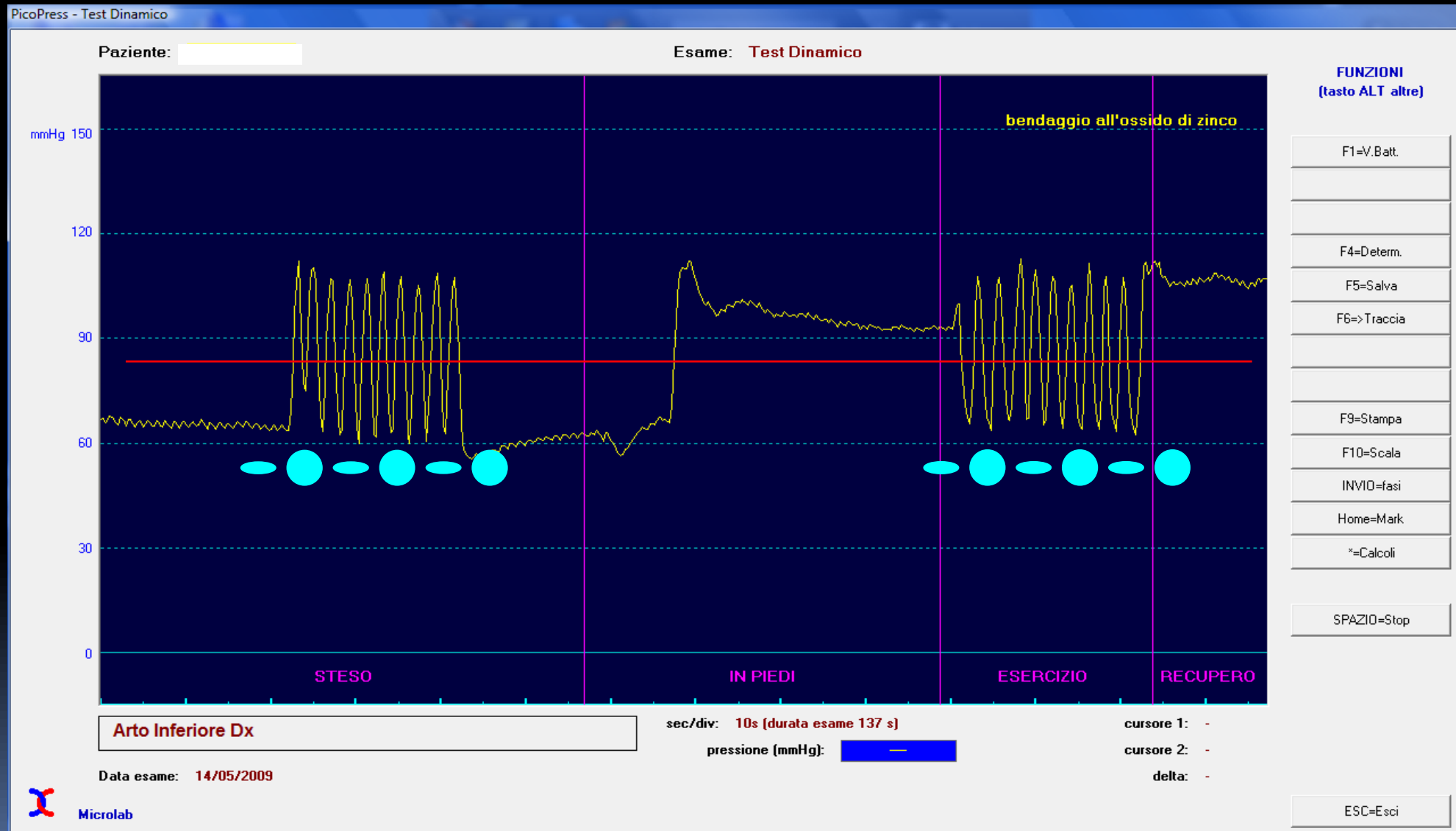


baseline

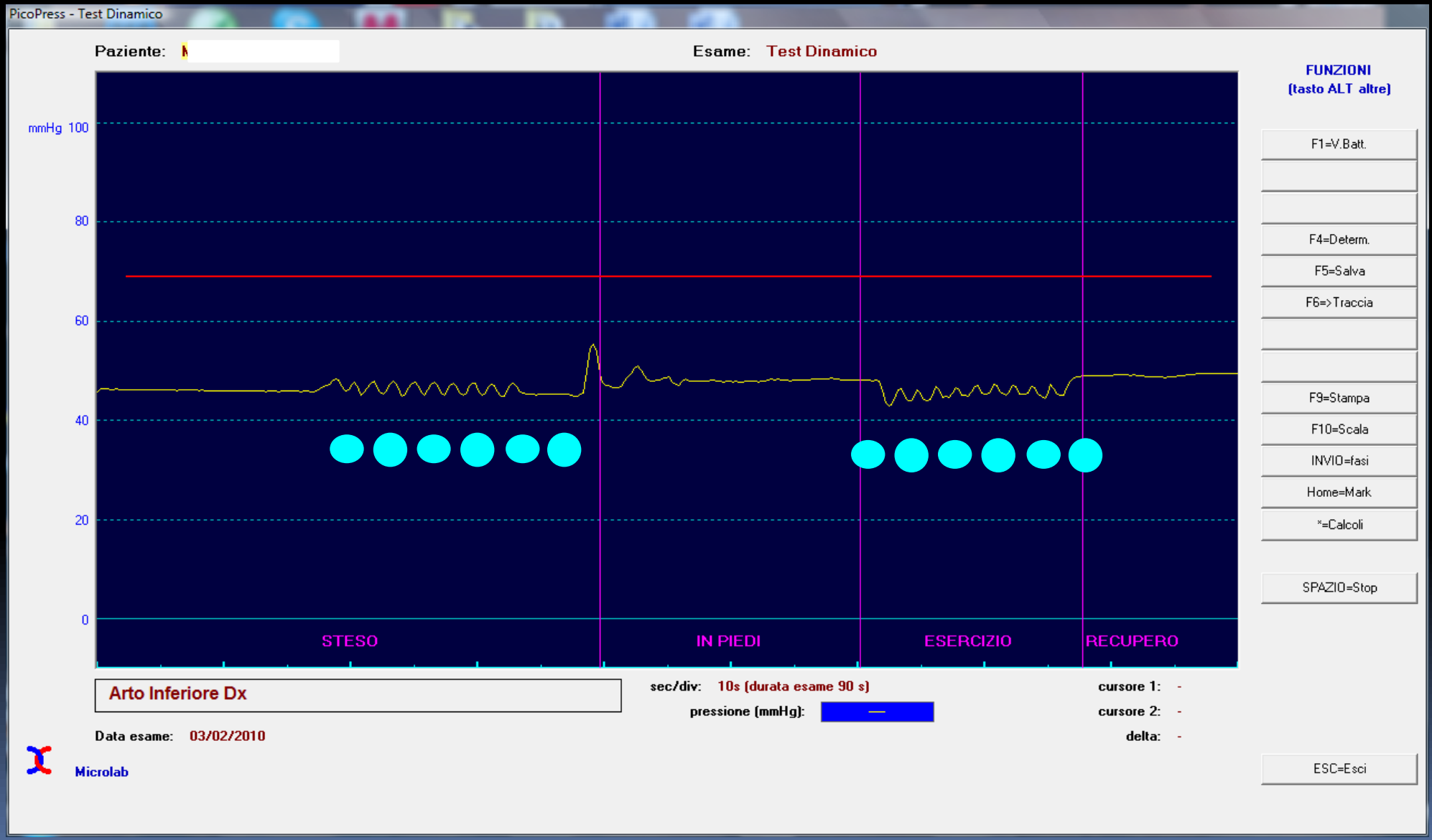
34→40

51→83

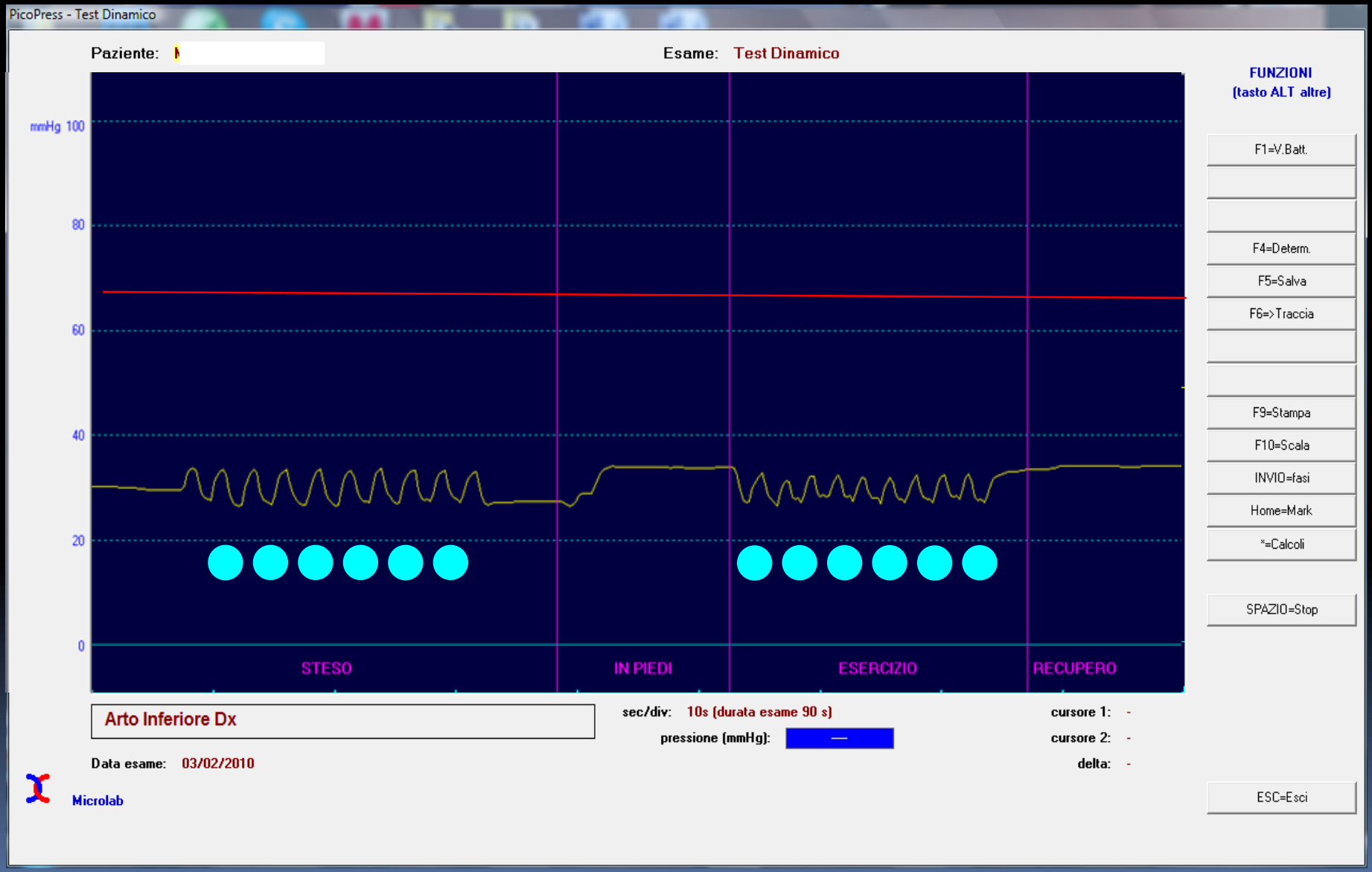
elastic or inelastic compression?



elastic or inelastic compression?



elastic or inelastic compression?



haemodynamic impairment in venous disease

venous reflux

inelastic- prevents venous reflux significantly more than elastic material

this was proved with:

- air plethismography in patients with DVT (1)
- duplex in patients with SVI (2)

1. Partsch H, Menzinger G, Mostbeck A. Dermatol Surg. 1999 Sep;25(9):695-700.
2. Mosti G, Partsch H. Int Angiol. 2010 Oct;29(5):416-20.

haemodynamic impairment in venous disease

ejection fraction

- only inelastic bandage restores the impaired ejection fraction of patients with venous insufficiency into its normal range (1);
- this can be done even with low pressure (2)
- the effect is maintained overtime despite a significant pressure loss (3)

1. Mosti G, Partsch H. Int Angiol. 2010 Oct;29(5):421-5.
2. Mosti G, Partsch H. Phlebology. 2010 Jun;25(3):145-50.
3. Mosti G, Partsch H. J Vasc Surg. 2010 Oct;52(4):925-31.

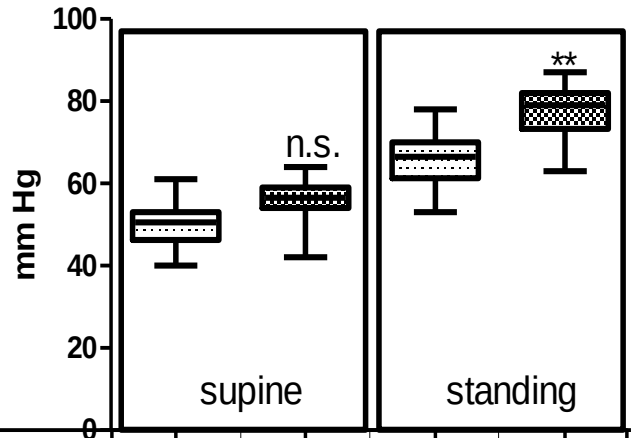
haemodynamic impairment in venous disease

reduction/abolition of venous reflux
venous pumping function increase

reduction of ambulatory venous hypertension

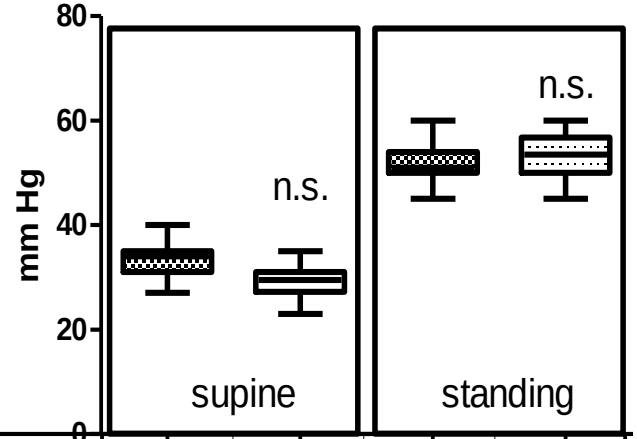
effect on healing rate of inelastic compression

supine and standing pressure (bandage application)



	C2L	UB	C2L	UB
Minimum	40.00	42.00	53.00	63.00
25% Percentile	46.25	54.00	61.25	73.25
Median	50.50	56.50	66.50	79.00
75% Percentile	53.00	59.00	70.00	82.00
Maximum	61.00	64.00	78.00	87.00

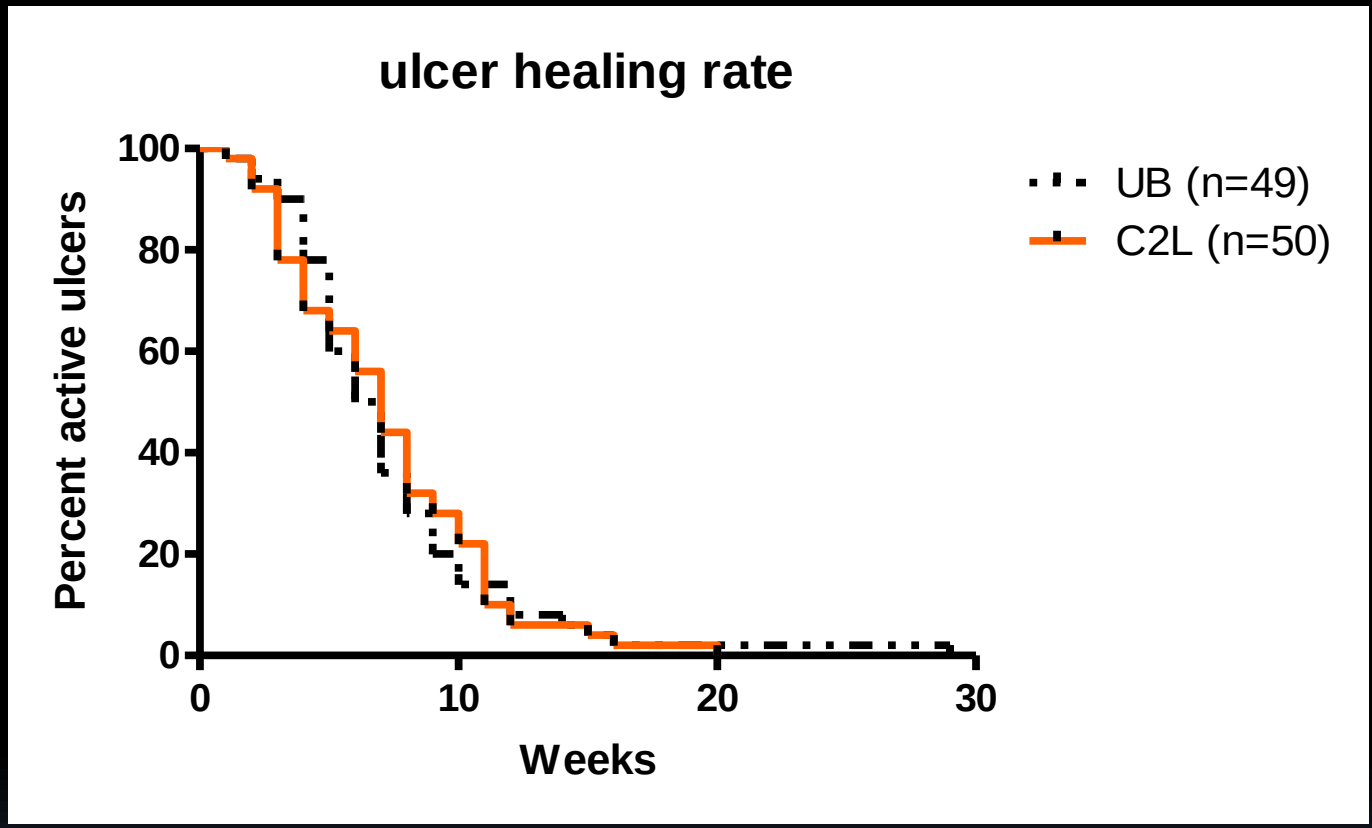
supine and standing pressure (bandage removal)



	C2L	UB	C2L	UB
Minimum	27.00	23.00	45.00	45.00
25% Percentile	31.00	27.25	50.00	50.00
Median	34.00	29.50	51.00	53.50
75% Percentile	35.00	31.00	54.00	56.75
Maximum	40.00	35.00	60.00	60.00

Mosti G, Crespi A, Mattaliano V. Comparison Between a New, Two-component Compression System With Zinc Paste Bandages for Leg Ulcer Healing: A Prospective, Multicenter, Randomized, Controlled Trial Monitoring Sub-bandage Pressures. Wounds 23, 5:126-134; 2011

effect on healing rate of inelastic compression



99 patients completed the study

47/50 patients (94%) in the C2L group

45/49 patients (91.8%) in the UB group

7 patients healed in the subsequent weeks

healed in 3 months;

elastic or inelastic compression?

inelastic compression applied with strong pressure is significantly more effective to counteract the AVH

it is extremely effective in promoting VLU healing when correctly applied

it should be considered the first choice in venous ulcer treatment

elastic or inelastic compression in current literature

why literature reports better outcomes with elastic materials (both bandages and stockings)?

major flaws:

- ✓ in almost all papers bandage pressure is not measured and stiffness not assessed
- ✓ who applied the bandage (level of expertise)
- ✓ adherence to treatment (is the patient allowed to remove and re-apply bandage by himself?)
- ✓ tourniquets? slippage? rolling?

elastic or inelastic compression in current literature

pressure is the dosage of compression and must be measured in modern studies on compression therapy

there is no other field in medical research where the dosage of a therapeutic procedure is not measured

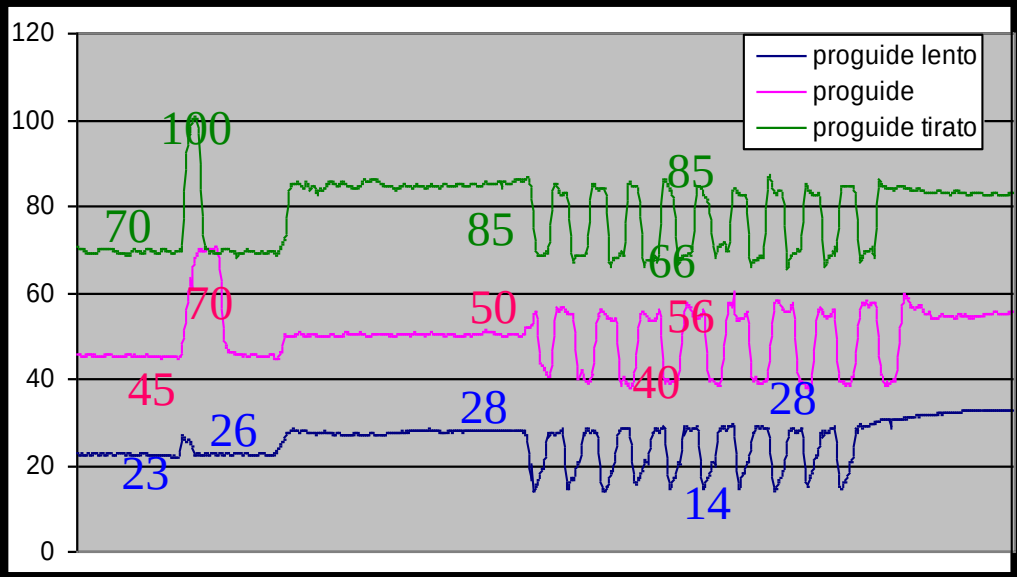
elastic or inelastic compression in current literature

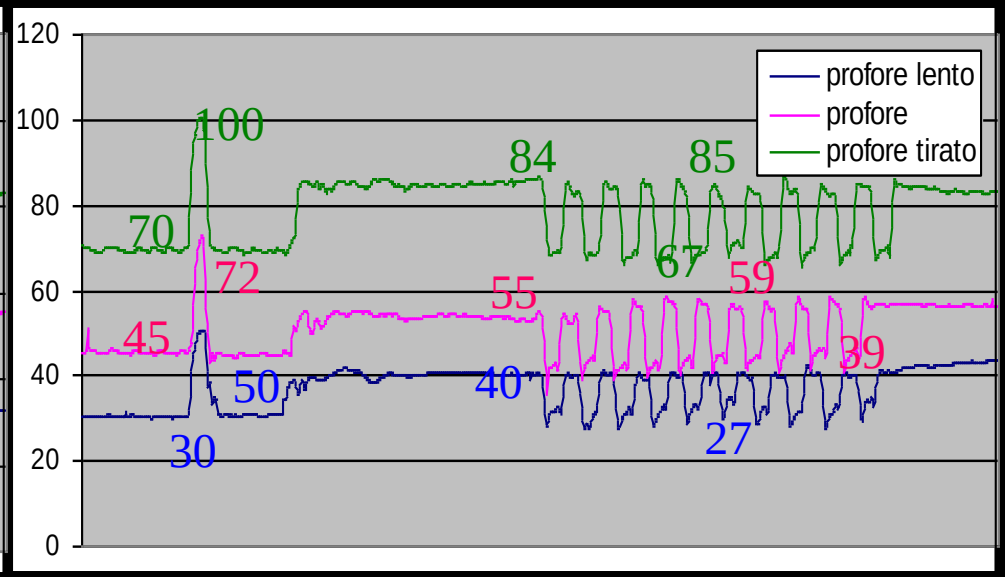
bandage pressure is extremely variable depending on the “bandage wrapper”

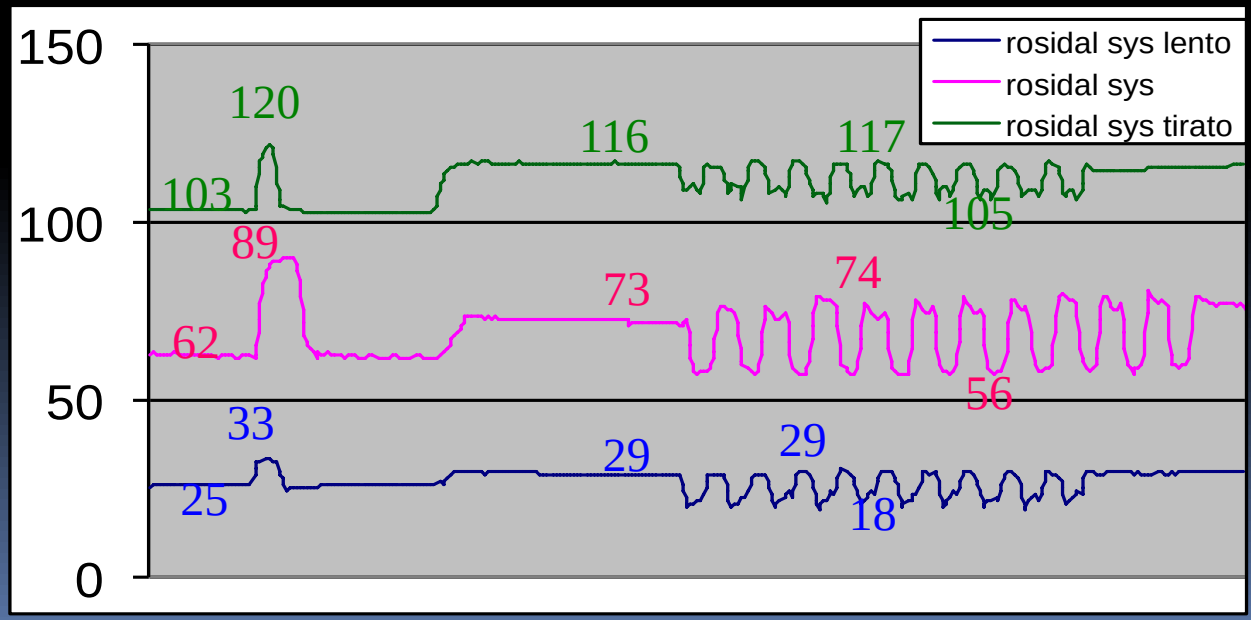
it only depends on the stretch applied by the “bandage wrapper” to the bandage: the pressure is not in the bandage but in our hands

this is not the case with elastic stockings

elastic or inelastic compression in current literature







elastic or inelastic compression in current literature

- when the pressure was measured 34.9% of nurses were unable to apply the intended pressure range in the supine position. The percent decreased to 17.5% after a training period
- 77% of these incorrect bandages were applied by nurses with more than 10 years of working experience
- before the bandage application the nurses were all confident to apply an adequate pressure.

Keller A, Müller ML, Calow T, Kern IK, Schumann H. Int Wound J. 2009 Oct;6(5):324-30.

elastic stockings or inelastic bandages?

elastic stocking exerting a pressure of 20-40 mm Hg at ankle level

- not able to compress the veins in the standing position
- not able to improve the impaired venous hemodynamics

are claimed to be more effective than inelastic bandages

elastic stockings or inelastic bandages?

Table I: Comparison between Sigvaris and Rosidal groups (median values, minimum to maximum values).

	Sigvaris (n = 25)	**Rosidal** (n = 25)
Age (years)*	54 (36–81)	70 (34–93)
Sex (m/f)	12/13	15/10
Left/right leg	14/11	15/10
Area (cm^2)	3.2 (0.8–10.4)	6.0 (0.8–26)
>1 ulcer	6	10
Medial localization	20	19
First appearance/relapse	4/21	4/21
First appearance (years ago)	5 (1.5–40)	15 (2–38)
Duration of ulcer (months)*	2 (0.25–36)	5 (0.25–36)
History of thrombosis	10	10

Horakova MA et al. Wien. med. Wschr.1994; 144:242-249

elastic stockings or inelastic bandages?

Table II: Compression values (mm Hg) after application of stocking/bandage ($\bar{x} \pm SD$)

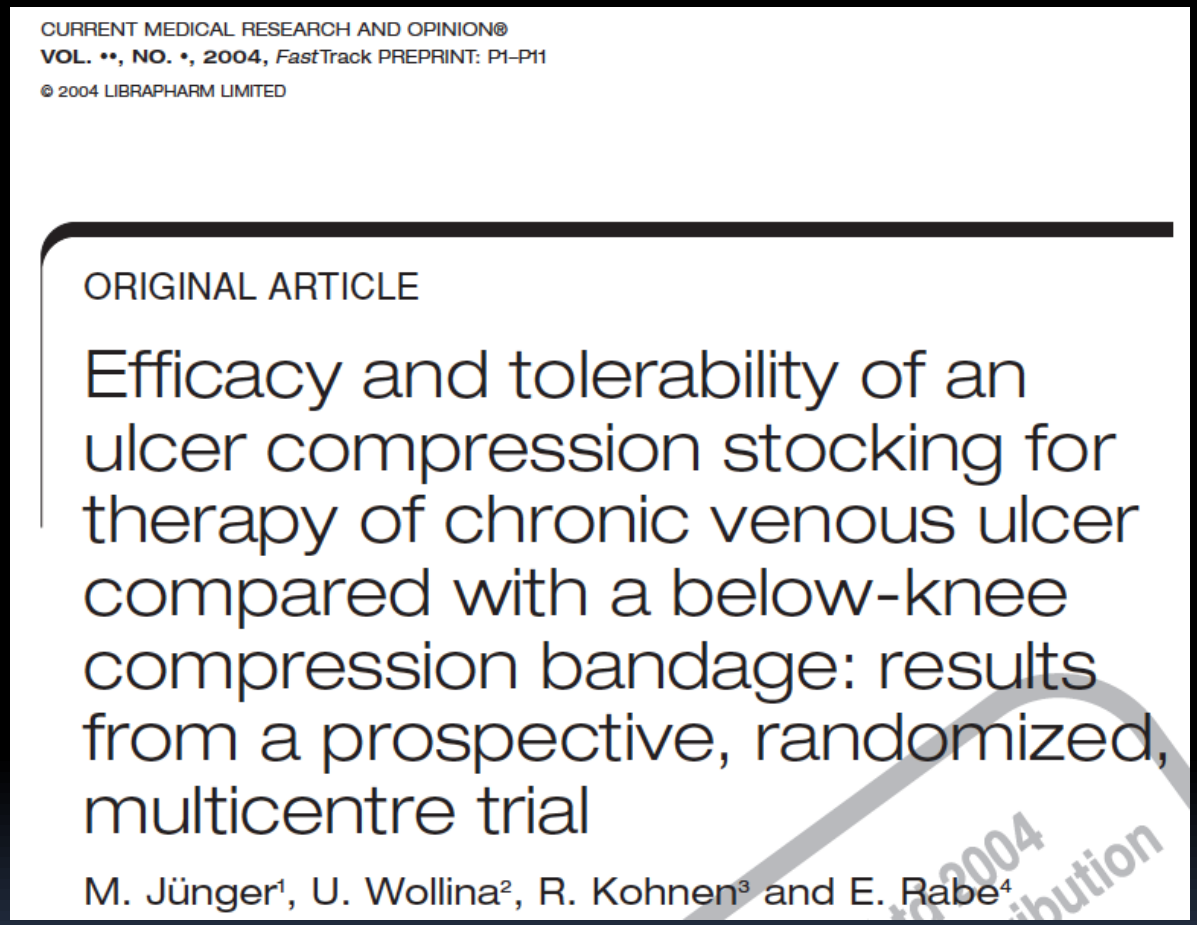
Thrombo + Sigvaris 503	Lying	Sitting	Standing
n = 16	31.1 ± 4.15	35.0 ± 6.7	39.1 ± 3.7
after 1 week	28.2 ± 5.3 *(–9.3%)*	28.9 ± 8.0 *(–17.4%)*	33.2 ± 5.9 *(–15.8%)*
Rosidal			
n = 21	27.4 ± 8.7	33.8 ± 13.1	38.0 ± 9.3
after 24 hours	15.6 ± 4.4 *(–43.8%)**	21.3 ± 5.6 *(–36.4%)**	24.4 ± 6.6 *(–35.8%)**

* Student test $p < 0.05$

compression pressure of elastic kit was higher than that of inelastic bandages!!!!!

→ inelastic bandages improperly applied very loosely

elastic stockings or inelastic bandages?



CURRENT MEDICAL RESEARCH AND OPINION®
VOL. ••, NO. •, 2004, *Fast*Track PREPRINT: P1–P11

ORIGINAL ARTICLE

Efficacy and tolerability of an ulcer compression stocking for therapy of chronic venous ulcer compared with a below-knee compression bandage: results from a prospective, randomized, multicentre trial

M. Jünger[1], U. Wollina[2], R. Kohnen[3] and E. Rabe[4]

patients in the bandage group allowed to remove their bandages after at least 8 hours after application and re-apply by themselves the following day

elastic stockings or inelastic bandages?

a good compression stocking is much more effective than a poorly applied bandage

elastic stockings or inelastic bandages?

any role for elastic stockings/elastic kits in ulcer treatment?

patients with small ulcers (diameter ≈ 5 cm) and a short duration (<3 months) might be candidates for a therapy with good compression stockings/kits exerting a pressure in the standing position of about 40 mmHg

Jünger M et al. Wounds 2004;16:313-20.
Partsch B and Partsch H. Phlebology 2008;23:40–46.

elastic stockings or inelastic bandages?

the role of elastic stockings in ulcer prevention is well known:

stockings are extremely effective in prevention of ulcer recurrence

the higher the pressure and the compliance of the patients the lower the recurrence rate

Nelson EA1, Bell-Syer SE. Cochrane Database Syst Rev. 2014 Sep 9;9:CD002303.
Nelson EA. J Vasc Surg 2006;44:803-8
Clarke-Moloney M, et al. Int Wound J. 2014 Aug;11(4):404-8.

elastic or inelastic bandage?

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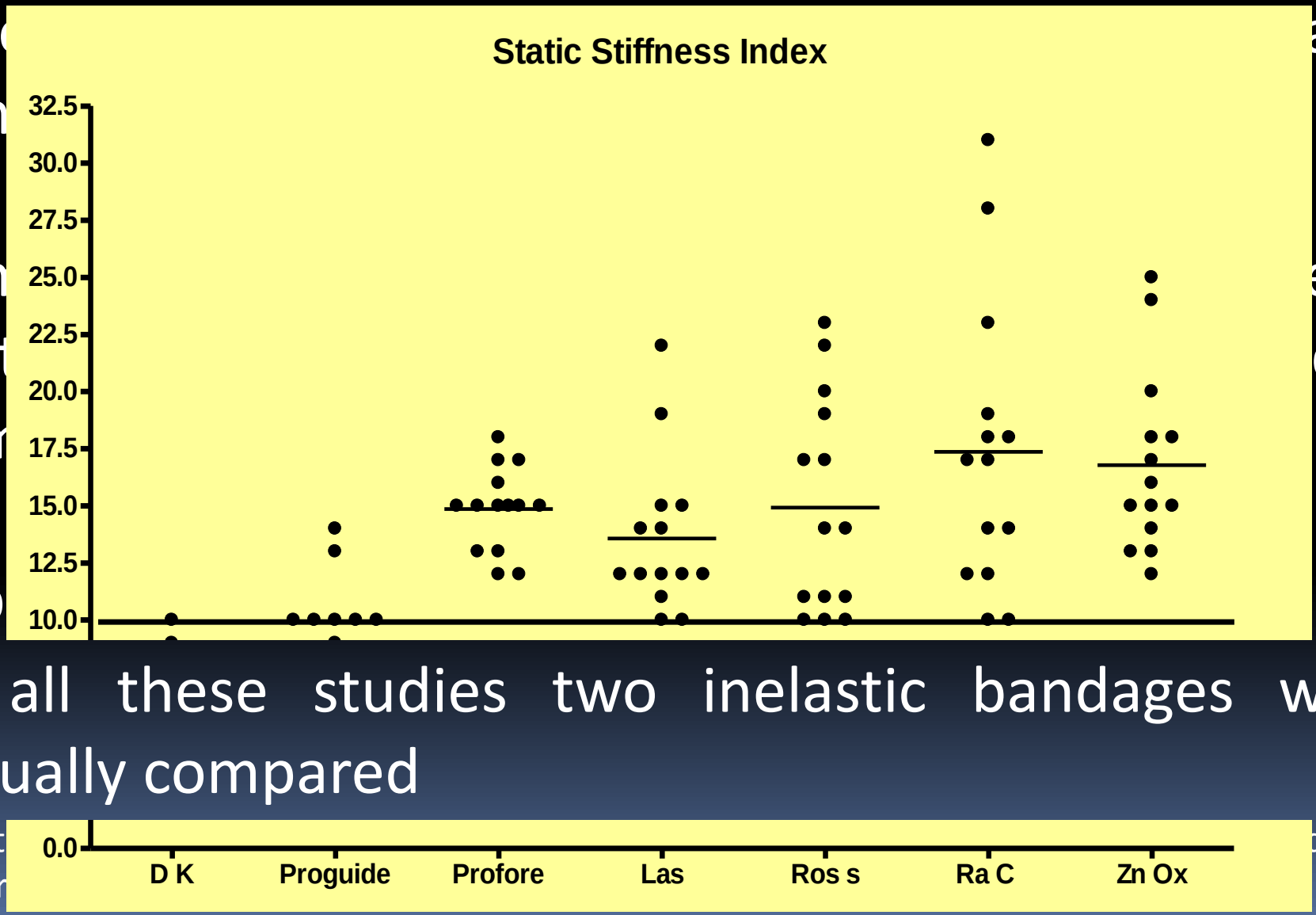

in all these studies two inelastic bandages were actually compared

Most dages
on pr

what happens when pressure is measured

C6: three groups:

1. tubular elastic device (36 mm Hg)
2. the same compression device + 1 elastic bandage (54 mm Hg)
3. the same compression device + 2 elastic bandages (74 mm Hg)

healing rate of the third group significantly > the second group significantly > the first group: the higher the pressure the greater the healing rate

when the pressure is measured the higher the pressure the higher the healing rate: which is in favour of inelastic material

Milic D et al. The influence of different sub-bandage pressure values on venous leg ulcers healing when treated with compression therapy. J Vasc Surg. 2010 Mar;51(3):655-61.

conclusions

inelastic compression is more effective than elastic in improving venous hemodynamics and in achieving ulcer healing: it should be considered the first choice

this is clear when the interface pressure exerted by compression devices is measured

when pressure is not measured you cannot know if compression was properly applied: these trials are very low quality trials

conclusions

designing new studies on compression pressure measurement is mandatory

read very carefully studies on compression; not always conclusions are realistic

5TH CONGRESS
WORLD UNION OF WOUND HEALING SOCIETIES

thank you for your attention

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