the effectiveness of comfort

Jan Schuren, RgN, OTc, MSc, PhD

retired 3M employee

inventor & co-developer of the 3M™ Coban™ 2 Layer compression systems

conflict of interest

Jan Schuren, RgN, OTc, MSc, PhD

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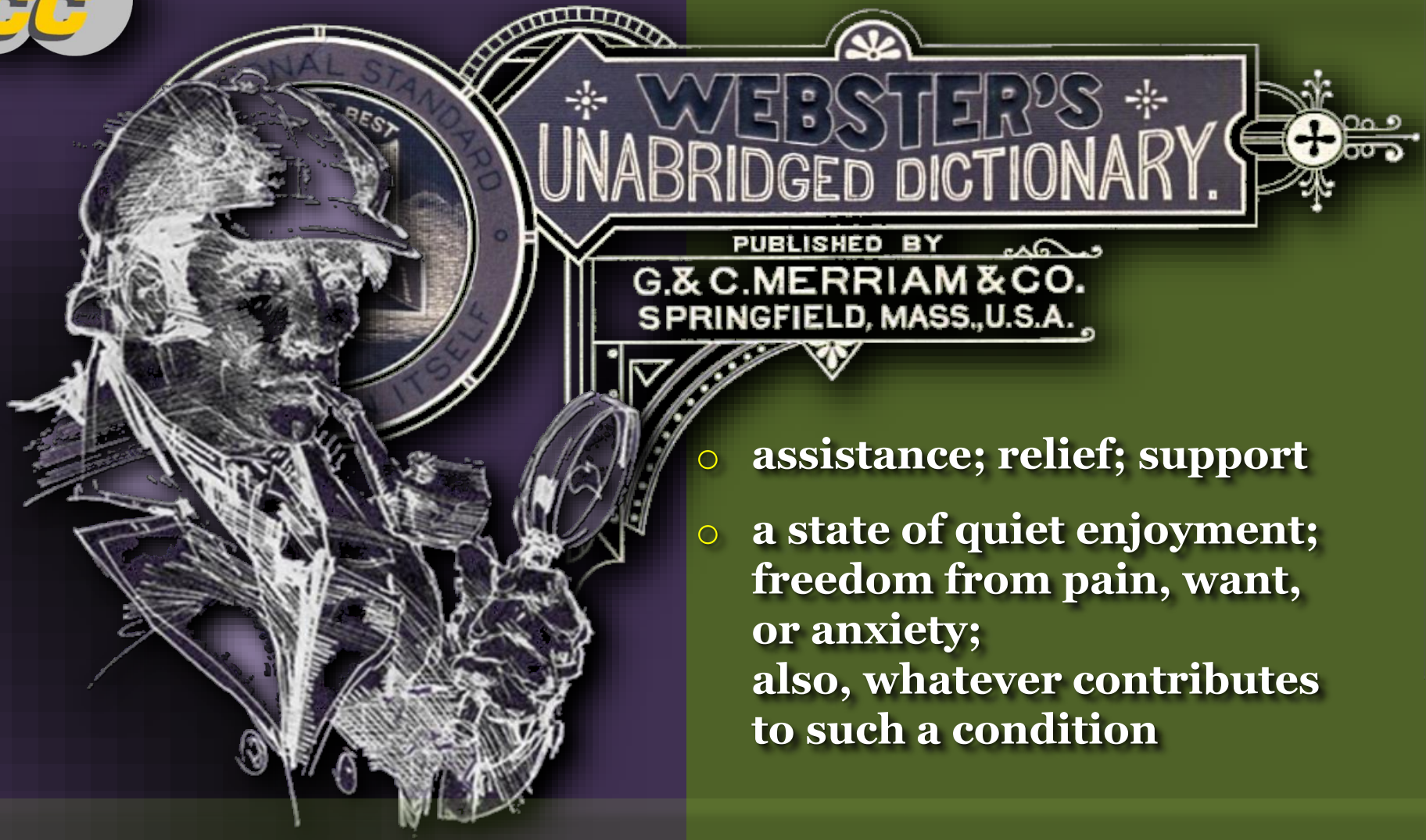
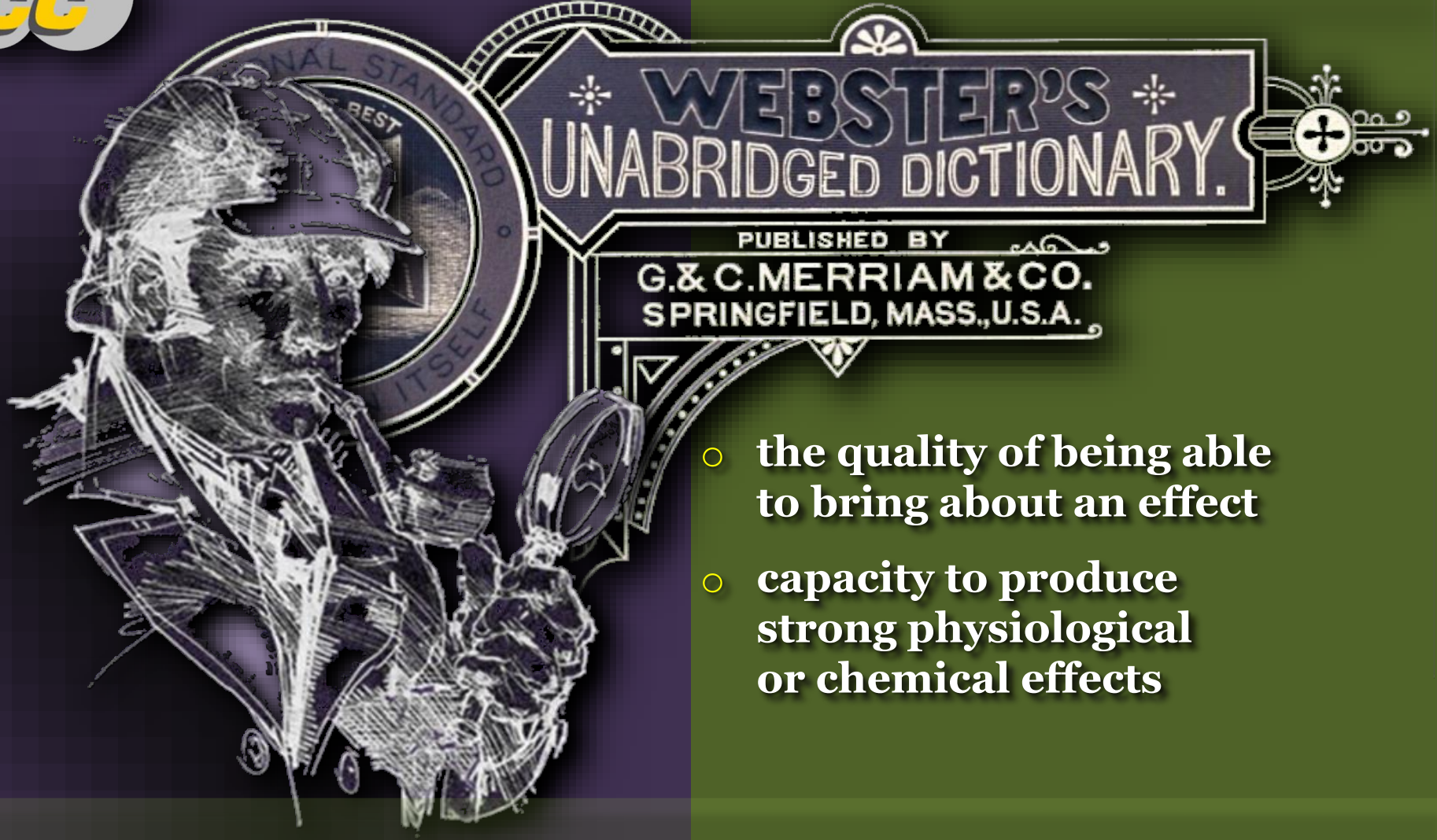


- assistance; relief; support
- a state of quiet enjoyment; freedom from pain, want, or anxiety;
  also, whatever contributes to such a condition

the effectiveness of comfort

from:
the Merriam-Webster Collegiate Dictionary.
G&C Merriam Co, Publishers, Springfield, Mass. USA.
2003; 11th edition.



- the quality of being able to bring about an effect
- capacity to produce strong physiological or chemical effects

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G&C Merriam Co, Publishers, Springfield, Mass. USA.
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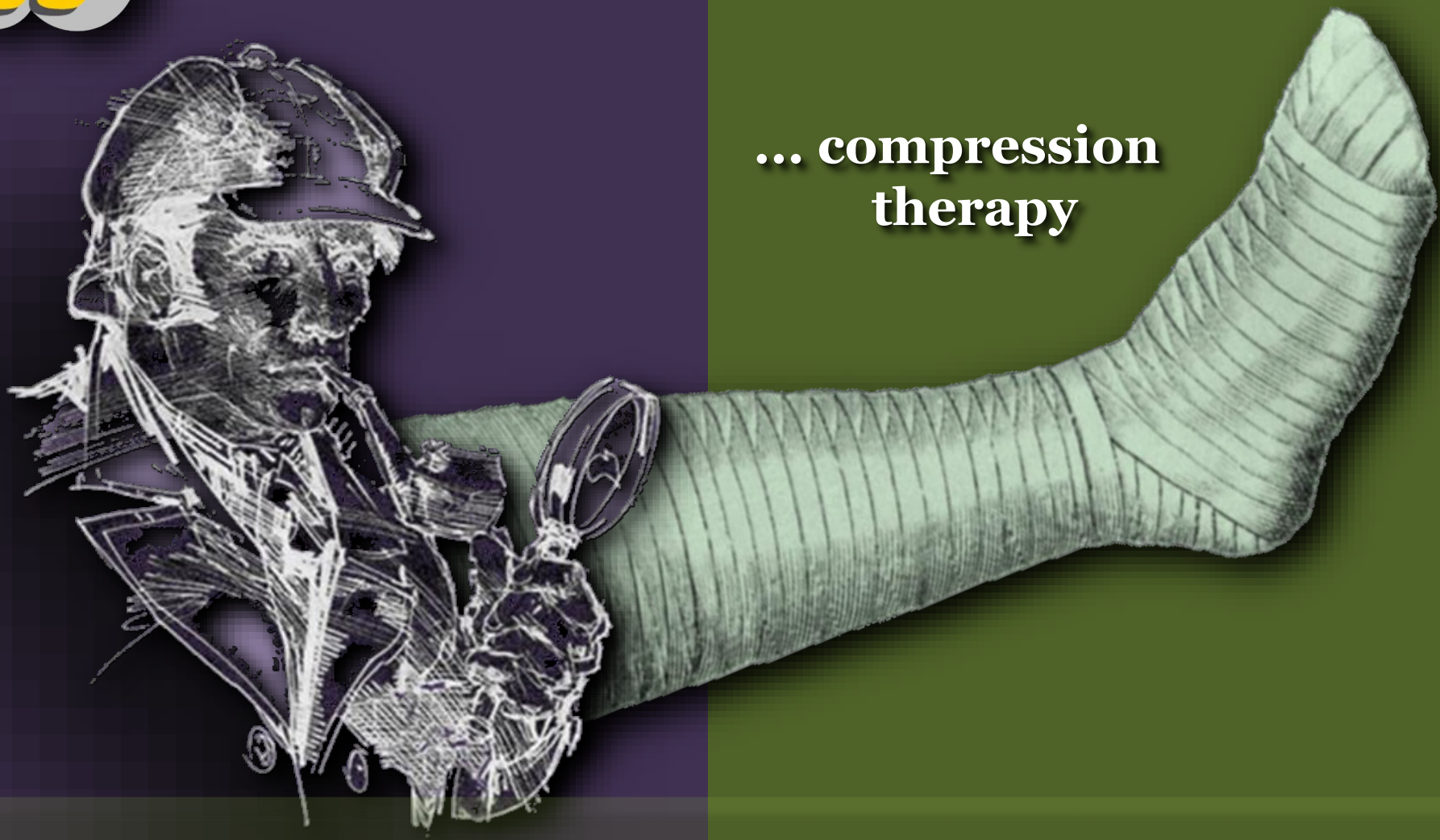
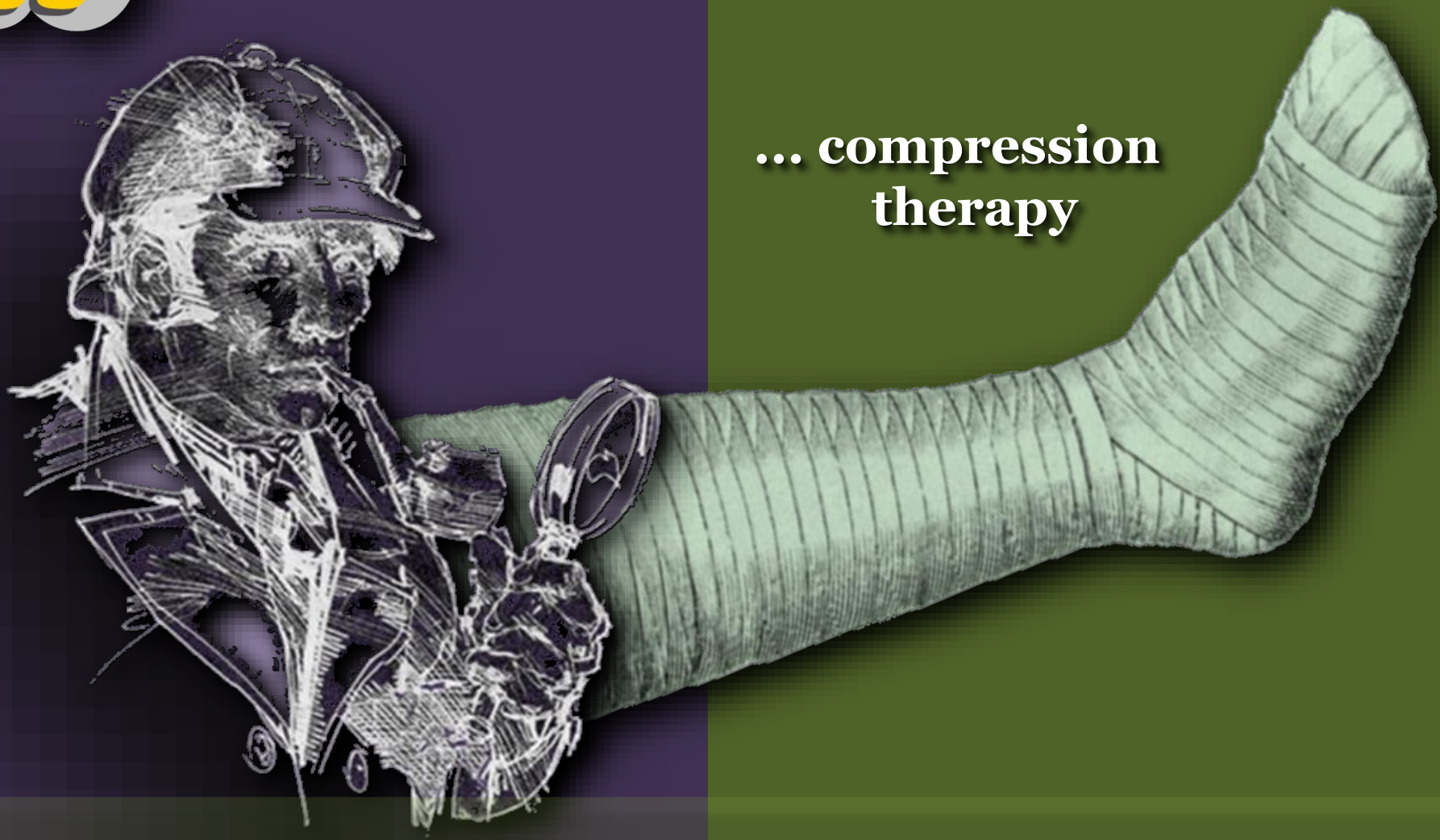


... compression therapy

the effectiveness of comfort

from:
Partsch H.
Compression therapy: clinical and experimental evidence.
Ann Vasc Dis 2012; 5: 416-422.



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mode of action:

… compression acts most effectively when it is combined with movement

… during walking, non-yielding stiff material will exert a massaging effect to the leg resulting in a reduction of ambulatory venous hypertension

the effectiveness of comfort

from:
Partsch H.
Compression therapy: clinical and experimental evidence.
Ann Vasc Dis 2012; 5: 416-422.

- compression is more effective in healing chronic venous ulcers compared with no compression
- multi-layered systems are more effective than single-layered systems

The Cochrane Library

- high compression is more effective than low compression but there are no clear differences in the effectiveness of different types of high compression

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O'Meara S, Cullum NA, Nelson EA.
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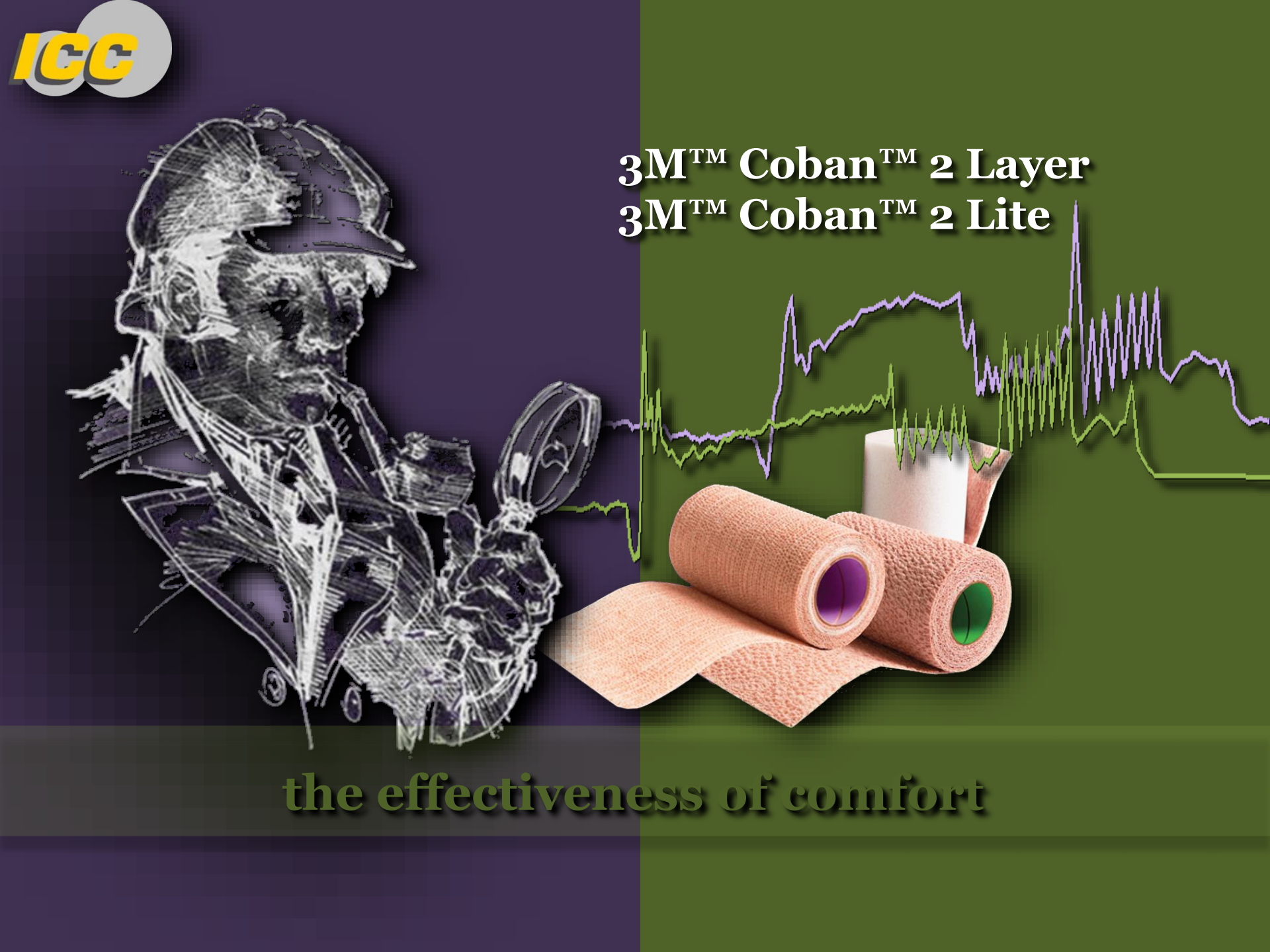
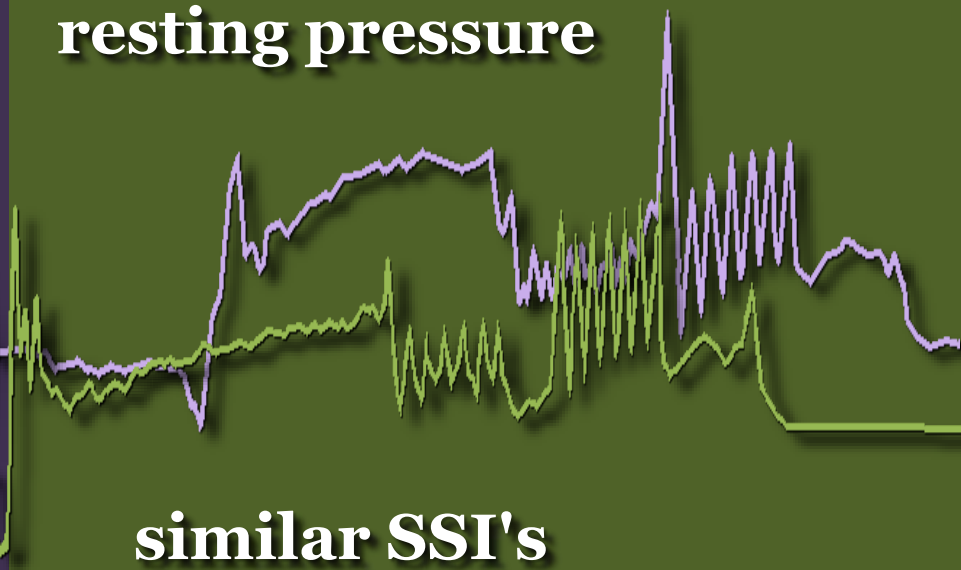
Cochrane Database of Systematic Reviews 2009.

- high compression is not comfortable

the effectiveness of comfort


3M™ Coban™ 2 Layer
3M™ Coban™ 2 Lite
the effectiveness of comfort

different
resting pressure

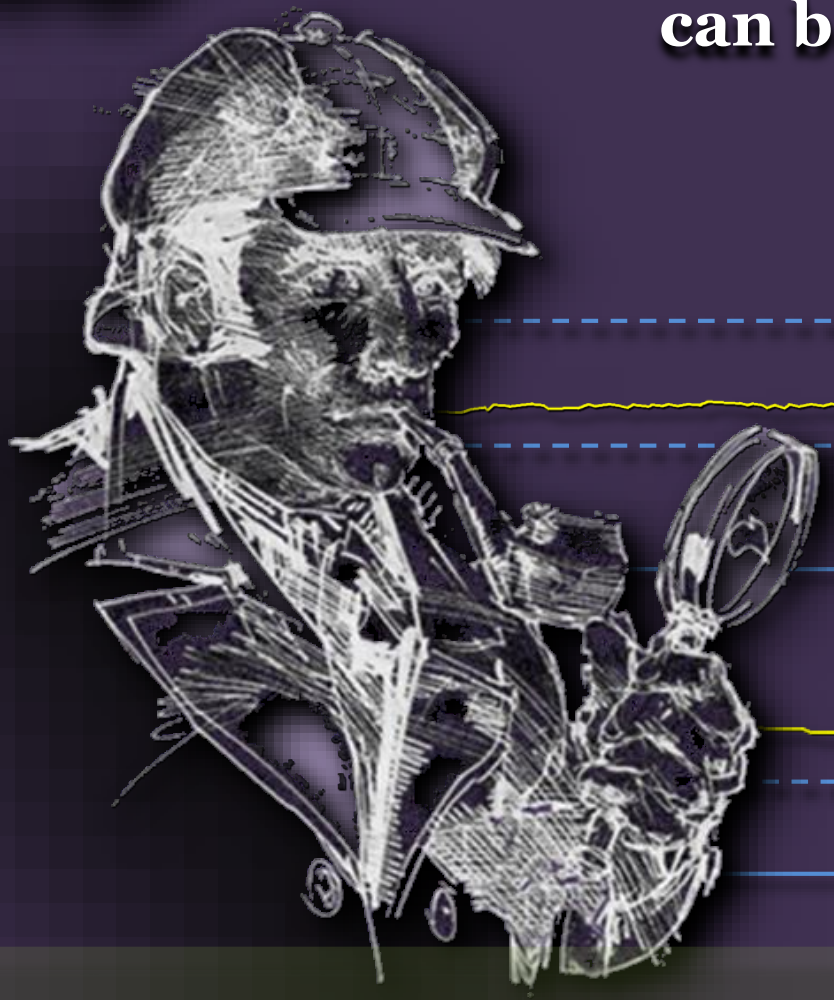


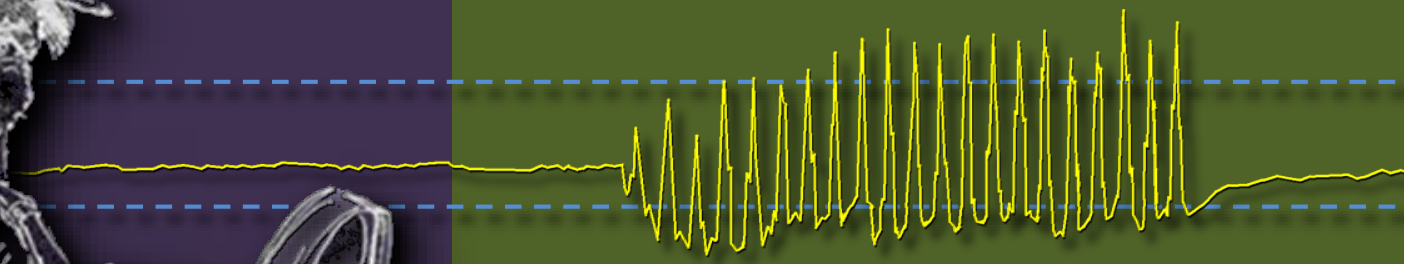
similar SSI's
and amplitudes

the effectiveness of comfort

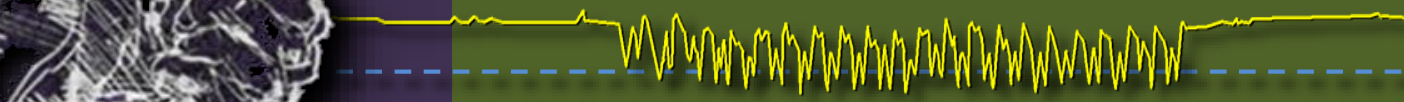
the effectiveness of comfort

the effectiveness of compression can be demonstrated by measuring the improvement of the ejection fraction (EF)





strain-gauge plethysmography

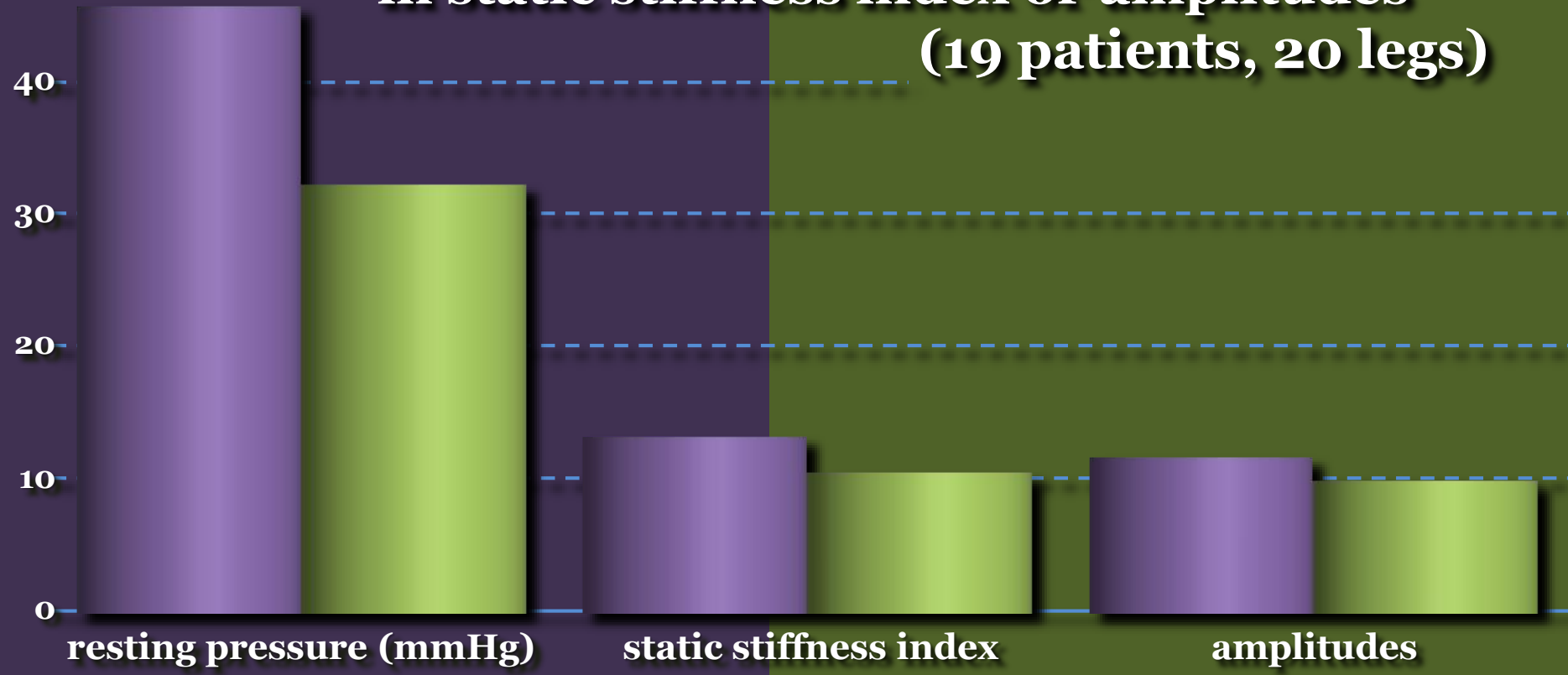


sub bandage pressure recording

the effectiveness of comfort

modified from:
Schuren J.
Compression unravelled.
Margreff Druck GmbH, Essen Germany 2011.

significant difference in resting pressure but no significant differences in static stiffness index or amplitudes (19 patients, 20 legs)



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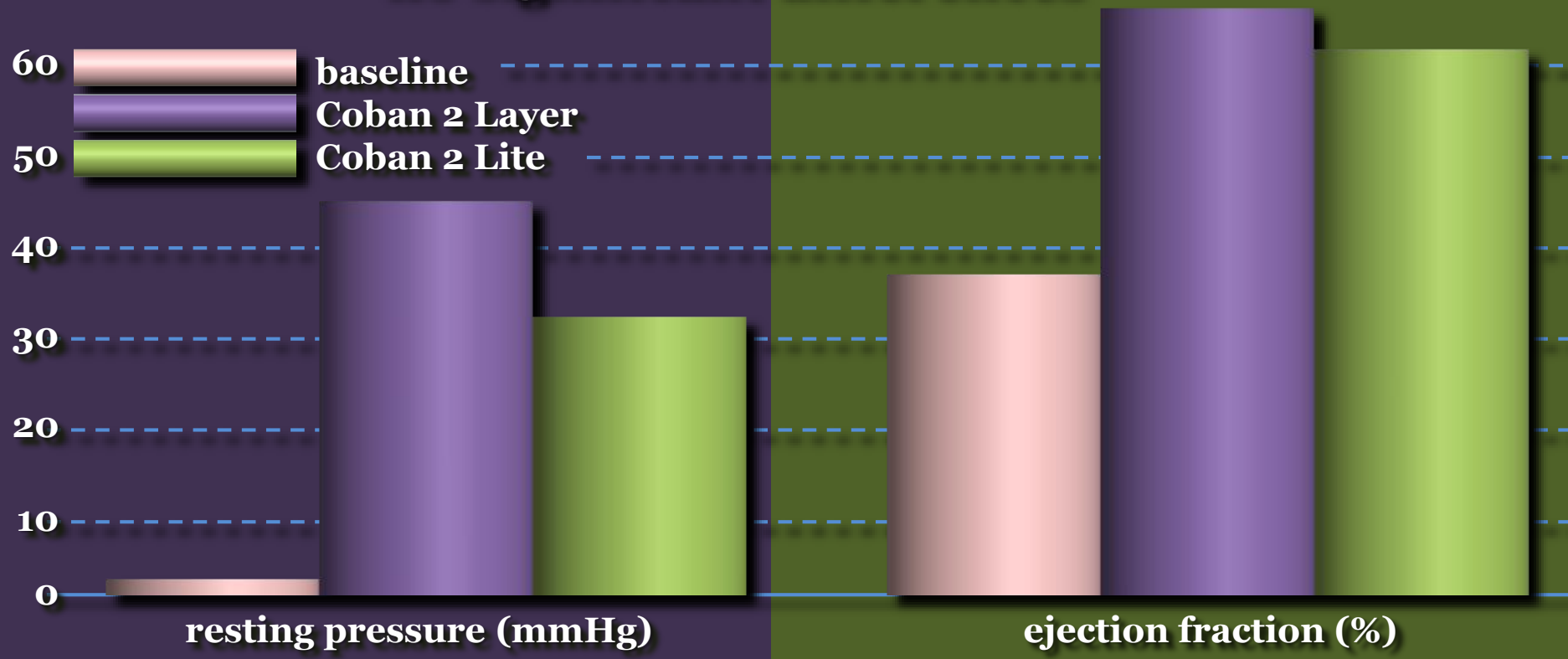
both systems significantly improve the ejection fraction but reveal no significant differences



the effectiveness of comfort

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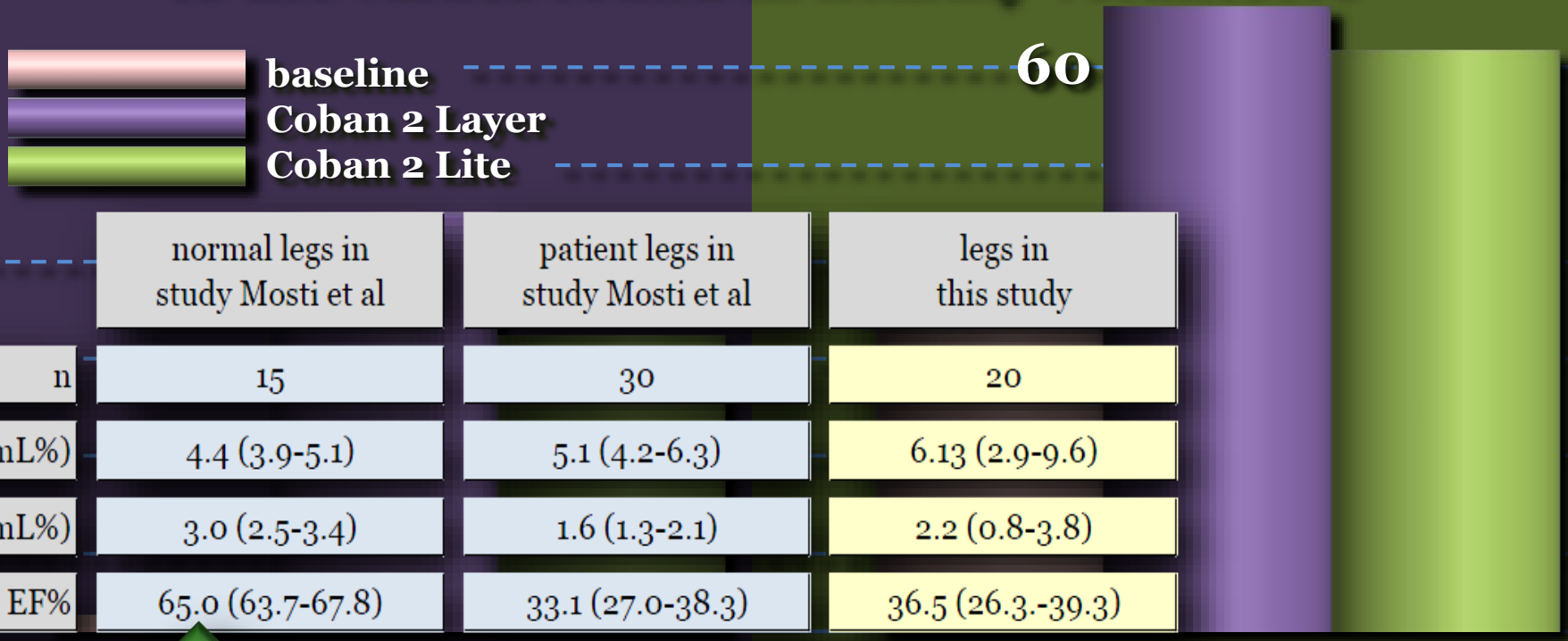
compression in this study resulted in ejection fraction values that are close to the values found in healthy volunteers



	normal legs in study Mosti et al	patient legs in study Mosti et al	legs in this study
n	15	30	20
VV (mL%)	4.4 (3.9-5.1)	5.1 (4.2-6.3)	6.13 (2.9-9.6)
EV (mL%)	3.0 (2.5-3.4)	1.6 (1.3-2.1)	2.2 (0.8-3.8)
EF%	65.0 (63.7-67.8)	33.1 (27.0-38.3)	36.5 (26.3.-39.3)

the effectiveness of comfort

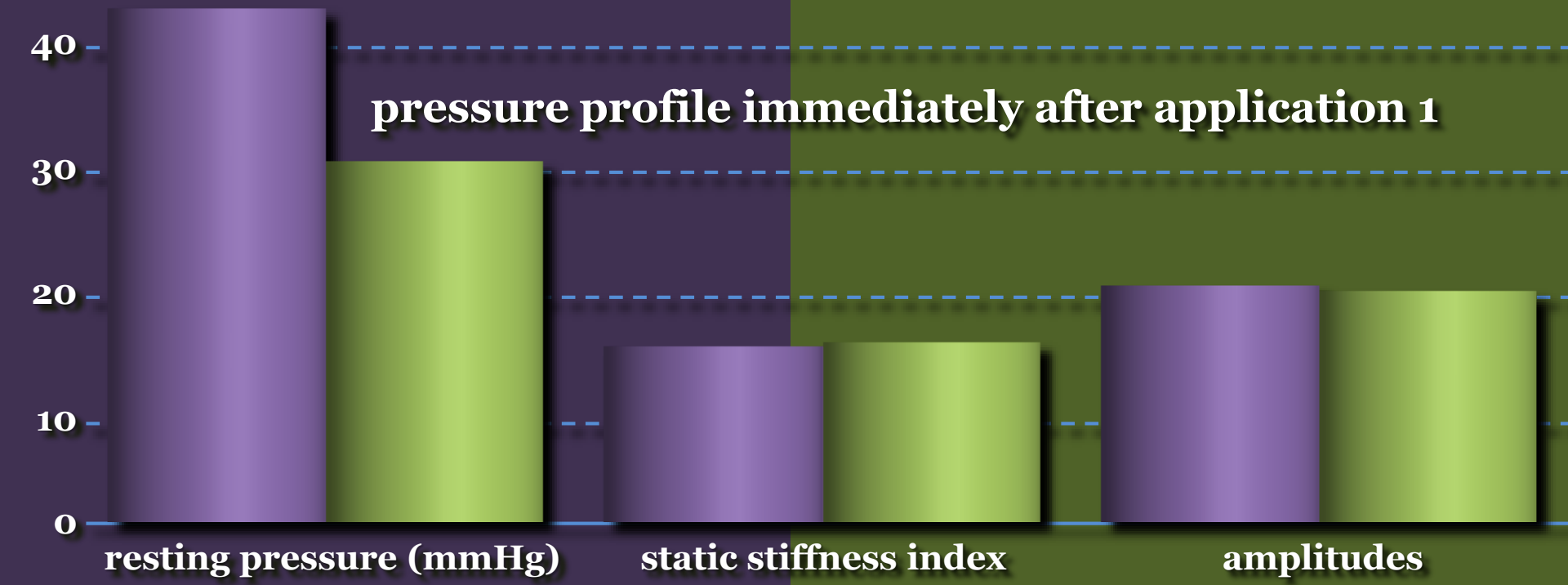
modified from:
Mosti G, Mattaliono V, Partsch H.
Inelastic compression increases venous injection fraction more than elastic bandages in patients with superficial venous reflux.
Phlebology 2010; 52: 287-294.

volumetry measurements (0, 24 & 48 hours) with both systems on both legs of 12 healthy volunteers (perfect match)

the effectiveness of comfort

modified from:
Damstra RJ, Brouwer ER, Partsch H.
Controlled, comparative study of relation between volume changes and interface pressure under short-stretch bandages in leg lymphedema patients. Dermatol Surg 2008; 34: 773-778.

significant difference in resting pressure but no significant differences in static stiffness index or amplitudes



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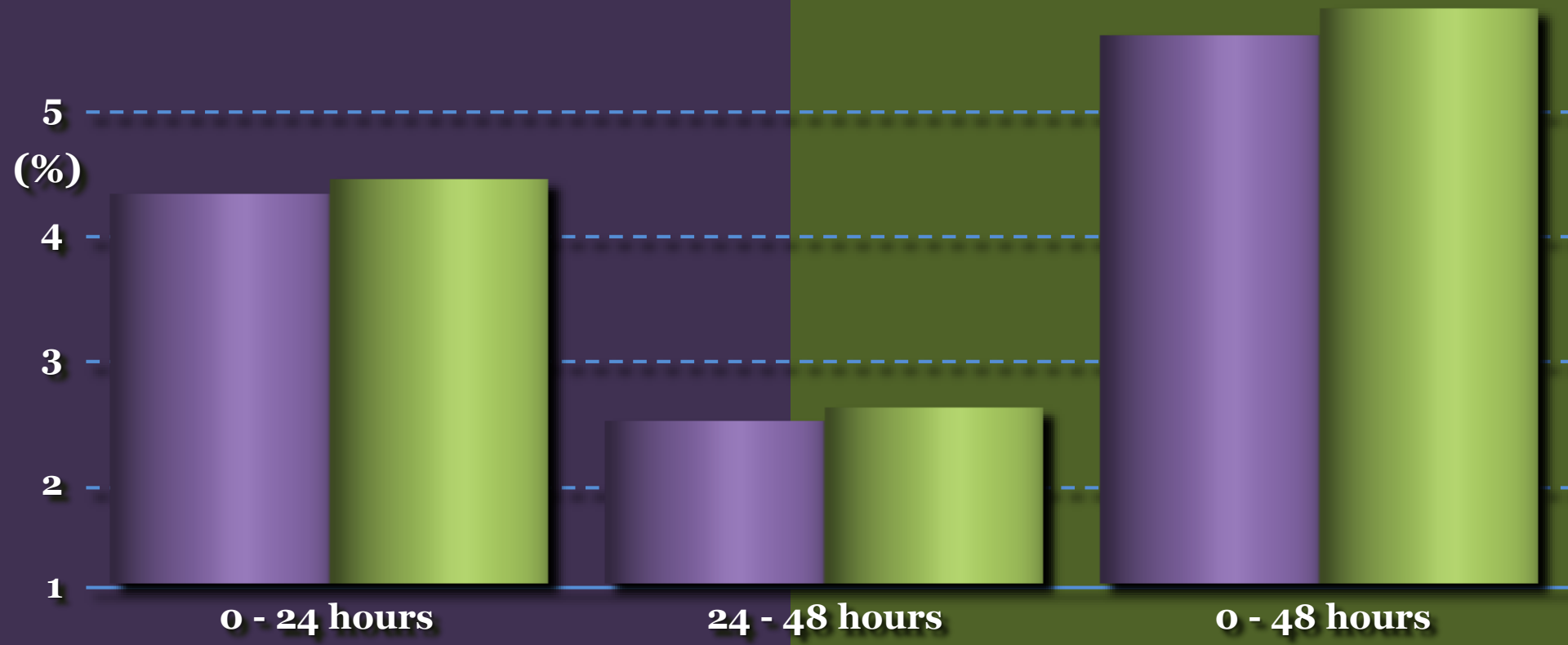
no significant difference in % volume reduction



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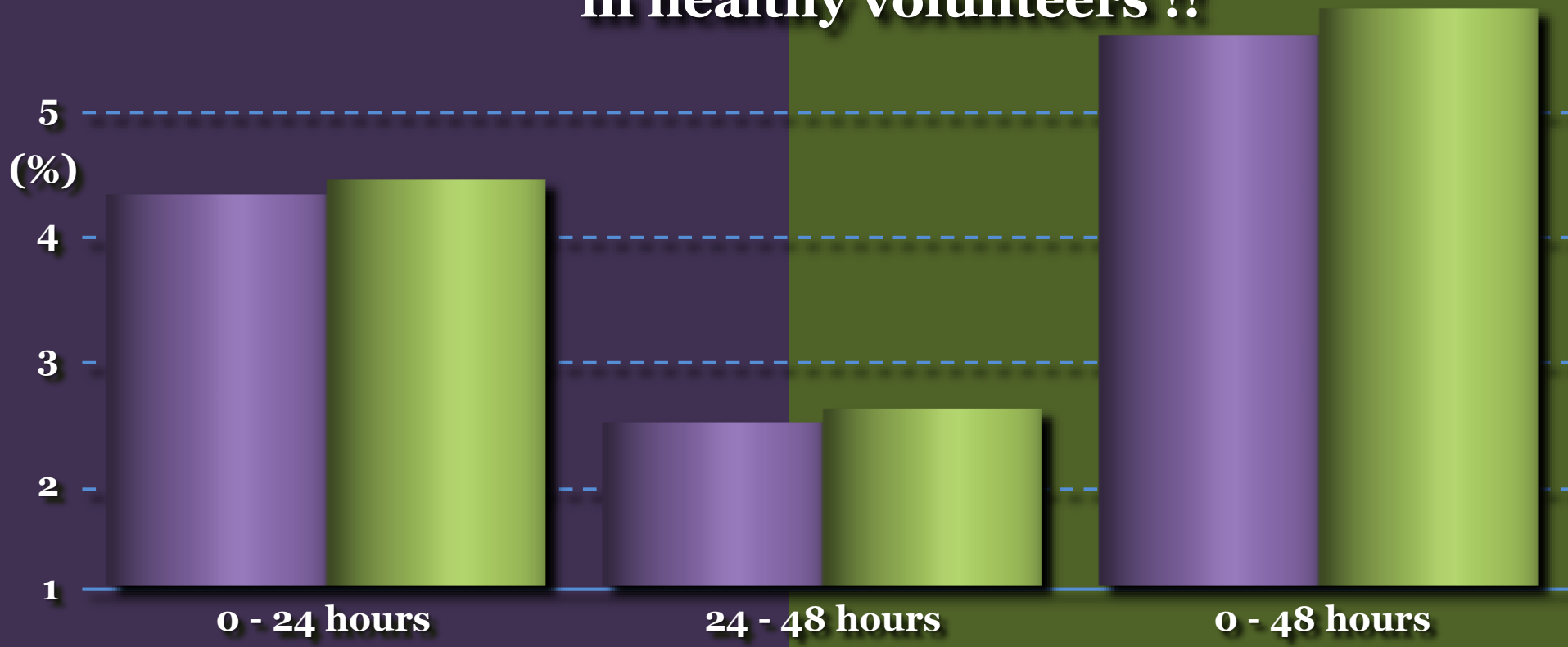
an average volume reduction of > 4% (3.14-7.63) in 48 hours in healthy volunteers !!



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relation between pressure & stiffness

the
"mannequin leg"

the effectiveness of comfort

modified from:
Hirai M, Partsch H.
The Mannequin-leg, a new instrument to assess stiffness of compression materials.
submitted for publication, presented at the ICC meeting in Vienna on May 25, 2012.

relation between pressure & stiffness

by pushing down the lever, the circumference of the model will increase by 1 cm at each level

the "mannequin leg"

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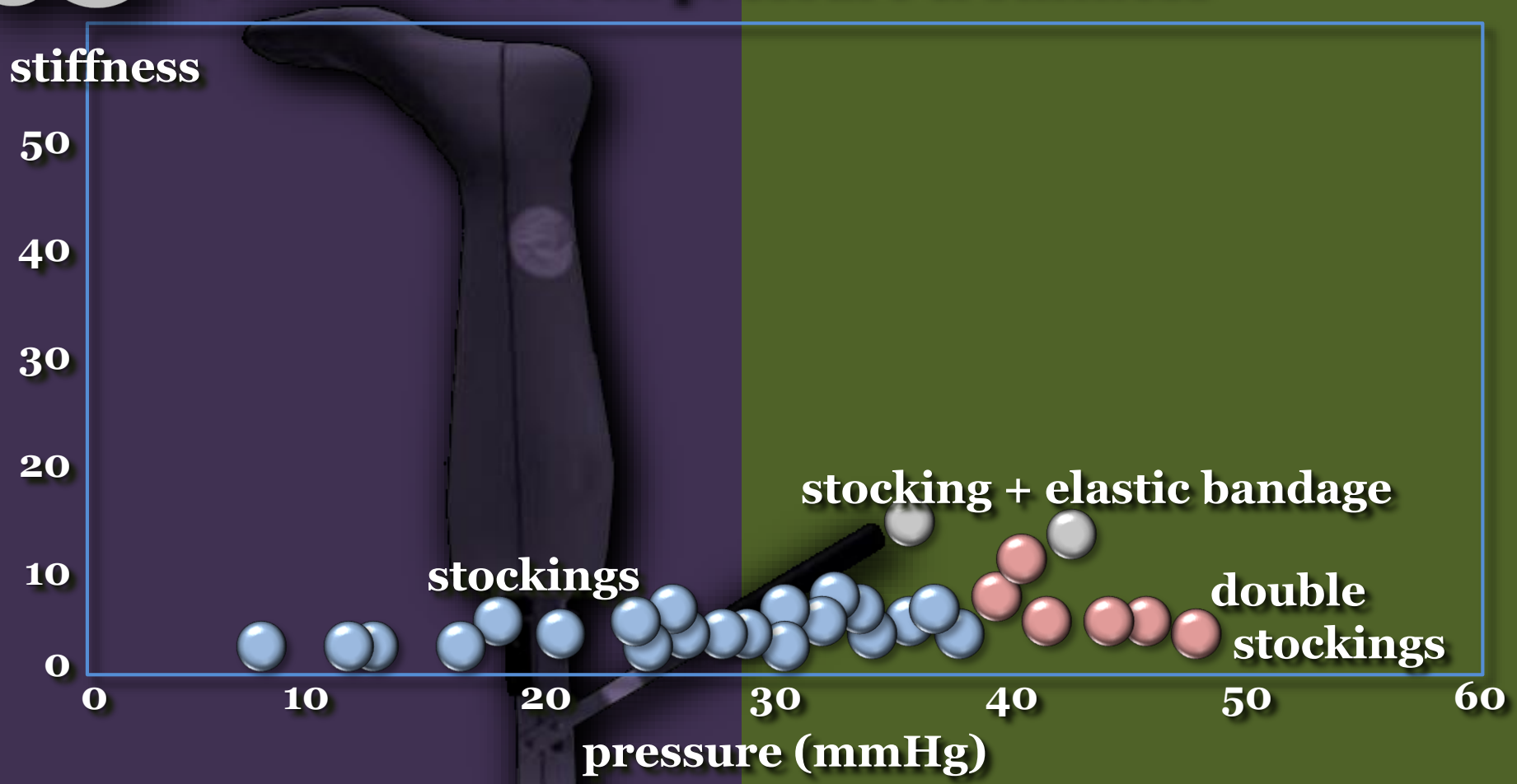

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Veins and lymphatics 2013; 2-e3: 7-10.

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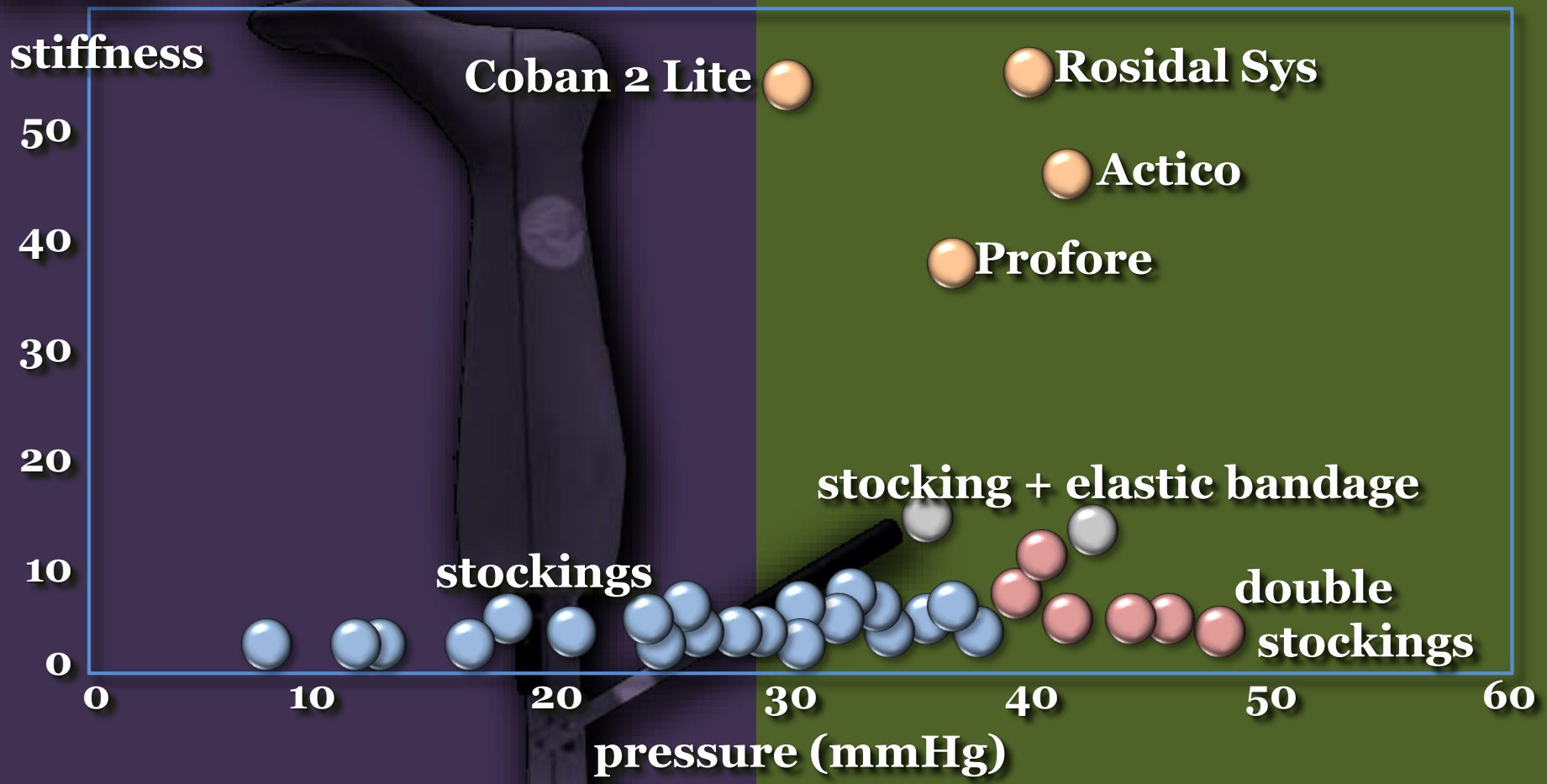

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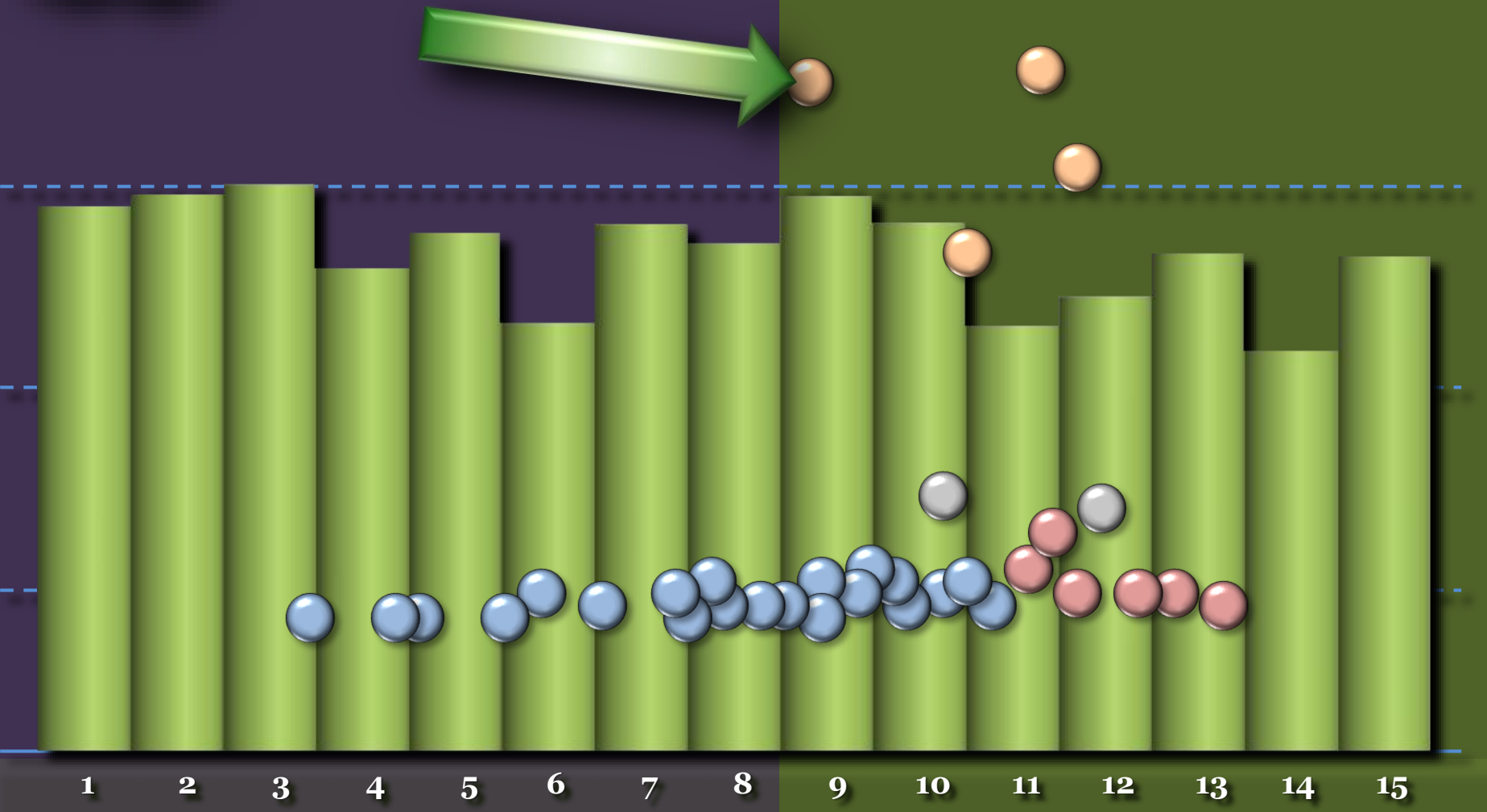
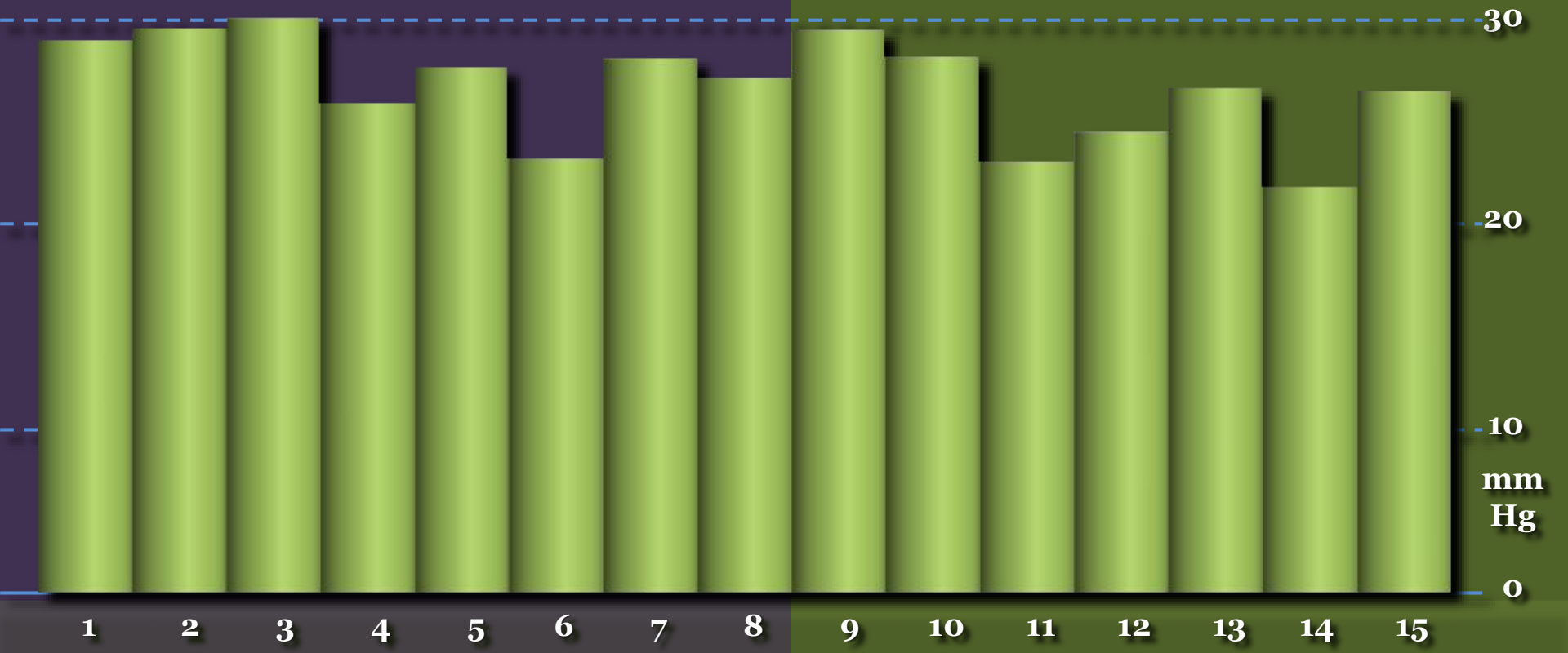
15 patients with PAOD



the effectiveness of comfort

15 patients with PAOD

- ABPI between 0.5 - 0.8
- 2 weeks voluntary Coban 2 Lite compression
- mean pressure after application < 30 mmHg



the effectiveness of comfort

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Jünger M, Haase H, Schwenke L, Bichel J, Schuren J, Ladwig A. Macro- and microperfusion during application of a new compression system, designed for patients with leg ulcer and concomitant peripheral arterial occlusive disease. Clin Hemorheol Microcirc. 2013; 53: 281-293.

15 patients with PAOD

≡ pressure measurements (B1), acral pulsation (hallux), laser Doppler fluxmetry (forefoot) and volumetry

the effectiveness of comfort

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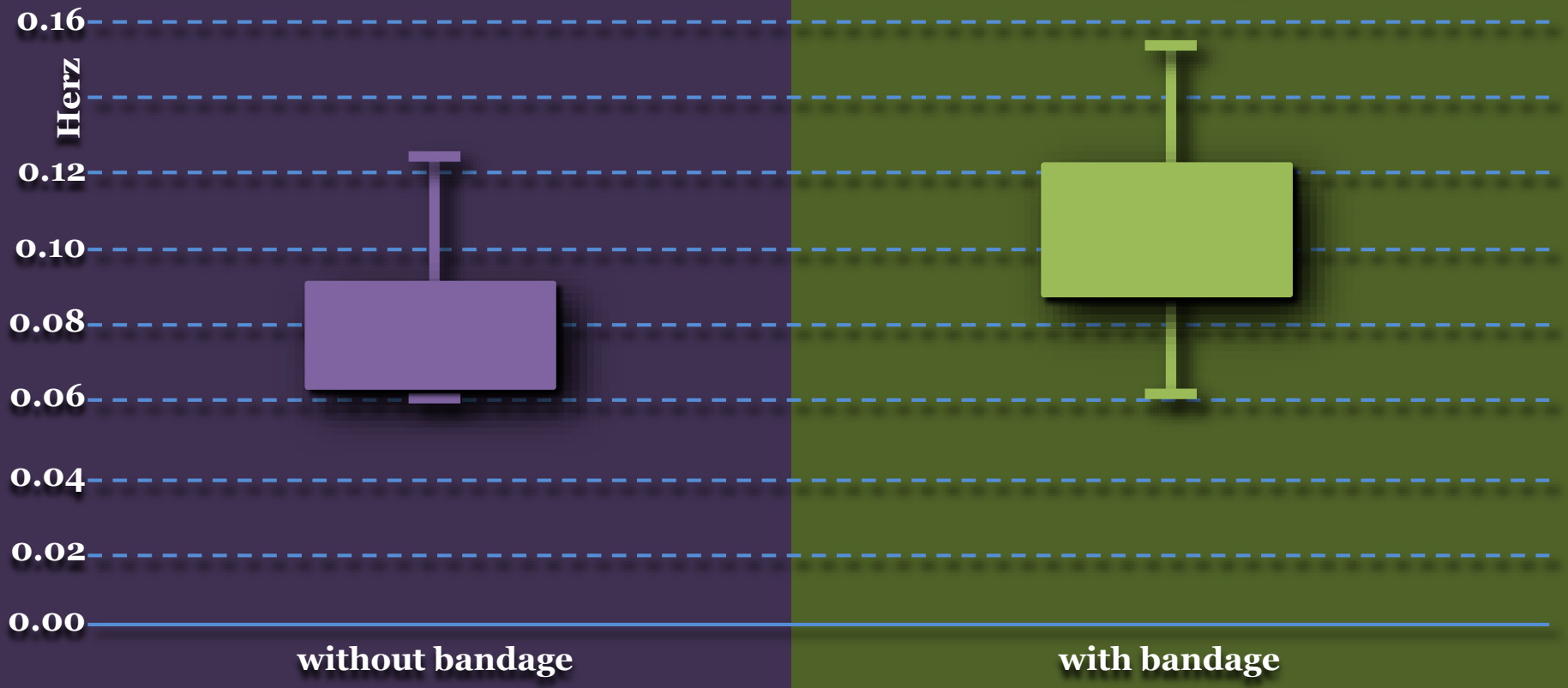
15 patients with PAOD

≡ laser Doppler fluxmetry indicated significant improvements of the microcirculation (p=0.01)



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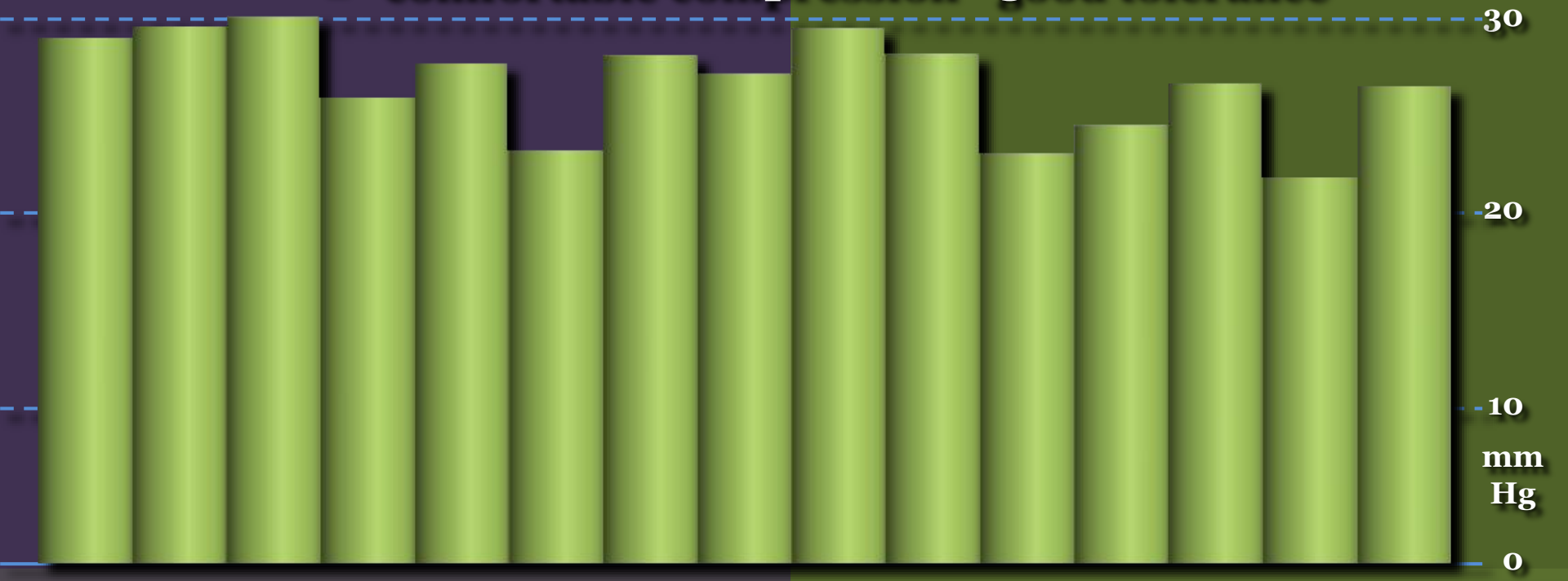
15 patients with PAOD

in addition:

- reduction of swelling (avg. 7.3% (SD 7.9%: p=0.03)
- no pain or skin problems
- comfortable compression - good tolerance



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25 patients with PAOD

(mean ABPI: 0.58; range: 0.5-0.65)

Compression therapy in mixed ulcers increases venous output and arterial perfusion

Giovanni Mosti, MD,[a] Maria Letizia Iabichella, MD,[a] and Hugo Partsch, MD,[b] *Lucca, Italy; and Vienna, Austria*

Objectives: This study was conducted to define bandage pressures that are safe and effective in treating leg ulcers of mixed arterial-venous etiology.
Methods: In 25 patients with mixed-etiology leg ulcers who received inelastic bandages applied with pressures from 20 to 30, 31 to 40, and 41 to 50 mm Hg, the following measurements were performed before and after bandage application to ensure patient safety throughout the investigation: laser Doppler fluxmetry (LDF) close to the ulcer under the bandage and at the great toe; transcutaneous oxygen pressure ($TcPo_2$) on the dorsum of the foot, and toe pressure. Ejection fraction (EF) of the venous pump was performed to assess efficacy on venous hemodynamics.
Results: LDF values under the bandages increased by 33% (95% confidence interval [CI], 17-48; $P < .01$), 28% (95% CI, 12-45; $P < .05$), and 10% (95% CI, –7 to 28), respectively, under the three pressure ranges applied. At toe level, a significant decrease in flux of –20% (95% CI, –48 to 9; $P < .05$) was seen when bandage pressure >41 mm Hg. Toe pressure values and $TcPo_2$ showed a moderate increase, excluding a restriction to arterial perfusion induced by the bandages. Inelastic bandages were highly efficient in improving venous pumping function, increasing the reduced ejection fraction by 72% (95% CI, 50%-95%; $P < .001$) under pressure of 21 to 30 mm Hg and by 103% (95% CI, 70%-128%; $P < .001$) at 31 to 40 mm Hg.
Conclusions: In patients with mixed ulceration, an ankle-brachial pressure index >0.5 and an absolute ankle pressure of >60 mm Hg, inelastic compression of up to 40 mm Hg does not impede arterial perfusion but may lead to a normalization of the highly reduced venous pumping function. Such bandages are therefore recommended in combination with walking exercises as the basic conservative management for patients with mixed leg ulcers. (J Vasc Surg 2012; 55:122-8.)

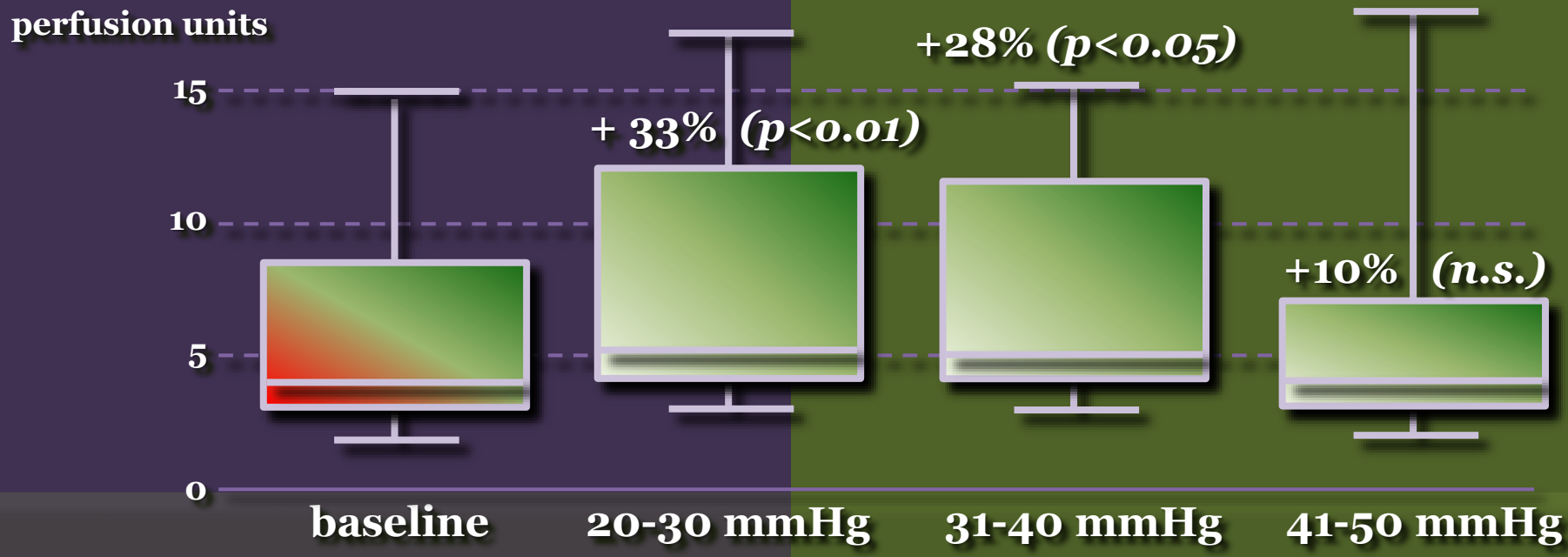
the effectiveness of comfort

Mosti G, Iabichella L, Partsch H.
Compression therapy in mixed ulcers increases venous output and arterial perfusion
J Vasc Surg 2012; 55: 122-128.

25 patients with PAOD

inelastic compression of up to 40 mmHg (B1):

- increases the arterial perfusion of the compressed part of the leg
- does not detoriate the arterial perfusion distal to the bandage
- significantly increases transcutaneous oxygen pressure on the forefoot
- significantly improves the reduced venous pump function (EF)



laser Doppler flux sub-bandage (peri-wound skin)

modified from:
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J Vasc Surg 2012; 55: 122-128.

25 patients with PAOD

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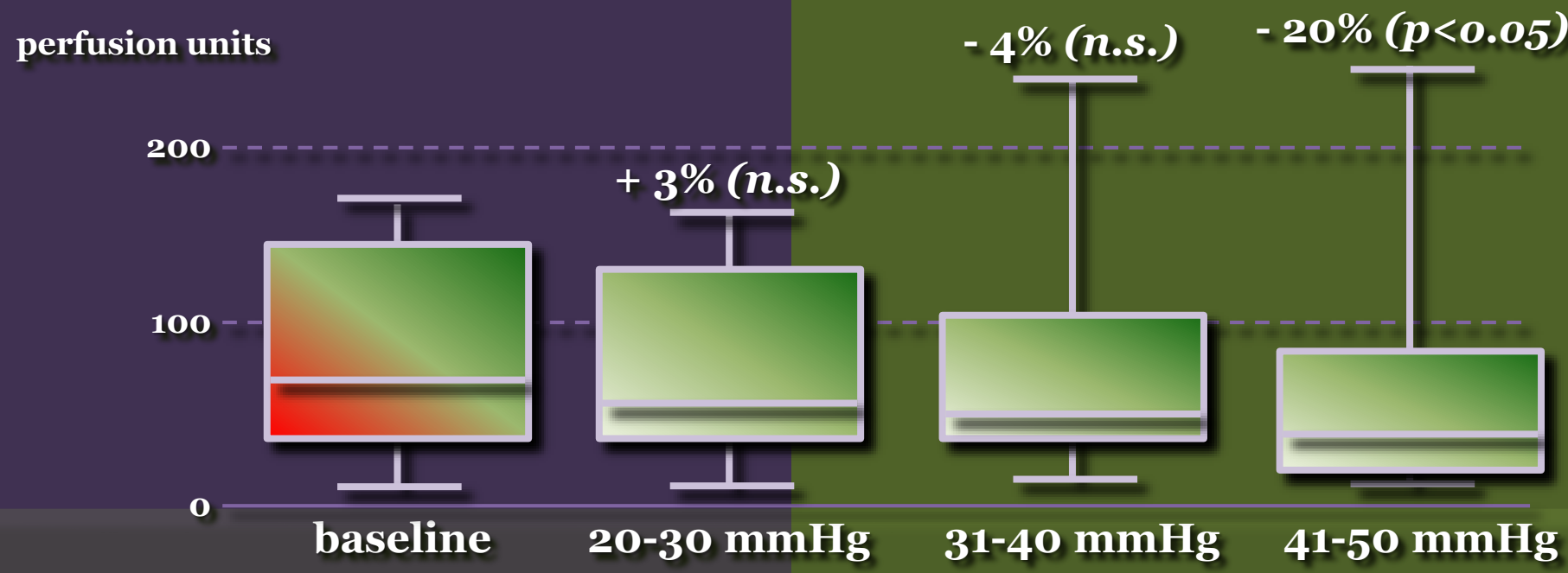

laser Doppler flux distal to the bandage (toe)

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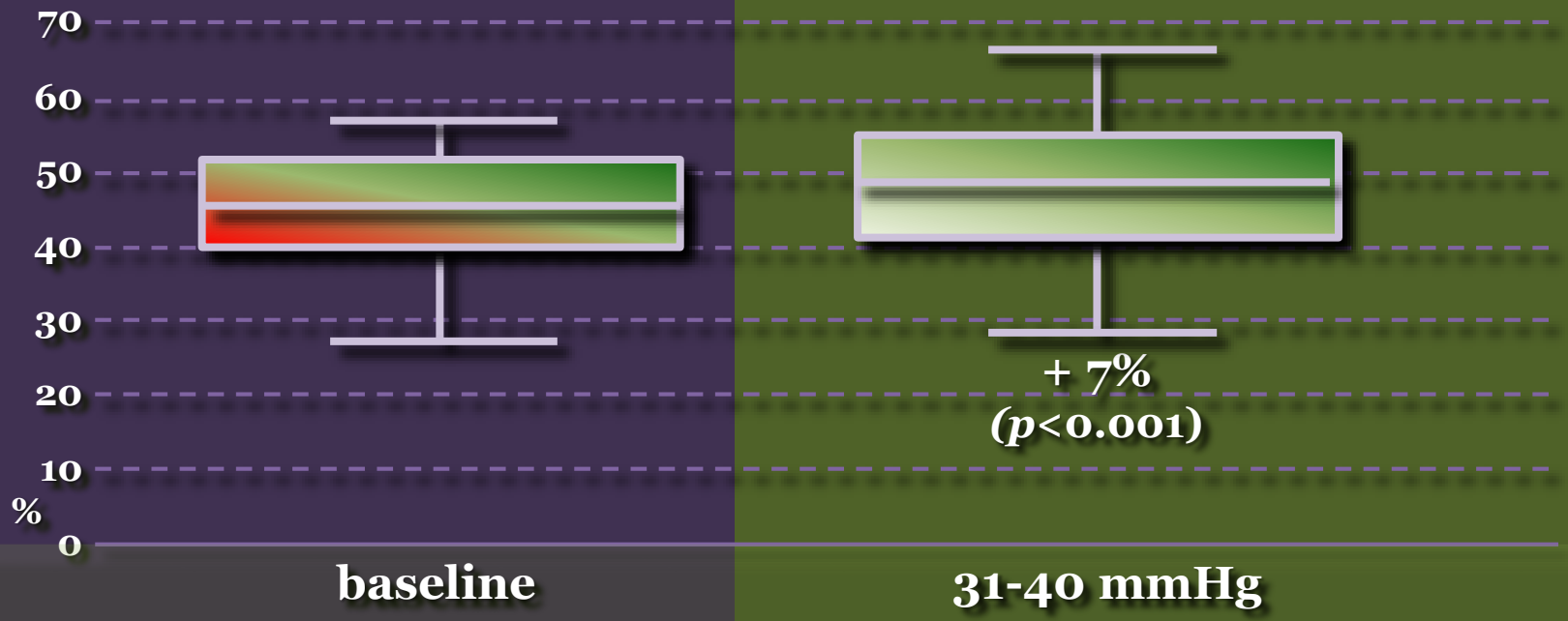

$TcPo_2$ measurements (Periflux system 5000)

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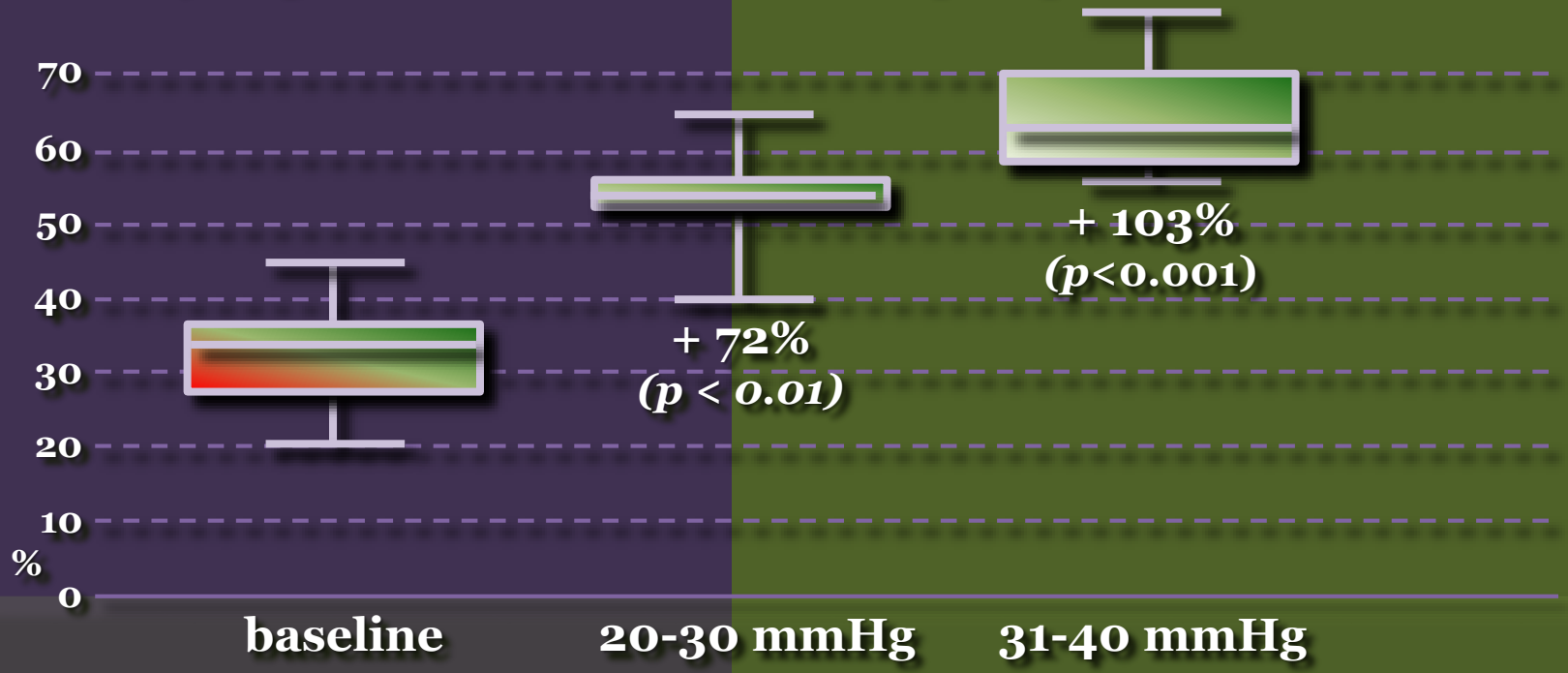

Ejection fraction (strain-gauge plethysmography)

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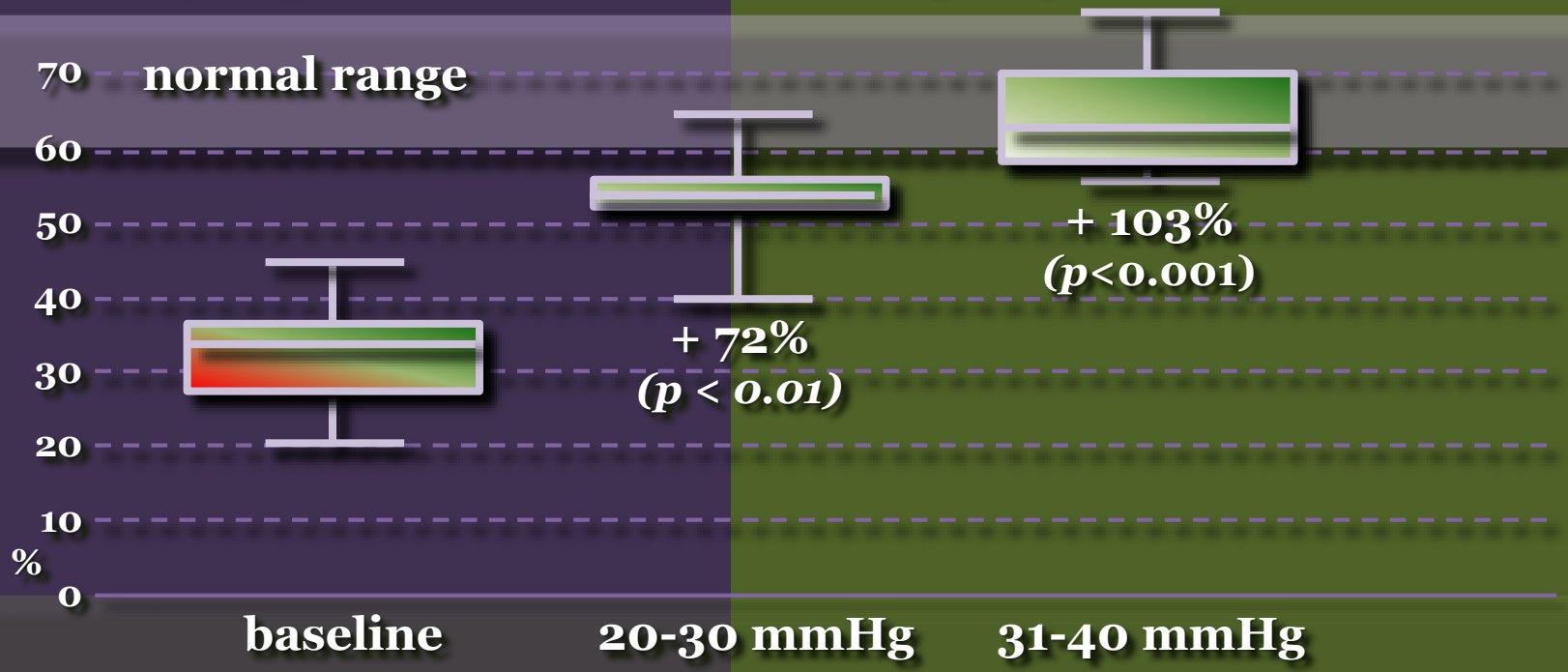

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conclusion

- increasing comfort
  by decreasing pressure

does not automatically leads to

- reduced effectiveness

the effectiveness of comfort

thank you for your attention