



Local heat preconditioning to prevent wound breakdown and skin necrosis: A translational study

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Disclosures

Y. Harder is consultant for Hilotherm GmbH



The clinical problem

Ischaemically challenged tissue

Wound breakdown: up to **39%** ¹

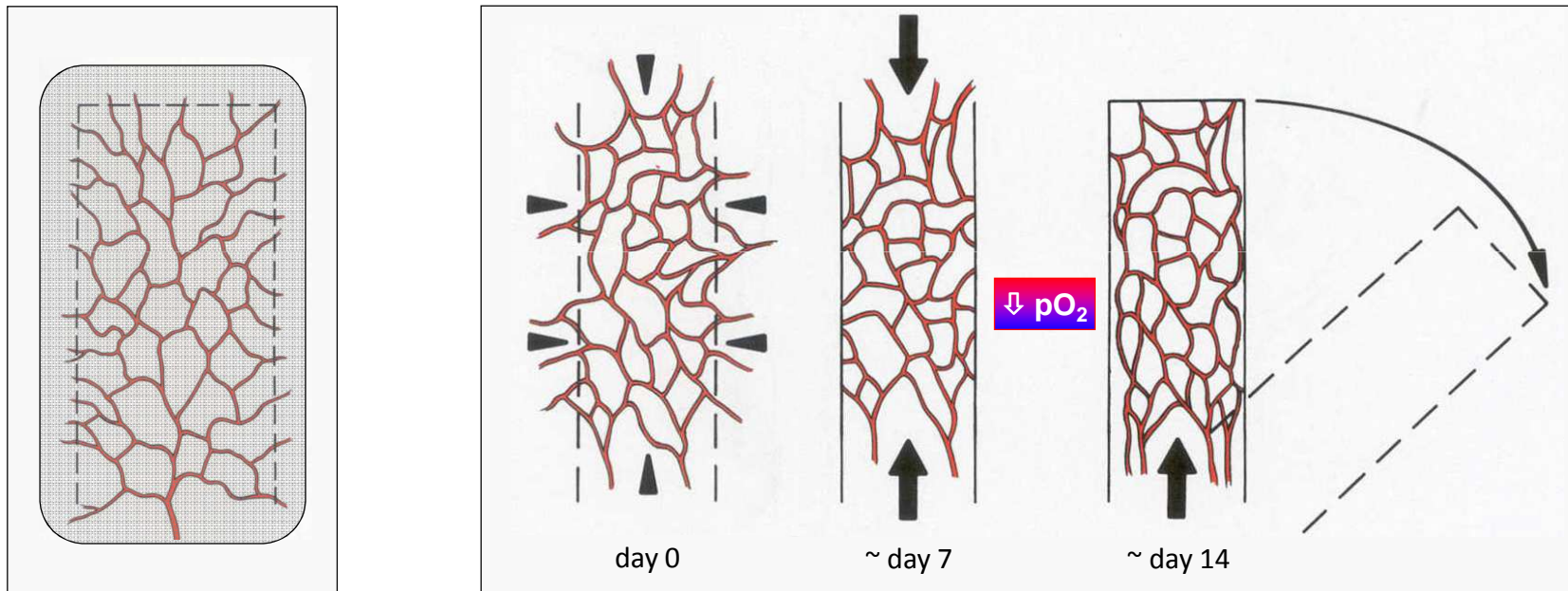
Skin flap necrosis: up to **54%** ²



[1 Zoumaras J et al.: *Aesthet Surg J.* 2008]

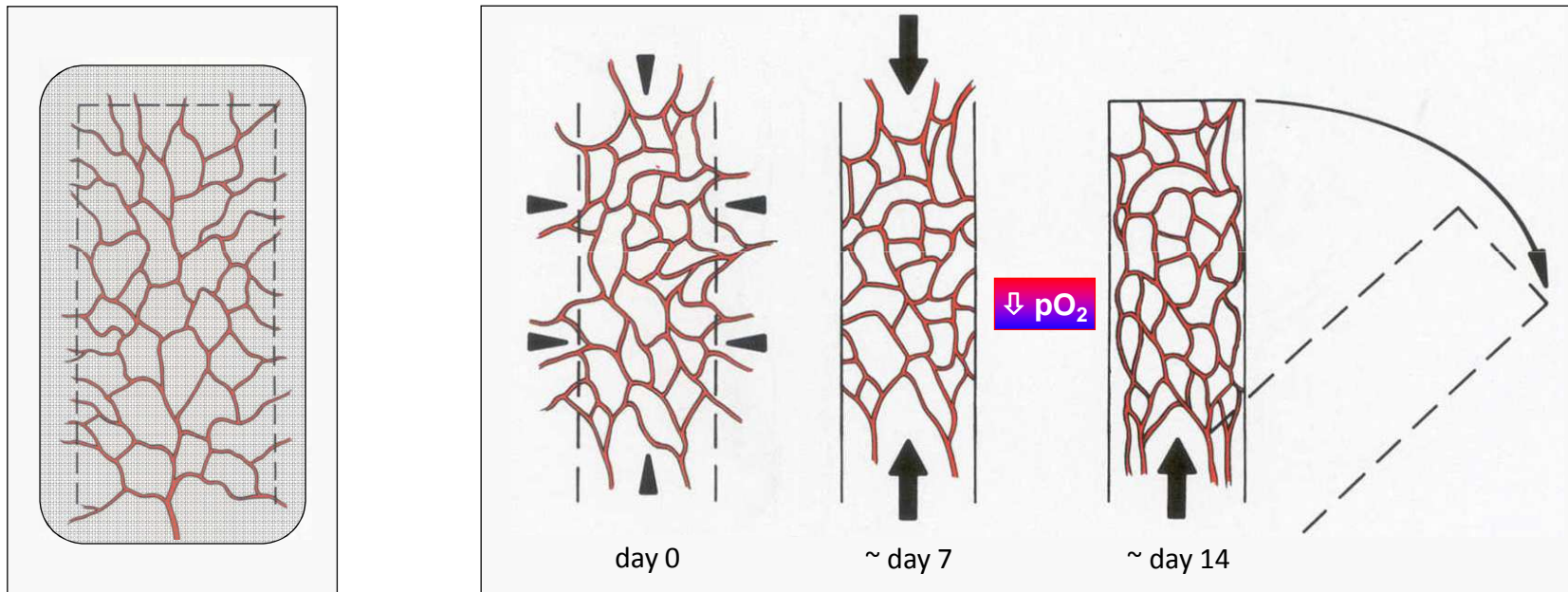
[2 Sotheran WJ et al.: *Ann R Coll Surg Engl.* 2004]

Surgical delay



[Reinisch JF: Plast Reconstr Surg, 1974]

Surgical delay



[Reinisch JF: Plast Reconstr Surg, 1974]

Invasive and time-consuming

Tissue preconditioning as alternative

Application of supraphysiologic stress to tissue prior to surgery



- Maintenance of microcirculation
- Increase of ischaemic tolerance of the tissue

Tissue preconditioning as alternative

- “True” preconditioning (PC)

- Ischaemic
- “Remote” ischemic



[Murry CE et al: *Circ Res*, 1990]

[Przyklenk K et al: *Circulation*, 1993]

- Systemic pharmacological PC

- Monophosphoryl Lipid A
- Erythropoietin
- Ghrelin



[Harder Y et al.: *Anesth & Analg*, 2005]

[Harder Y et al: *Surgery*, 2009]

[Rezaeian F & Harder Y et al: *Am J Physiol*, 2012]

- Local physical PC

- Shock-wave
- Cooling
- Heat



[Tobalem M & Harder Y et al: *J Surg Res*, 2013]



[Yunoki M et al: *J Neurosurg*, 2002]



[Yamashita N et al: *Circulation*, 1998;
Harder Y et al: *Ann Surg*, 2005]

Study aim

Effectiveness of repetitive local heat preconditioning

Incidence of

- Wound break down
- Skin flap necrosis

Methods

1. Skin Sparing Mastectomy and immediate breast reconstruction

- 25 patients:
Local heat preconditioning
- 25 patients:
No preconditioning (control)

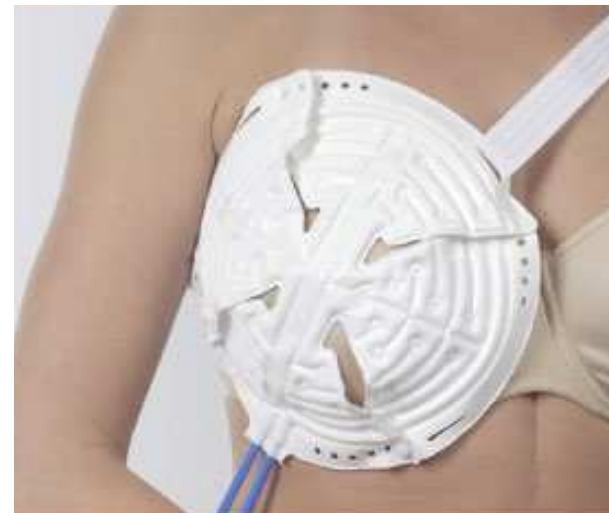


2. Reduction Mammoplasty (RMP)

- 15 patients:
Local heat preconditioning of one breast
No preconditioning of the other breast (control)



Methods

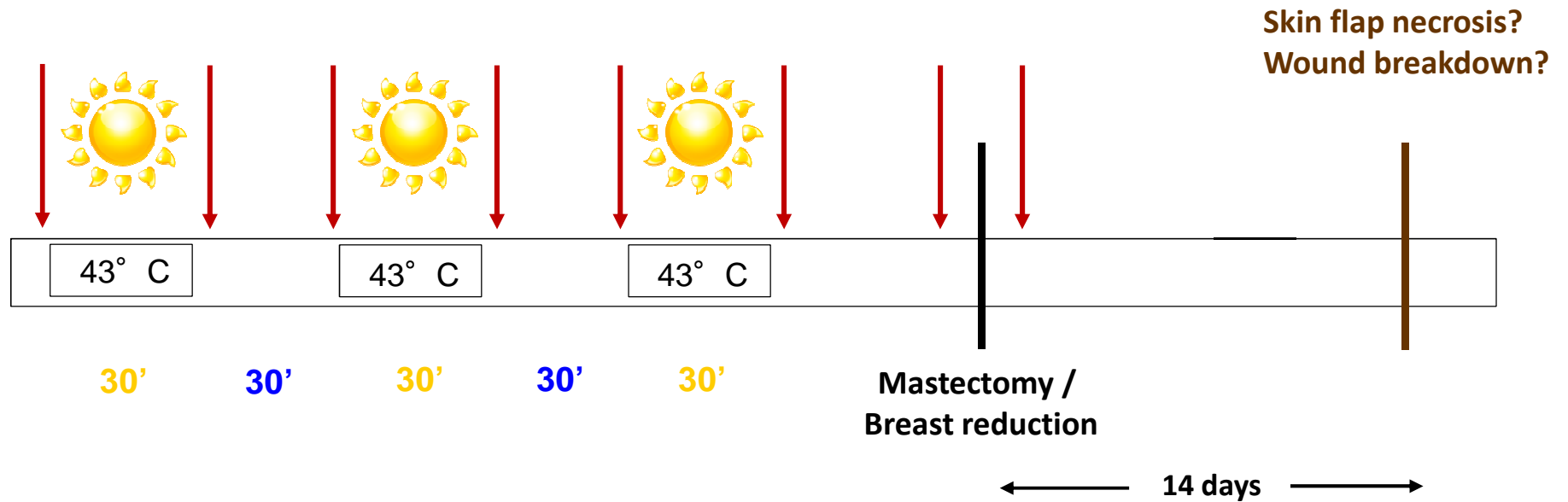


[Hilotherm GmbH, Deutschland]

Methods

PC initiated 18 hours prior to surgery

Perfusion measurements

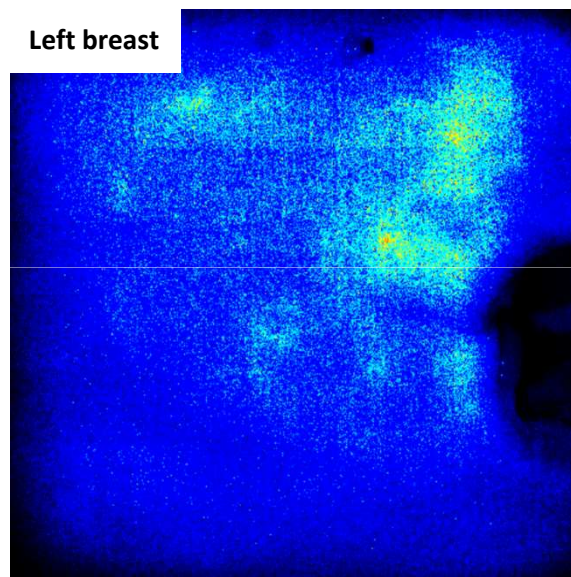


Results. Overall

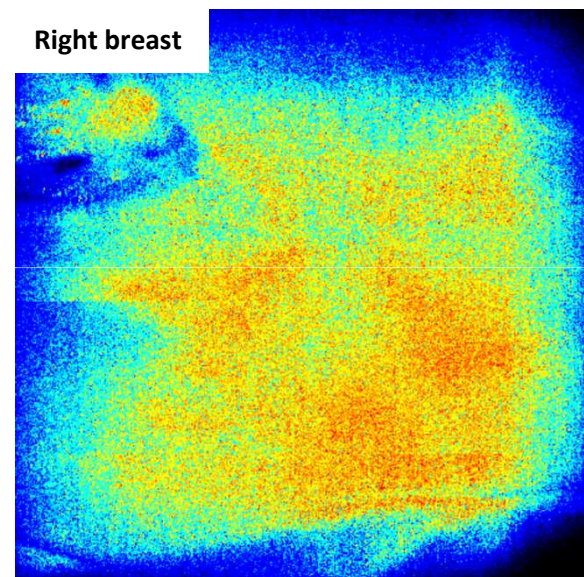
- No burns were noticed
- Heat-induced hyperaemia completely vanished prior to surgery

Results: Skin Sparing Mastectomy

Skin perfusion



1 hour after mastectomy
un-preconditioned

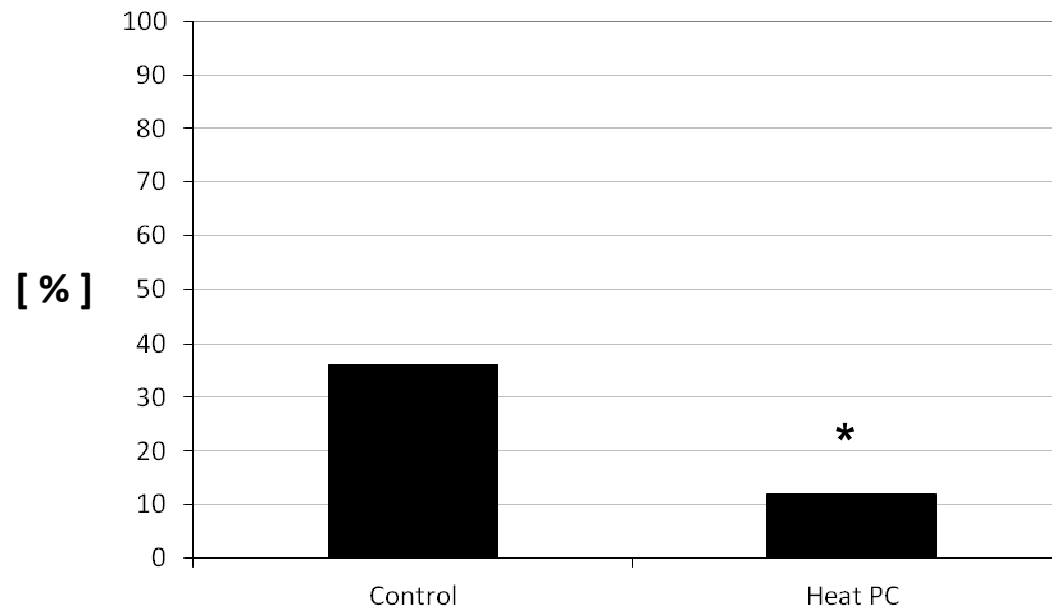


1 hour after mastectomy
preconditioned

[Farhadi J & Harder Y et al: J Plast Reconstr Aesthet Surg, 2013]

Results: Skin Sparing Mastectomy

Skin flap necrosis

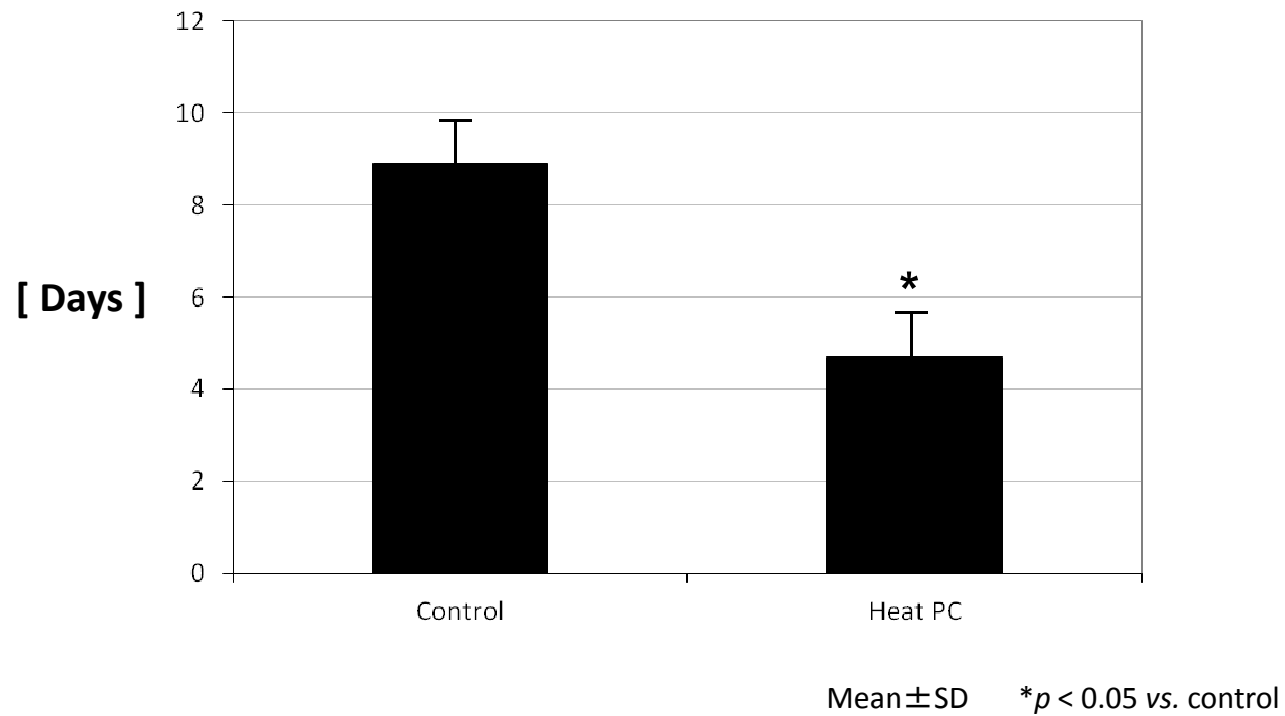


Mean * $p < 0.05$ vs. control

[Farhadi J & Harder Y et al: J Plast Reconstr Aesthet Surg, 2013]

Results: Skin Sparing Mastectomy

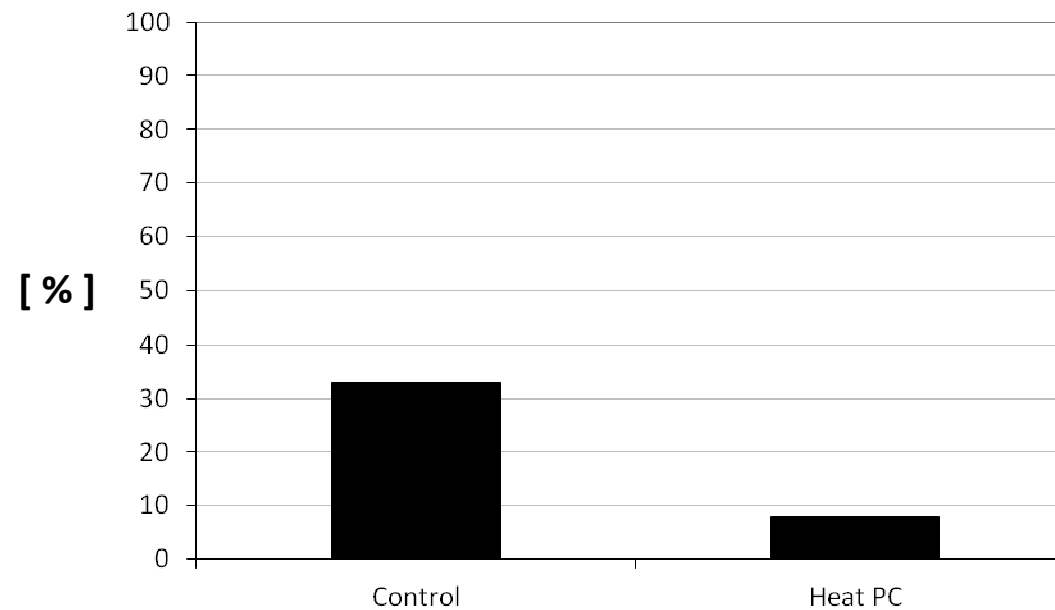
Length of hospital stay



[Farhadi J & Harder Y et al: J Plast Reconstr Aesthet Surg, 2013]

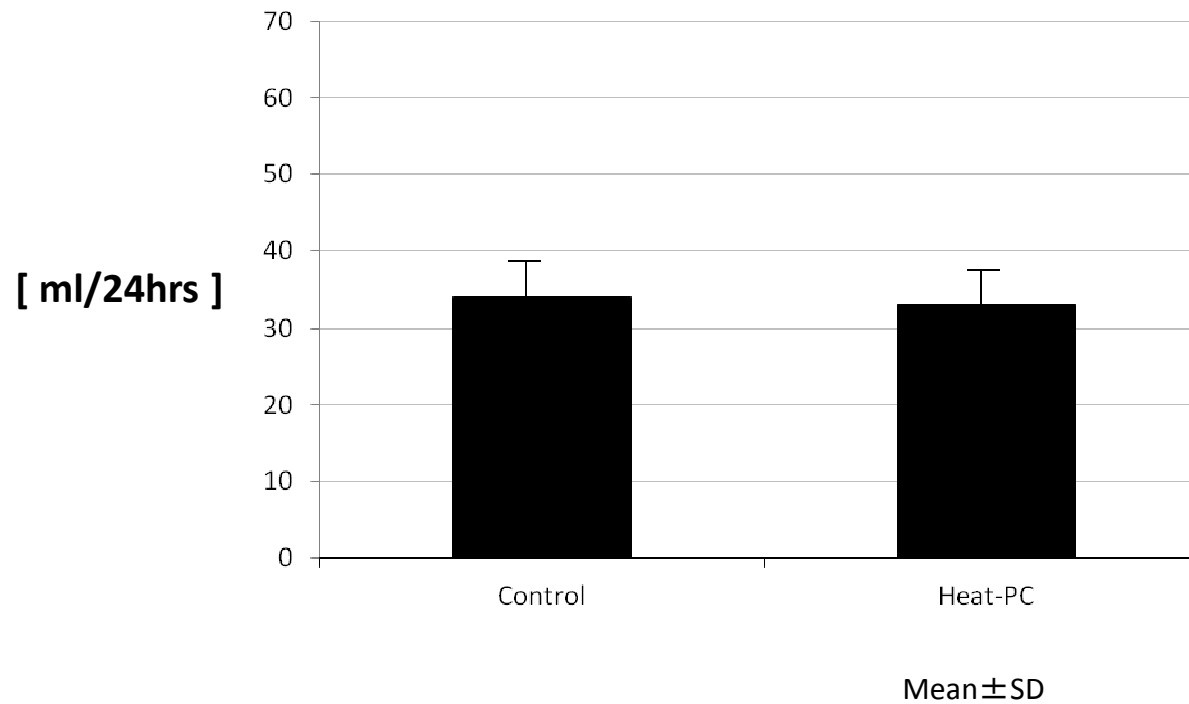
Results: Reduction Mammoplasty

Wound breakdown



Results: Reduction Mammoplasty

Wound drainage



Summary

Local heat preconditioning

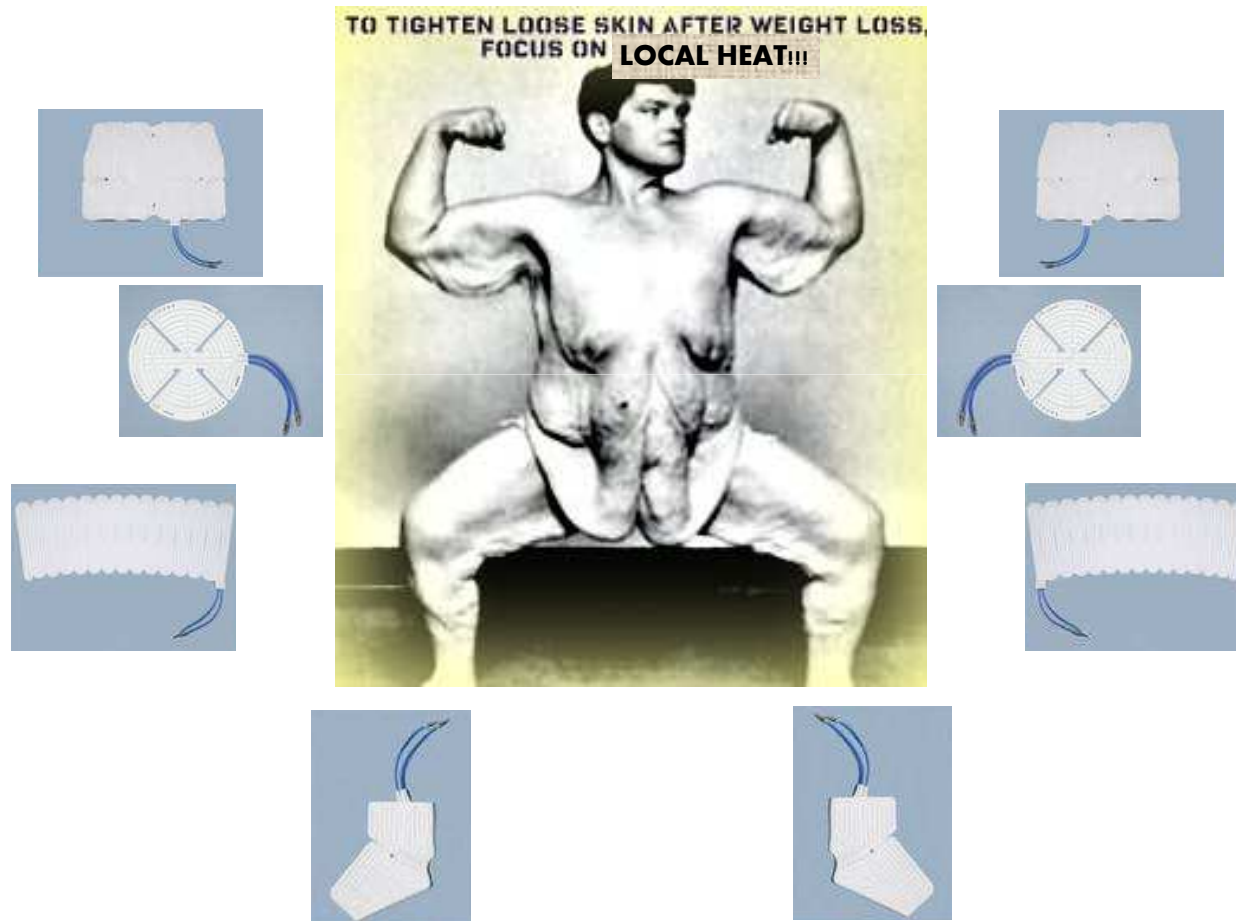
- Can be translated into daily clinical surgery
- Increases perfusion in ischaemically challenged tissue
- Significantly decreases skin flap necrosis
- Reduces wound breakdown
- Reduces length of hospital stay
- Does not increase postoperative drainage

Conclusions

Local heat preconditioning in specific breast procedures

- Safe
- Simple
- Efficient
- Applicable briefly prior to surgery
- Cost-effective

Perspectives





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