HILOOTHERAPY

The thermo-technique that can be controlled precisely to the degree

Local heat application for body tightening interventions and tissue transfers
What does heat application using Hilotherapy mean?

Hilotherapy enables the local application of heat for pre- or postconditioning of tissue that potentially or actually experiences a critically low blood supply. This condition particularly occurs with surgical interventions on the surface of the body, such as extensive dissections or tissue transfers. The heat is applied by placing pliable silicone water-flow cuffs on the target tissue and the temperature can be set to a precise degree from +35 °C to +43 °C.

The role of vascular alteration (increase in vascular diameter and number of blood vessels)

Tissue preconditioning (prior to tissue dissection) using local heat leads to:
1. Vascular dilatation immediately after heat application (maintenance of blood flow in areas with critical ischemia) and
2. Increase in ischemia tolerance (improved tissue survival despite tissue blood flow remaining the same)

Tissue postconditioning (following tissue dissection) using local heat leads to better maintenance of perfusion, especially at a capillary level in areas at risk

In both cases, it must be guaranteed that the desired temperature is kept constant. Ideally, the physically stressor (in this case, the local heat) must be applied in the supraphysiological or sublethal range, which is guaranteed for local heat at around 43 °C.

The experimental concept:
The difficult clinical implementation of ‘surgical delay’ has led many researchers to investigate alternative forms of conditioning for tissue and organs. Murry et al. have performed pioneering work here by researching the concept of ischemic preconditioning on the heart. They were able to demonstrate that the repeated, short-term occlusion (ischemia) of the supplying coronary blood vessels, followed by a temporally defined reperfusion phase, was able to significantly reduce the extent of a subsequent heart attack compared with unconditioned animals. This concept of ischemic tissue preconditioning found imitators that achieved similar effects through alternative physical (including local heat, cold, shockwaves) and non-physical stressors (including Monophosphoryl Lipid A, erythropoietin, ghrelin). As local heating of the skin to 43 °C is not only effective but also pleasant for the patient, this concept of tissue conditioning was pursued and implemented in the hospital.

References:
Local heat application on the skin

Experiments from animal testing and clinical research have been able to show that tissue preconditioning with local heat at around 43 °C leads to a significant improvement in wound healing and the survival of the skin flap, and thus can replicate the effects of repeated skin flap circumcision (‘surgical delay’).

The solution: Heat application using HILOThERAPY

Thermo-therapy enables the local and controlled application of heat, both before an intervention (tissue preconditioning) and after an intervention (tissue postconditioning). This local heat application on the skin appears to be particularly helpful in plastic and reconstructive surgery, as extensive tissue dissections often occur here. Hilotherapy with local heat is a very effective alternative to ‘surgical delay’.

The application

As a comparative study has shown, tissue protection is especially pronounced when the heat application is applied repeatedly around 18 hours before the operation - i.e. on the evening before.

Three heat cycles of 30 minutes each at a temperature of 43 °C, each interrupted by a passive cooling phase at room temperature, have proven to be especially effective.

(For details of the study, see page 4)

In the postoperative phase, the heat can be applied on the day of the intervention and then on a daily basis afterwards. It is recommended to also apply the heat repeatedly here. The aim it to achieve through vascular dilatation both an improved arterial inflow and an improved venous outflow. The heat application should above all be performed during the first 3-5 days following the intervention, the time in which necrosis usually occurs.
Results of two clinical pilot studies in which two fields of application were investigated:

1. Skin-sparing mastectomy with immediate breast reconstruction for breast cancer. 6
2. Breast reduction for breast hypertrophy (enlargement of the breast). 7

The first study included 50 patients, 25 patients each with and without heat preconditioning.

The second study involved 20 patients with one breast pretreated with heat and one breast that was not pretreated.

The patients or breasts pretreated with heat showed improved tissue survival in comparison with the untreated patients (12% partial necrosis vs. 36% in the control group) for mastectomy skin flaps and faster healing of surgical wounds following breast reduction. The improved tissue survival involved permanently improved blood flow. As a positive side effect of the reduced surgery-related morbidity, it was found that the pretreated patients were able to leave the hospital following breast reconstruction on average after a stay of just 4 days (9 days in the case of untreated patients).

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Following breast reduction, it was shown that in the case of heat preconditioning on the evening before, 92% of all surgical wounds were healed just 14 days after the intervention (67% in the case of breasts that were not pretreated). Furthermore, it was observed that patients treated with local heat did not display any increased tendency toward postoperative bleeding.

Conclusion

Heat preconditioning leads locally in the skin tissue to

1. lasting maintenance of blood flow, especially in tissue that is potentially at risk of ischemia, without the increased risk of postoperative bleeding
2. rapid increase in the ischemia tolerance of the tissue (better survival despite poorer tissue blood flow)
3. significant reduction in the skin necrosis and wound-healing disorder rates and
4. faster healing of surgical wounds.
The heat application

The heat effect is produced using water as a medium. This is set to the desired temperature, which is precise to the degree, in the specially designed treatment equipment and kept constantly at this level.

This ensures the temperature is kept constant, as required medically, regardless of whether the application is needed over the short, medium or long term. Multi-hour or even multi-day applications are also possible by applying a constant temperature.

The water heated to the desired temperature (application range 35 °C to 43 °C) flows through pliable water-flow cuffs made from silicone, which are available in various shapes and sizes, and thus can be applied to various areas of the body.

Round cuff, small

Flat cuff, small

Round cuff, large

Flat cuff, large
The treatment equipment

The HILOTERM Calido device was specially developed for local heat application as part of HILOTHERAPY.

HILOTERM Calido

• Particularly suitable for the clinical field of application, both pre- and postoperatively
• Designed for the connection of 1 cuff (using a Y-piece, 2 cuffs can also be used at the same time).
• Constant-temperature permanent operation (through sensors).
• Cooling medium: distilled water (2 liters of distilled water every 6 months).
• Temperature range +35 °C to +43 °C (can be selected in 1 °C increments)
• Dimensions 430 x 275 x 268 mm
• Weight: Empty weight: 10 kg Ready for operation: 12 kg
• Transport: Indoors: Where possible on a Hiloroll equipment trolley. Outdoors: In the original box or in a suitable carry bag.
• Power supply (230 V)