

An Analysis of Tissue Temperature and Adipocyte Morphology Following External Ultrasound with the MC1 Device

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Abstract

Background: The VASER Shape is a non-invasive ultrasound (US) system which received FDA clearance in 2010 for relief of pain, muscle spasms and joint contractures [1]. The device has been used “off- label” for non-invasive body contouring on the premise that US diathermy may have a reducing effect on adipose tissues. This study documents both the time/temperature relationships and cellular changes following VASER Shape treatments.

Methods: Treatment and control areas were marked on the abdomen of 3 anesthetized 70 kg pigs. Thermocouples were placed into the treatment area at depths of 2mm, 14mm and 30mm under Touchview US guidance (Fig. 1). Treatments were applied at manufacturer’s recommended settings for 2 consecutive 30 min. intervals. A thermal camera recorded skin surface temperature. Lymph samples were taken pre-treatment from control side and post treatment from treated side. Biopsies were taken of the skin, adipose tissues and lymph nodes on both sides. Tissue temperatures were recorded [2, 3].

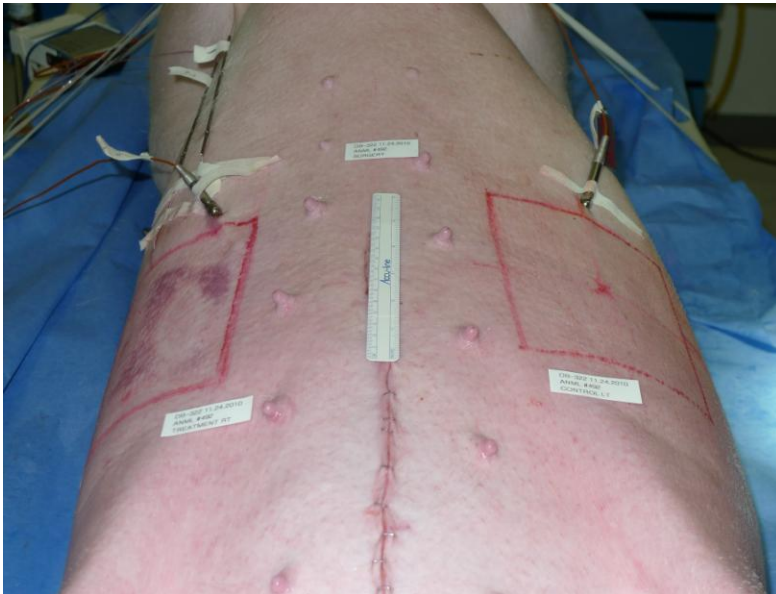


Figure1. Thermocouples in treatment area.

Results: The skin biopsies did not reveal thermal damage. Electron microscopy of the treated adipose tissue revealed alterations in the cellular architecture without necrosis. Lymph analysis revealed that triglycerides were 1598 treated side versus 232 for control. Analysis of lymph node biopsies revealed free vacuoles of fat within the lymph tissue on treated side compared to normal lymph node histology on control side. Temperature measurements for typical study subject are depicted in Fig. 2.

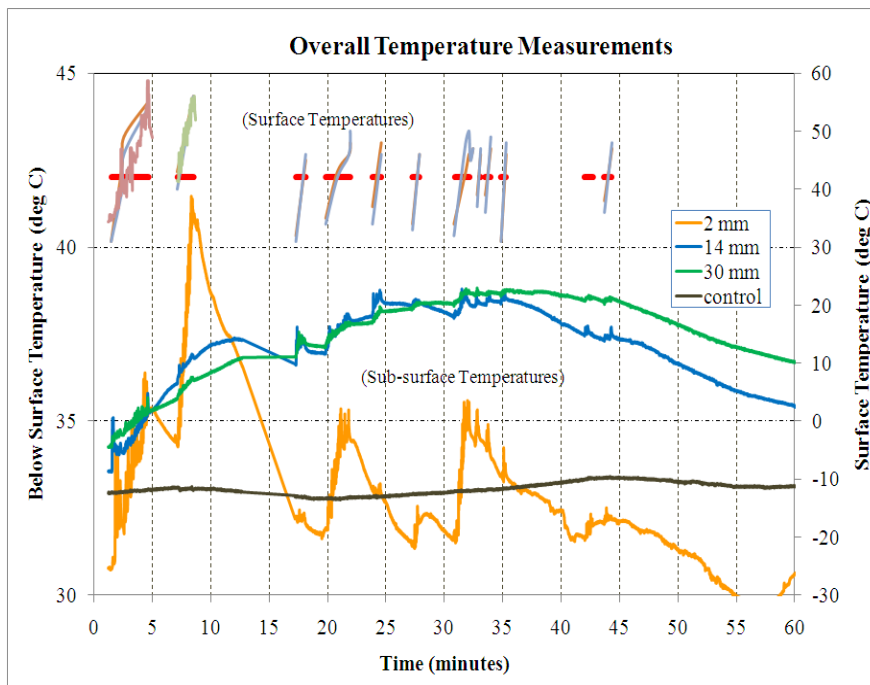


Figure 2. Time/temperature relationships.

Conclusions: The tissue temperatures produced were not associated with thermal tissue damage at energy levels recommended for clinical use. Based on the cellular changes and the increase of free lipids in the lymph system on the treated side, we conclude that treatment with this device may have a reducing effect on adipose tissue, possibly by altering the permeability of fat cells.

References

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