Eur J Vasc Endovasc Surg **34**, 250 (2007)
doi:10.1016/j.ejvs.2007.03.009, available online at http://www.sciencedirect.com on ScienceDirect

CORRESPONDENCE

Reply to Letter to the Editor re: Investigation on Radiofrequency and Laser (980 nm) Effects after Endoluminal Treatment of Saphenous Vein Insufficiency in an Ex-vivo Model

Dear Editors,

We would like to thank Serge Mordon and his group for their stimulus to an important discussion, which was one of the aims of our paper to initiate.[1]

Our first series of experiments indicate that ELT leads to a wide variation in the effects on tissue within a certain treatment protocol. This may be due to a very complex mechanism of endovenous laser-induced thermal alteration. In ELT, energy level does not seem to be the single variable influencing thermal effects on endovenous tissue. Mordon *et al.*[2] presented an interesting mathematical model for evaluation and demonstration of tissue heating during ELT. There findings confirm our own theoretical calculations.[3]

Human saphenous veins are, as a rule, completely surrounded by fatty tissue.This condition can be assumed and is adequately represented by our model. In addition, to our knowledge, heat conductivity of muscle tissue is only slightly higher than that of fatty tissue (fatty tissue: 0,1-0,37 W/(m • K), muscle tissue: 0,34-0,68 W/(m • K)[4,5]). Experiments in our ex-vivo model were performed without tumescent anesthesia. We assume that heat conductivity of tumescent fluid (normal saline with highly diluted local anesthetic) is similar to tissue with around 0,5 W/(m • K). We do not think that perivascular tumescence directly influences the intravenous thermal effects of ELT such as uniform distribution of heat inside the vessel, as proposed by Mordon *et al.* Tumescence may reduce vein-lumen diameter due to perivascular pressure and it enlarges the distance between treated vein and perivenous fatty tissue, nerves and skin thus avoiding thermal injury of these structures.

In conclusion, we think that our ex-vivo cow's foot model adequately represents the clinical situation for endovenous thermal procedures in veins with a diameter up to 5,5 mm.

We feel that research and discussion on ways of optimizing endovenous therapeutic procedures and their appropriate evaluation in experiments are of great importance since, there are up to now very few systematic experimental examinations of this therapeutic procedure although it is being used clinically with increasing frequency.

We would be very pleased to collaborate with Mordon's working group to combine their mathematical with our biological model. It may well be that data stemming from a combination of these two models can offer greater validity for clinical work with humans.

C.-G. Schmedt[1]*, R. Sroka[2]
[1]*Clinic for Surgery (Director: Prof. Dr. W. Mutschler), Division of Vascular Surgery and Phlebology (Head: Prof. Dr. B. Steckmeier), Ludwig-Maximilians-University Munich, Nussbaumstrasse 20, D-80336 Munich, Germany*
[2]*Laser-Research-Laboratory in the LIFE-Center (Head: Prof. Dr. Dr. h.c. mult. A. Hofstetter), Ludwig-Maximilians-University Munich, Marchioninistrasse 23, D-81377 Munich, Germany*
E-mail address: cg.schmedt@t-online.de

References

1 Schmedt CG, Sroka R, Steckmeier S, Meissner OM, Babaryka G, Hunger K *et al*. Investigation on radiofrequency and laser (980nm) effects after endoluminal treatment of saphenous vein insufficiency in an ex-vivo model. *Eur J Vasc Endovasc Surg* 2006;**32**:318–325.
2 Mordon SR, Wassmer B, Zemmouri J. Mathematical modeling of endovenous laser treatment (ELT). *BioMedical OnLine* 2006;**5**:26, www.biomedical-engineering-online.com/content/5/1/26.
3 Sroka R, Schmedt CG, Steckmeier S, Meissner OA, Beyer W, Babaryka G *et al*. Ex-vivo investigation of endoluminal vein treatment by means of radiofrequency and laser irradiation. *Medical Laser Application* 2006;**21**:15–22.
4 Duck FA. Physical properties of tissue. Academic press; 1990. pp. 9.
5 Welsh AJ, van Germert MJC. Optical-thermal response of laser-irradiated tissue. Plenum Press; 1995. pp. 367.

Accepted 27 March 2007
Available online 15 May 2007

*Corresponding author. C.-G. Schmedt, Division of Vascular Surgery and Phlebology, University of Munich, Nussbaumstrasse 20, D-80336 Munich, Germany.

DOI of original article: 10.1016/j.ejvs.2006.11.043.