New investigation of endovenous laser ablation of varicose veins

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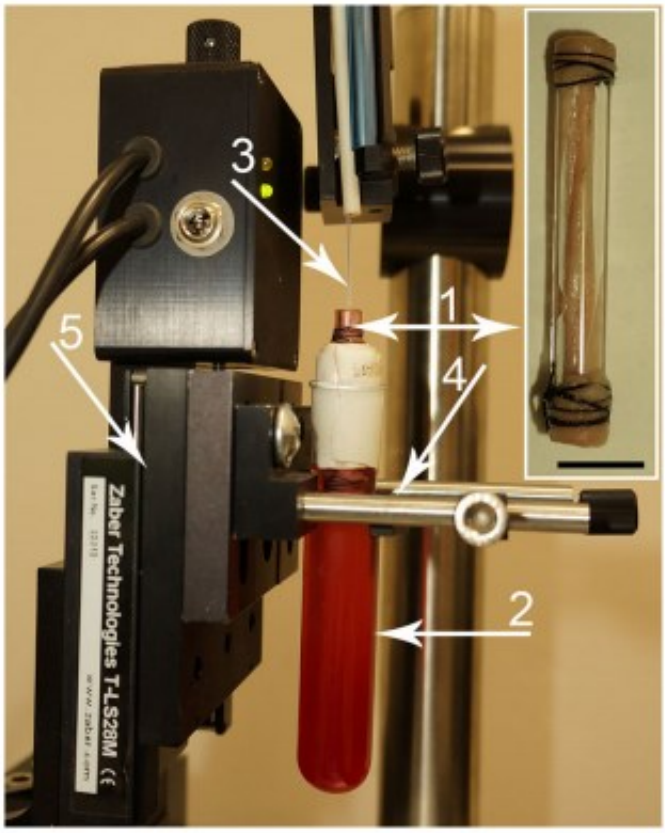

Fig. 1 Experimental device for simulation of EVLA. Designations: a piece of vein placed in a glass tube (on insert scale bar represents 1 cm) (*1*), a test tube containing pure saline solution (or RBC suspension) (*2*), the fiber (*3*), a holder (*4*), and a motorized translation stage (*5*)

Experimental device for simulation of endovenous laser ablation. Credit: Kazan Federal University

Laser ablation for varicose veins is an effective and minimally invasive technique for the treatment of varicose. However, this kind of therapy is associated with significant collateral damage because of the high output power of the laser. Therefore, it is an important issue in vein surgery to optimize the laser characteristics for ablation.

For endovenous laser ablation (EVLA), it is necessary to focus the laser radiation on a region of the vessel so that it receives sufficient energy to cause thermal damage. The value of this energy should provide coagulation of the vein, while being optimized so that the structure of the surrounding healthy tissues receives a minimum degree of damage.

This original study conducted by researchers from Ogarev Mordovia State University and Kazan Federal University presents the results of experiments on endovenous laser ablation of varicose veins in vitro using laser radiation of a solid-state laser and identifying the role a carbonized layer of blood in these experiments.

An experimental series with saline solution and red blood cell (RBC) suspension in the venous lumen was performed to identify the impact of a heated carbonized layer on the fiber end face versus the efficiency of EVLA. Results of these experiments confirmed that the presence of a heated carbonized layer on the fiber end face increases the efficiency of EVLA.

Further experiments are planned for process optimization, for instance, using radial emitting fibers, a technique that can minimize the possibility of vein perforations. Also, modification of the device to eliminate the requirement of placing the vein into a glass tube will create experimental conditions more similar to reality.

More information: Alexander N. Belyaev et al, Investigation of endovenous laser ablation of varicose veins in vitro using 1.885-μm laser

radiation, *Lasers in Medical Science* (2016). DOI: 10.1007/s10103-016-1877-z