

## **Investigation of the influence of thermally induced methemoglobin on the human skin optical reflection depending on temperature**

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### Abstract

Telangiectasias, also known as spider veins, are small dilated blood vessels (arteriole, venule or capillary) of dermis. Its average size is from 0.1 to 1 mm. Percutaneous laser sclerosis of blood vessels is one of the modern technologies to remove spider veins. Dual wavelength laser treatment of telangiectasias is the development of laser sclerosis spider veins technology. The dual wavelength method is based on the transformation of dermal hemoglobin into methemoglobin due to preliminary heating of the dermis. The development of this method is impossible without detailed optimization of laser parameters, which requires the creation of a feedback system that allows determining the degree of thermally induced change in the optical parameters of the skin. Based on the developed optical model of human skin, which takes into account the influence of the concentration of thermally induced methemoglobin in the blood on the human skin optical reflection, the dependences of the human skin optical reflection at the wavelengths at which the absorption of human skin during heating changes the most on the concentration of methemoglobin in the skin are determined. The possibility of using laser radiation with wavelength closed to those wavelengths as a feedback indicator has been studied. The effect of skin heating temperature on human skin optical reflection intensity at the studied wavelengths was estimated. Comparison of simulation results with experimental results was done.