One step closer to a personalized laser heating treatment for retinal diseases
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In her Master’s thesis in biomedical engineering titled “Retinal Pigment Epithelium Heating Treatment for Age-Related Macular Degeneration”, Satu Pallasaho studied the feasibility of a novel temperature determination method during a retinal heating treatment with a near-infrared laser using mice as model animals. The obtained results will be utilized in the future to develop a new treatment modality for vision threatening retinal diseases such as age-related macular degeneration that is the leading cause of vision loss in the elderly people of Western countries. The study was conducted as a part of ongoing research in the Department of Neuroscience and Biomedical Engineering (NBE) of Aalto University developing a personalized laser heating treatment for retinal diseases.

The Master’s thesis utilized an electroretinography based retinal temperature determination method developed in the Cellular Biophysics research group in Aalto University. As hypothesized, it was observed that the same heating laser power does not induce an equivalent temperature increase in all the treated retinas. Since the magnitude of temperature elevation is essential for the success and safety of the retinal heating treatments, the results underline the need for personalized temperature control during heating treatment.

The beneficial effects of heating derive from the increased production of heat shock proteins which is cell’s own repair mechanism. The temperature dependent upregulation of heat shock protein production after laser heating treatment was confirmed in this study. The heating induced increase in the retinal amount of this protein may be used in the future to restore the healthy state of the diseased retina. This thesis serves as a foundation for further research on the subject and brings personalized laser heating treatments one step closer to a clinical use.

More information:
Satu Pallasaho
satu.pallasaho@aalto.fi