Synopsis of Original Research Paper

Evaluation of skin functional properties by multi-functional imaging of micro-vasculatures

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It is known that there is a close relationship between skin function and microvascular structures and blood flow dynamics. To measure the microvascular structures and the blood flow dynamics, functional imaging with optical coherence tomography (OCT) has been attracting attention. OCT is a noninvasive micro-tomographic imaging technique based on low coherent interferometry of near-infrared light and can visualize the tissue structure of the skin, evaluate aging by visualizing capillaries, and measure functional information such as blood flow velocity. However, previous studies with OCT measured static functional information independently and thus were insufficient to evaluate skin functional properties. In other words, it is necessary to comprehensively analyze these dynamics to evaluate skin functional properties. Therefore, this study aimed to develop a novel method to evaluate skin functional properties by detecting multiple functional information of skin micro-vasculatures and by analyzing their dynamics. To realize this, I developed a novel functional OCT technique that can simultaneously detect micro-vasculatures, blood flow velocities, and blood flow angles. Furthermore, the technique was applied to human subjects, and the dynamics of micro-vasculatures and blood flows during stimulation were investigated. In this report, I report validation results of the developed technique and its application to human subjects during alcohol stimulation for evaluating alcohol tolerance.