

Abstract Submitted
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Simulations of the Microcirculation in the Human Conjunctiva

WILLIAM DOW, FRANK JACOBITZ, University of San Diego, PETER CHEN, University of California, San Diego — The microcirculation in the conjunctiva of a healthy human subject is analyzed using a simulation approach. A comparison between healthy and diseased states may lead to early diagnosis for a variety of vascular related disorders. Previous work suggests that hypertension, arteriosclerosis, and diabetes mellitus have noticeable very early changes in the microvasculature (Davis and Landau, 1957; Ditzel, 1968; Kunitomo, 1974) and the vessels of the conjunctiva are specifically useful for this research because they can be studied non-invasively. The microcirculation in the conjunctiva has been documented over the course of disease treatments, providing both still images and video footage for information on vessel length, diameter, and connectivity as well as the direction of blood flow. The numerical method is based on a Hagen-Poiseuille balance in the microvessels and a sparse matrix solver is used to obtain the solution. The simulations use realistic vessel topology for the microvasculature, reconstructed from microscope images of tissue samples, and consider blood rheology as well as passive and active vessel properties.

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