

Ocular blood flow in rabbits under deep anesthesia: a real-time measurement technique and its application in characterizing retinal ischemia

ABSTRACT

In this study, we reported a new technique based on laser speckle flowgraphy to record the ocular blood flow in rabbits under deep anesthesia, and proposed parameters to characterize retinal ischemia. We applied the proposed technique to study the correlation of blood flow between the eyes of normal non-anesthetized animals, and to characterize the occlusion of the internal carotid artery (ICA) and external carotid artery (ECA). We established a correlation in blood flow between the eyes of non-anesthetized animals, and derived two new parameters, namely, the laterality index and vascular perfusion estimate (VPE). Our experimental results from 16 eyes (of 13 New Zealand white rabbits) showed a reduction in ocular blood flow with a significant decrease in the VPE after the occlusion of the ECA ($p < 0.001$). A low/minimal effect on blood flow was observed with the occlusion of the ICA. In conclusion, we demonstrated a means for the real-time measurement of the ocular blood flow in rabbits under deep anesthesia by using laser speckle flowgraphy and the VPE as an indicator of successful occlusion. The proposed technique might be applicable in quantifying the efficacy of new drugs and interventions for the treatment of retinal ischemia.