

The choroidal circulation accounts for 90% of ocular blood flow. Ocular circulation is implicated as a major risk factor in diseases such as Diabetic Retinopathy, Retinopathy of Prematurity, Age Related Macular Degeneration, Glaucoma, and Ischemic Optic neuropathy. Most current techniques to evaluate ocular circulation (fluorescein angiography, ICG angiography, OCTA) focus on the macula, optic nerve, and posterior pole. An accurate, readily useable, clinically useful means to measure global ocular circulation has not been available.

OcuFLOW Choroidal Circulation Analyzer (CCA) (OcuFLOW Inc., Timonium, Maryland) is an updated pneumatic tonometer that accurately and reliably analyzes the time resolved, pulsatile waveform of intraocular pressure (IOP) and derives eye circulation parameters such as intraocular pressure pulse amplitude (PA), pulsatile ocular blood flow (POBF), pulsatile ocular blood volume (POBV) and pulsatility index equivalent. It also calculates ocular perfusion pressure (OPP) using brachial blood pressure. Using a suction apparatus, the ophthalmic artery pressure can be determined (OAP). It is efficient enough to perform combined measurements within 5-10 seconds. Two FDA cleared devices; the Paradigm Ocular Blood Flow Analyzer (Guvant et al, 2004) and the Langham Ocular Blood Flow (OBF) (Langham, 1988) are no longer available. The OcuFLOW-CCA addresses design flaws present in the predicate devices improving functionality and user dependence. A cloud based normative database is being developed with algorithms to adjust for axial length and gender, increasing the diagnostic potential of the OcuFLOW-CCA.

Over 300 peer-reviewed scientific publications using the predicate devices have demonstrated the validity of POBF as a surrogate for global choroidal blood flow. According to these peer reviewed references, the OcuFLOW-CCA measures 75 to 85% of eye circulation. This compares to optical_coherence_tomography_angiography (OCTA) which evaluates less than 1% of the eye circulation, color Doppler of the retrobulbar vessels that measures less than 50% the eye circulation.

Scientific publications indicate that the measurement of POBF and OPP helps to distinguish vascular from nonvascular glaucoma (especially in LTG) and ischemic and nonischemic central retinal vein occlusion. In diabetic retinopathy and age-related macular degeneration POBF and PA decrease with worsening stage of disease. With internal carotid occlusion, the PA and OAP are decreased. The response to ocular therapies can be evaluated using the OcuFLOW-CCA to ensure that drugs that decrease eye circulation are not utilized in ischemia related ocular disease. Conversely, the OcuFLOW-CCA has potential to monitor therapies that increase ocular blood flow.