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A proposed study in detection of hypertension by ultra-widefield ophthalmic imaging

Alan Fleming
Optos, UK

Statement of the Problem: Ophthalmic imaging may provide a method for hypertension detection. Changes to the caliber of the retinal vasculature near the optic disc are early biomarkers of hypertension. We hypothesize that changes in vessel caliber in ultra-widefield scanning laser ophthalmoscope (UWF-SLO) images can be used to classify hypertensive status. A pilot study with 500 subjects has shown that software (optomapHT, Optos, UK) for semi-automated detection of venular and arteriolar caliber in UWF-SLO images can predict hypertensive status, defined by clinical blood pressure (BP) >= 140mmHG, area under receiver operator characteristics curve (AUROC) of 0.720.

Proposed study aim: To determine the ability of optomapHT to predict hypertensive status as established through either ambulatory BP measurement or clinical BP measurement.

Study design: Ambulatory BP measurements provide a better prediction of retinal arteriole caliber than clinical BP. However, the procedure for ambulatory BP measurement may cause discomfort for the patient making population based studies difficult. Therefore, the proposed study participants will be patients whose routine care includes either ambulatory BP or clinical BP measurement. Informed consent will include agreement to undertake, in addition, UWF-SLO retinal imaging. Outcome measures will be AUROC for the prediction by optomapHT of hypertension according to clinical BP or ambulatory BP. To show that optomapHT is at least equivalent to clinical BP for diagnosis of hypertensive status 600 participants are required.

Conclusion: In addition to eye care, UWF-SLO imaging technology presents an opportunity for early detection of hypertensive patients. Collaborators in this study would benefit from partnership with a highly successful ophthalmic imaging company.

Biography

The authors have many years experience in developing algorithms for retinal image analysis in industry and academia. Alan Fleming has many publications in this field from University of Aberdeen. Gavin Robertson completed his PhD at University of Edinburgh in retinal vascular analysis. Jano van Hemert has led multidisciplinary research groups in academia and industry and is an ardent exponent in the commercialisation of research output.

aflemming@optos.com

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