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Early detection of macular disease: AMD, DMO and beyond

New treatments for neovascular age-related macular degeneration (nAMD) and diabetic macular oedema (DMO) have transformed the prognosis for patients. But there is a pressing need for improved, cost-effective methods of detection and monitoring of these conditions. The handheld radial shape discrimination (hRSD) test has shown potential for the early detection of macular pathologies. We followed patients diagnosed with nAMD in their first eye, with no evidence of nAMD in their other eye (study eye, SE) over consecutive, routine, clinic visits at which they undertook the hRSD test presented on an Apple iPod Touch. We also examined hRSD test performance in patients referred from diabetic screening as being at risk of DMO (screening grade M1). Of 179 nAMD patients, 19 (10.6%; "converters") developed nAMD in the SE; hRSD thresholds in the converters began to decline 190 days before diagnosis. At an hRSD cut-off of -0.60 logMAR, sensitivity was 0.79 (95% CI: 0.54–0.94) with a specificity of 0.54 (0.46–0.62). Of 145 M1 patients, 44 (30.3%) were found to have centre involving macular oedema; hRSD thresholds were significantly worse in these patients, compared both to those with no DMO and those with non-centre threatening DMO. Thus, the hRSD test is sensitive, both to the earliest stages of pathology (in the nAMD patients) and to different stages of pathology (in DMO). Given high levels of patient acceptability, that it can be done by patients away from clinics, and that it runs on inexpensive, well connected devices, the hRSD test could have a role in both improved detection and monitoring of macular disease away from hospital clinics.

Recent Publications

1. Ku J Y, Milling A F, Pitrelli Vazquez N and Knox P C (2016) Performance, usability and comparison of two versions of a new macular vision test: the handheld Radial Shape Discrimination test. PeerJ. 4:e2650.

2. Wang Y-Z, He Y-G, Mitzel G, Zhang S and Bartlett M (2013) Handheld shape discrimination hyperacuity test on a mobile device for remote monitoring of visual function in maculopathy. Invest Ophth Vis Sci. 54 (8): 5497-505.

Biography

Paul Knox is a Physiology graduate from the University of Glasgow, from where he also obtained his PhD in Neurobiology. After appointments in the Universities of Hull and Edinburgh, a Wellcome Trust Vision Research Fellowship allowed him to develop his research interests in vision and eye movement. Currently the Reader in Vision Science in the University of Liverpool, he now conducts research on human vision and visually-guided behaviour in development, ageing, health and disease. He has been a member of the NICE Medical Technologies Advisory Committee since its inception in 2009. This led to an active interest in the generation and assessment of clinical evidence, including evidence demonstrating the performance of vision tests deployed on mobile devices. He is currently one of the investigators in the UK HTA-funded MONARCH study researching tests for home monitoring in neovascular AMD patients.