Comparison of Optic Disc Images from Two Smartphone Based Imaging Systems in Glaucoma Patients

These devices have a role in recording the appearance of ocular structures and aiding in the detection and management of disease

Truckee, Jan 28, 2019 (Issuewire.com**)** - D-EYE™, a leading developer of advanced devices for mass health screenings and data analytics is pleased to share the publication of a study comparing the D-EYE Retinal Imaging System™ with the *Welsh Allyn iExaminer* and the conventional indirect *Kowa 3D* fundus camera.

"We are very pleased by the comparative clinical research effort at the University of Liverpool have done with the *D-EYE Retinal Imaging System* stated Spencer Lee, D-EYE Founding Partner. "D-EYE continues the re-birth of the important direct ophthalmoscopy examination. The future of the D-EYE *smartphone-based mobile telemedicine system* will help reduce missed clinical diagnosis not easily found with the traditional ophthalmoscope. The University of Liverpool team captured some amazing examples of the fundus images D-EYE can see."

Published in *Research Gate™* a professional network for scientists and researchers web portal and funded by a grant from *Fight for Sight* (Ref: 1552/53), the study was performed by a team of researchers by the *Department of Eye and Vision Science, University of Liverpool and St. Paul's Eye Unit, the Royal Liverpool University Hospital, Liverpool, United Kingdom*. The purpose of the study was to compare the quality of retinal images obtained with the iExaminer system and D-EYE with those of a standard digital retinal camera.

Methods: *The team conducted a prospective observational study of the patients with confirmed or suspected glaucoma. Images from both un-dilated and dilated eyes of all patients were acquired by both smartphone devices while a single image was acquired using the Kowa 3D fundus camera (dilated). All images were acquired by the same trained operator. All the acquired images were cropped and normalized to the same size followed by grading on the image quality and cup to disc ratio by two masked graders. Statistical analysis was performed with SPSS v22 (SPSS Inc, IBM, USA)*

Proportions of Images Suitable for OC/OD measurements

Example images graded as suitable for OC/OD measurement by each grader (Grader 1 and Grader 2, 1st grading) are shown in Figure 4 of the study. The number of images deemed to have adequate and/or above quality by both graders was: 70 images by Kowa with dilation, 32 by D-Eye without dilation, 40 by D-Eye with dilation, 15 by iExaminer without dilation, and 22 using iExaminer with dilation. For images acquired using KOWA-3D fundus camera, 77% and 78% were graded as suitable for further analysis (note that these images were only obtained from dilated eyes).

Results: *103 patients (39 diagnosed glaucoma, 37.9%) were recruited, providing a dataset of 515 optic disc images. The proportions of images suitable for a cup and disc measurements obtained from dilated eyes by D-Eye and iExaminer were statistically significantly lower when compared to that of the Kowa camera (P<0.05). For images graded as at least acceptable, an inter-observer agreement for the cup-to-disc ratio extracted from them was good with intraclass correlations (ICCs) of 0.885 or better, with no marked differences between devices, and no great improvement with dilation. Intra-observer agreement was also good (ICC = 0.909 or better) across devices and conditions.*

Conclusion: *The smartphone-based imaging systems we investigated both showed promise for imaging the optic disc of patients with diagnosed or suspected glaucoma, with the D-Eye slightly out-performing the iExaminer. In circumstances where a fundus camera is not available, these devices might have a role in recording the appearance of key ocular structures and aiding in the detection and management of the disease.*

The full study is available from:

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About: Department of Eye and Vision Science, University of Liverpool

The Institute of Ageing and Chronic Disease is using world-class research to improve the quality of life of millions of people on an international scale. We want to understand the mechanisms of aging – from the cellular to the muscular-skeletal – to find the ways to delay its onset and to mitigate its effects. Our research translates into real benefits for people and animals of all ages - from unique approaches to prevent muscle wasting in intensive care patients, a retina scan to detect cerebral malaria in African children, and exercise and nutritional regimes that can prevent obesity and morbidity. We're also making strides in veterinary medicine, and investigating rare diseases like alkaptonuria, which causes severe early onset osteoarthritis. And we don't work alone. We have newly-created facilities in the University of Liverpool's William Henry Duncan Building, work closely with other exceptional university teams such as the School of Veterinary Science and its Leahurst animal hospital, and our global partners include the Welcome Trust, UK Research Councils, NIH (USA), Unilever and GSK.

About: St. Paul's Eye Unit, The Royal Liverpool University Hospital - Our Trust, which was established in 1995, manages three hospitals based on two sites: The Royal Liverpool University Hospital, Liverpool University Dental Hospital, and Broadgreen Hospital. We are the major adult university teaching hospitals trust for Merseyside and Cheshire and our hospitals have often been at the forefront of medical breakthroughs.

 About: D-EYE - Founded in 2014, with offices in Padova, Italy and Truckee, CA. Developed in conjunction with Incubator M31 Italia, Srl, and technology company Si14, Spa, the company's first product is the revolutionary D-EYE Smartphone-based Retinal Imaging System™ focusing on eye care. The system works in harmony with smartphones, allowing medical professionals to examine patients' retina for various health issues.

D-EYE's certifications include: FDA Class II 510(k) exempt 2014 – audited August 2018; CE Class I Registered Device 2014; ISO 13485:2012 – Medical Devices – Quality Management Systems; ISO 13485:2002 – Canada – EN ISO 15004-1 2009 -EN ISO 10940-2009 Ophthalmic Instruments.

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