The diagnostic accuracy of new imaging technologies for the diagnosis of glaucoma: results from the GATE study

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Purpose: To compare the diagnostic performance of automated imaging technologies in diagnosing glaucoma.

Methods: Design: comparative diagnostic accuracy study of 4 imaging tests for glaucoma diagnosis. Population: adult patients, newly referred from community to hospital eye services for suspected glaucoma. Reference standard: comprehensive clinical examination by experienced consultant ophthalmologist, including fundus examination and visual field tests. Index tests: 1: Moorfields regression analysis (MRA) - Heidelberg Retina Tomograph (HRT3); 2: Glaucoma probability score (GPS) - HRT3; 3: Scanning laser polarimetry (GDx-ECC); 4: Optical Coherence Tomography (OCT) - Spectralis. Setting: NHS secondary care, UK. Outcomes: Sensitivity, Specificity.

Results: Between April 2011 and July 2013, 955 participants were recruited from 5 UK Hospitals: 943 completed all 4 index tests. Glaucoma was diagnosed in 158 (17%) patients. 299 (32%) patients were diagnosed with no glaucoma related findings. The remainder were classified as Glaucoma Suspect, Ocular Hypertension, Primary angle closure (PAC) or PAC suspect. Using the machine generated classification of “outside normal limits”, the sensitivity (and 95% CI) was highest for MRA at 87% (81-93%) and lowest for GDx-ECC at 42% (33-50%). GPS had sensitivity of 82% (75-88%) and OCT sensitivity was 77% (70-84%). Specificity ranged from 94% (92-95%) for GDx-ECC, to 64% (61-68%) for MRA. GPS had specificity of 68% (64-71%) and OCT was 79% (76-81%). Sensitivities and/or specificities statistically differed between all pairs of tests (McNemar’s test). For all tests including the “borderline” results as well as the “outside normal limits” as abnormal, increased sensitivity although with a reduction in specificity (e.g. MRA values of 95% and 44% respectively).

Conclusions: This was the largest prospective diagnostic study of four commonly used tests for glaucoma. The diagnostic accuracy of the tests varied. MRA had the highest sensitivity though a lower specificity. In contrast, GDx-ECC had poor sensitivity but a very high specificity.