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Saccadometry: A novel diagnostic tool in covert hepatic encephalopathy

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The study of saccadic latency, the variable time between presentation of a peripheral stimulus and foveation of the target, has provided important insights into the neural mechanisms underlying reaction times and decision. It has emerged as a powerful tool to quantify neurological impairment in a wide range of conditions. Patients with Huntington's disease and Frontotemporal dementia, for example, generate saccades with significantly increased latency. In Parkinson's disease meanwhile, saccadometry demonstrates how neural function is affected by the disease and its treatment, for example deep brain stimulation.

Our latest work has shown measurement of saccadic latency distributions in patients with liver cirrhosis can accurately detect Covert Hepatic Encephalopathy (CHE). This cognitive defect, found in 30-70% of cirrhosis patients, has been linked to poor quality of life and increased mortality, while early detection and appropriate treatment may reverse the deficit. Despite its clinical significance, diagnosis relies on psychometric tests that have proved unsuitable for clinical use.

Our study diagnosed CHE in a subset among 36 cirrhosis patients by subjecting them to the World Congress of Gastroenterology standard of psychometric tests. We then used a portable saccadometer to measure their saccadic eye movements. We found those with CHE (16) had significantly prolonged saccadic latencies when compared with those without (20). There was in fact a spectrum of cognitive impairment among cirrhosis patients, with those defined as having CHE by psychometric testing having slower reaction times.

Saccadometry therefore represents an opportunity for accurate and early diagnosis of CHE, better informing treatment in these patients. (250 words)

Biography

Nicholas Cunniffe graduated from Cambridge University with degrees in neuroscience and medicine. After completing junior years in Cambridge, he is now undertaking specialist training in London, while lecturing neuroscience at the University of Cambridge and continuing to conduct research with Professor Carpenter who was originally invited to this meeting, but prevented from travelling by a medical condition: Nicholas Cunniffe is representing him. Roger Carpenter is Emeritus Professor of Oculomotor Physiology at Cambridge, and directed medical studies for many years at Gonville and Caius College. Well known as the author of the classic *Movements of the Eyes*, he has published many papers using eye movements to study decision mechanisms of the brain (the LATER model) and their clinical applications. He is also the author of the highly successful *Neurophysiology*, now in its fifth edition.

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Page 56