Movement Disorders

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Convergent and contrasting modulation of saccade and pupil responses by several neurodegenerative diseases during free viewing of video clips

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Background: Saccade and pupil responses are potential neurodegenerative disease biomarkers due to overlap between oculomotor circuitry and disease-affected areas. Instruction-based tasks have previously been examined as biomarker sources, but are arduous for patients with limited cognitive abilities; additionally, few studies have evaluated multiple neurodegenerative pathologies concurrently. Methods: The Ontario Neurodegenerative Disease Research Initiative recruited individuals with Alzheimer's disease (AD), mild cognitive impairment (MCI), amyotrophic lateral sclerosis (ALS), frontotemporal dementia, progressive supranuclear palsy, or Parkinson's disease (PD). Patients (n=274, age 40-86) and healthy controls (n=101, age 55-86) viewed 10 minutes of frequently changing video clips without instruction while their eyes were tracked. We evaluated differences in saccade and pupil parameters (e.g. saccade frequency and amplitude, pupil size, responses to clip changes) between groups. Results: Preliminary data indicates low-level behavioural alterations in multiple disease cohorts: increased centre bias, lower overall saccade rate and reduced saccade amplitude. After clip changes, patient groups generally demonstrated lower saccade rate but higher microsaccade rate following clip change to varying degrees. Additionally, pupil responses were blunted (AD, MCI, ALS) or exaggerated (PD). Conclusions: This task may generate behavioural biomarkers even in cognitively impaired populations. Future work should explore the possible effects of factors such as medication and disease stage.

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Oculomotor learning as a biomarker in Huntington's Disease (HD) patients

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Background: Huntington's disease (HD) is an inherited neurodegenerative disorder associated with cognitive, psychiatric, and motor dysfunction. As a potential behavioural biomarker, experimental tasks assessing motor learning may thus provide a reasonable assay of HD onset and progression. The saccadic adaptation paradigm is a non-invasive, accessible method of assessing rapid learning in the oculomotor system. Evidence demonstrates that the thalamus and basal ganglia are important loci for saccadic adaptation, also known to exhibit neurodegenerative pathology before the onset of clinically observable symptoms in HD. Methods: 26 early symptomatic HD patients (Total Functional Capacity Score ≥ 10/13) and sex/age-matched controls were tested on a standard saccadic adaptation task. Eye movements were measured using infrared oculography. Learning dynamics of how quickly the participants adapted their saccade metrics were analysed using state learning models. Results: Initial findings demonstrate that the learning dynamics of HD patients are slower and more variable with respect to saccade amplitude compared to controls. Conclusions: These results demonstrate that motor learning dynamics as captured by a saccadic adaptation task reveal early motor dysfunction in HD, thus providing a discriminating tool to detect early pathological changes in HD patients. Further work is needed regarding applications as a biomarker for disease progression.

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Safe prescribing of antipsychotic drugs in the elderly - Parkinson Disease

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Background: The Canadian Guideline for Parkinson Disease (PD) indicates clozapine and quetiapine are considered the only safe antipsychotics for people with PD, to avoid potentially exacerbating motor symptoms. In response to safety events in our centre, we explore contraindicated antipsychotic prescriptions being administered to hospital inpatients with PD to determine common factors and develop approaches to prevent future occurrences. Methods: Following a privacy impact analysis, the Interior Health Quality Improvement & Patient Safety Office identified inpatients at Kelowna General Hospital, between December 2018 and June 2021, with a coded diagnosis of PD. Pharmacy medication order and dispensing data were cross-referenced to determine patients exposed to a contraindicated antipsychotic for further chart analysis. Results: Of the 140 admissions with a PD diagnosis, 17 had at least one contraindicated antipsychotic prescribed or dispensed (12.1%). Loxapine (7) and haloperidol (6) were the most frequently prescribed. This occurred despite a diagnosis of PD being noted on admission in 14 cases, and 13 cases were known to be taking levodopa. Conclusions: These results demonstrate additional safety measures are needed to reduce the frequency of contraindicated antipsychotic prescriptions in this population. We propose developing a stepwise plan for behaviour de-escalation and pharmacological management.