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# Impaired response times to luminance stimuli in dystonia patients indicate disordered superior colliculus processing

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## Session Information

Date: **Thursday, June 23, 2016**

Session Time: 12:00pm-1:30pm

Session Title: **Dystonia**

Location: Exhibit Hall located in Hall B, Level 2

**Objective:** We hypothesise that patients with adult onset isolated focal dystonia (AOIFD) will have slower reaction times to luminance stimuli versus healthy controls due to GABAergic dysfunction at a collicular level. Reaction times to chromatic based stimuli should be unaffected.

**Background:** AOIFD is the most common form of dystonia yet its pathogenesis is unknown. Visual processing pathways carrying achromatic (luminance) signals – magnocellular and retinotectal routes – are faster, while chromatic signals (parvocellular, koniocellular) which are processed first by the cortex, are available only later to the basal ganglia after cortical processing. It has been shown in Macaques that the deep layers of the superior colliculus (DLSC) mediate the expression cervical dystonia. The superficial layer of superior colliculus (SLSC) detect rapid environmental visual change via the retinotectal visual pathway, and respond by discharges to the pre-motor neurons for saccade generation and head turning. GABAergic inter-neurons modulate the activity of both the visual sensory receptive cells in the SLSC and the premotor neurons in the DLSC.

**Methods:** Patients with AOIFD were recruited from a specialist dystonia outpatient clinic in St. Vincent's University Hospital, Ireland. All participants had reported normal or corrected to normal vision without any impairment on Ishihara testing. Healthy control participants were age and sex matched to cervical dystonia patients. Participants sat at a computer screen in a dark room and were asked to respond to an achromatic or chromatic stimulus depending on test stage. Participants first completed calibration and stimuli validation tasks. Next participants were instructed to respond as fast as possible to a perceived brief change (achromatic or chromatic) in the visual stimulus.

**Results:** Initial results show that the control participants, as expected, were faster when responding to the achromatic change stimuli than chromatic change stimuli. While AOIFD patients gained no benefit for the achromatic change compared with the chromatic change. Interestingly, the control and AOIFD had similar response times for the chromatic stimuli. Full results and analysis to follow.

**Conclusions:** These results further strengthen the hypothesis that dystonia is a GABAergic dysfunction at a collicular level.

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