



BIPOLAR DISORDERS Factsheet

July 2020

What is eye movement dysfunction?

Smooth pursuit eye movement is a visual tracking reflex evoked by a smoothly moving target, usually elicited by stimuli presented on a computer monitor. The aim of the smooth pursuit reflex is to maintain the image of the moving target on the fovea, the region of the retina with the highest density of photoreceptors. The neural pathways involved in generating smooth pursuit are a complex network from the cortical visual pathways through to the brainstem ocular motor nuclei (III, IV and VI), and consequently an alteration in smooth pursuit performance may not in itself shed light on the actual nature of the dysfunction.

Components of smooth pursuit which are quantified include gain in the open and closed loops, as well as rates and amplitudes for both intrusive and anticipatory saccades (fast eye movements). Closed loop gain is an index of temporal synchrony of the eye and the target during pursuit, and is estimated as the ratio of the respective velocities. Open loop gain is the average acceleration during the initiation of pursuit, in the first 100ms. During this period there is no visual feedback and so the movement is solely a result of visual motion signal input. Spontaneous saccades can occur during smooth pursuit: these can either be anticipatory saccades which facilitate movement towards the target, such as reflexive visually guided saccades; or intrusive saccades, which interrupt the smooth tracking of the target, such as catch-up saccades, back-up saccades, and memory-guided saccades.

What is the evidence for eye movement dysfunction in people with bipolar disorder?

Moderate to low quality evidence suggests reaction time and error rates in antisaccade tasks are increased, and accuracy is decreased in people with bipolar disorder compared to controls. People with major depression also show increased reaction time and error rates, with no differences in accuracy. On predictive tasks, people with bipolar disorder perform similarly to controls, while people with major depression show reduced accuracy and increased correction rates. On smooth pursuit tasks, both people with bipolar disorder and depression show less pursuit gain and more initial eye accelerations and catch-up saccades. On fixation tasks, people with bipolar disorder showed more inhibition error than controls.

For more information see the technical table

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NeuRA (Neuroscience Research Australia) is one of the largest independent medical and clinical research institutes in Australia and an international leader in neurological research.

Diseases of the brain and nervous system pose the greatest health, economic and social burden of any disease group because they are chronic, debilitating and have no known cures.

Medical research is the cornerstone of efforts to advance the health and wellbeing of families and the community. Our dedicated scientists are focussed on transforming their research into significant and practical benefits for all patients.

While we hope you find this information useful, it is always important to discuss any questions about bipolar disorder or its treatment with your doctor or other health care provider.