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Using Pupillometry to Characterize Visual Perception in Autistic Mouse Models

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ABSTRACT

Fragile X syndrome (FXS) is the leading genetic cause of autism. Individuals with Fragile X Syndrome (FXS) commonly display social, behavioral, and intellectual disabilities. Perceptual deficits and their underlying neural activity remain poorly characterized in FXS and other autism spectrum disorders (ASD's). To explore visual perception in autism, we developed camera based pupil tracking software using OpenCV (an open-source computer vision library) capable of measuring visually evoked changes in pupil area and position in the FXS mouse model (*Fmr1* KO). Changes in pupil area and position are believed to correlate with changes in arousal or visual processing and may serve as an indirect readout of brain state. To explore visually evoked changes in pupil area, head-restrained wild type or Fragile X mice were exposed to visual stimulation consisting of sinusoidal gratings. The average pupil area of Fragile X mice was increased compared to wild type controls. Our results suggest that online pupillometry has a high potential to serve as a diagnostic tool for autism spectrum disorders.

KEYWORDS

Pupillometry, Fragile X