

## Correlation of Objective Pupillometry to Midline Shift in Acute Stroke Patients.

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**Introduction:** The relationship between pupillary reactivity assessed with a hand-held flashlight, and intracranial midline shift has been previously noted. Pupillometers allow objective and standardized evaluation of the pupillary light reflex (PLR). Our goal was to examine the hypothesis that objective pupillometry values, i.e. pupillary size, neurological pupil index (NPi), and constriction velocity (CV) correlate with intracranial midline shift.

**Methods:** The ENDPANIC registry is a prospective database of pupilometer readings in neurological patients. From this registry we identified 179 patients with an acute ischemic stroke or intracerebral hemorrhage who had at least 2 neurologic imaging studies (CT or MRI) performed within 6 hours of a pupilometer assessment. Septum pellucidum shift (SPS) was measured in 677 images meeting inclusion criteria by an investigator who was blinded to the pupilometer data. We computed the correlation between SPS and the following pupillary variables: Size, NPi, CV (Left, Right and left-right difference) using SAS software. We then performed a mixed effect regression model to control for confounders.

**Results:** The mean age was  $64.3 \pm 15.5$  years, 52% were female. There was 133 Patients (74.3%) with an Ischemic stroke and 46 patients (25.7%) with Hemorrhagic stroke. After controlling for age, race and gender, there was a significant correlation between the SPS and NPi [Left ( $p < 0.001$ ), Right ( $p < 0.001$ ) and left-right difference ( $p < 0.005$ )], CV [Left ( $p < 0.005$ ), Right ( $p < 0.001$ ) and pupillary asymmetry (absolute difference between right and left;  $p < 0.05$ ), but not between SPS and pupillary size (left or right). There was also a significant correlation between the NPi and CV for the right pupil when there was a right-to-left SPS ( $p < 0.001$  and  $p < 0.05$  respectively), but none between the NPi and CV for the left pupil and left-to-right SPS.

**Conclusions:** We conclude that there is significant relation between midline shift and objective measures of pupillary reactivity (NPi and CV) but not with pupillary size.