

# Establishing Normative Values for Pupillometer Readings

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## Description

This is a prospective observational non-randomized study to provide descriptive data for pupillometer readings. Pupil assessment has steadily evolved alongside technology. Centuries of simply noting the absence of reactivity was replaced by decades of dutifully recording pupil size, shape, and reactivity. The acronym PERRLA (pupils equal, round, reactive to light and accommodation) has become standard for neurological assessments. Technology advances have automated pupillary assessment and pupillometry is becoming mainstream. However, 'normal' pupil size and reaction are based on historical and subjective assessments; there are no modern data describing the central tendencies for pupillometer readings. Nurses need to know what counts as normal. Without knowing the normative values, nurses cannot determine when to notify the physician about abnormal findings. This abstract will set the foundation for automated pupillometer assessment data by providing descriptive data on over 5,000 readings from over 300 patients with a variety of neurologic pathologies.

## Identified Gaps

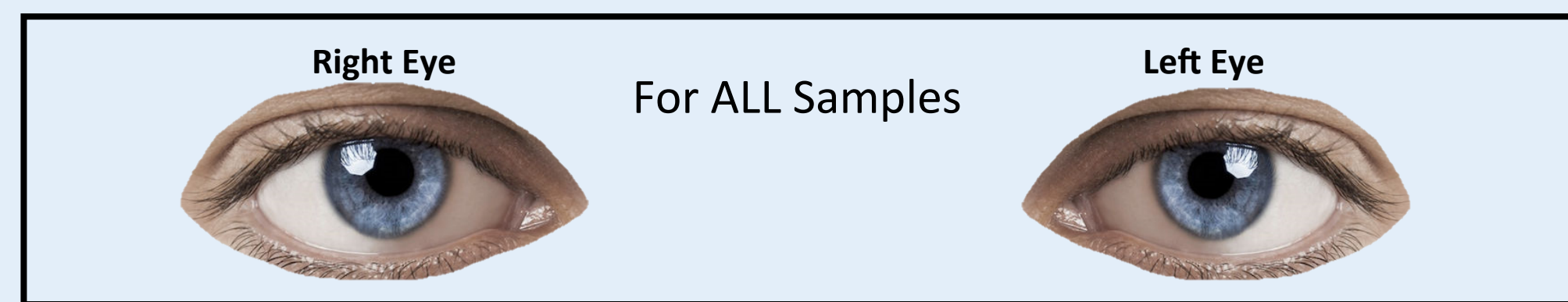
There are no published prospective data describing the central tendencies for pupil size, neuropupillary index (NPI), or constriction velocity (CV) as measured by automated pupillometers.

**Current State** Despite adoption of pupillometers, most clinical nurses rely upon recommendations provided by industry representatives to provide insight into inferences of pupil readings.

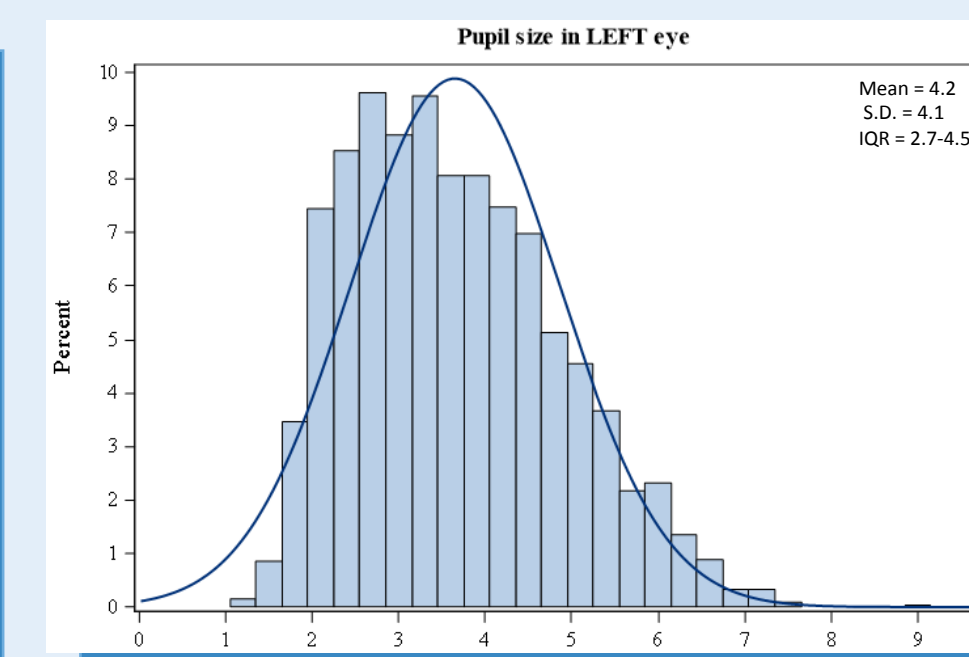
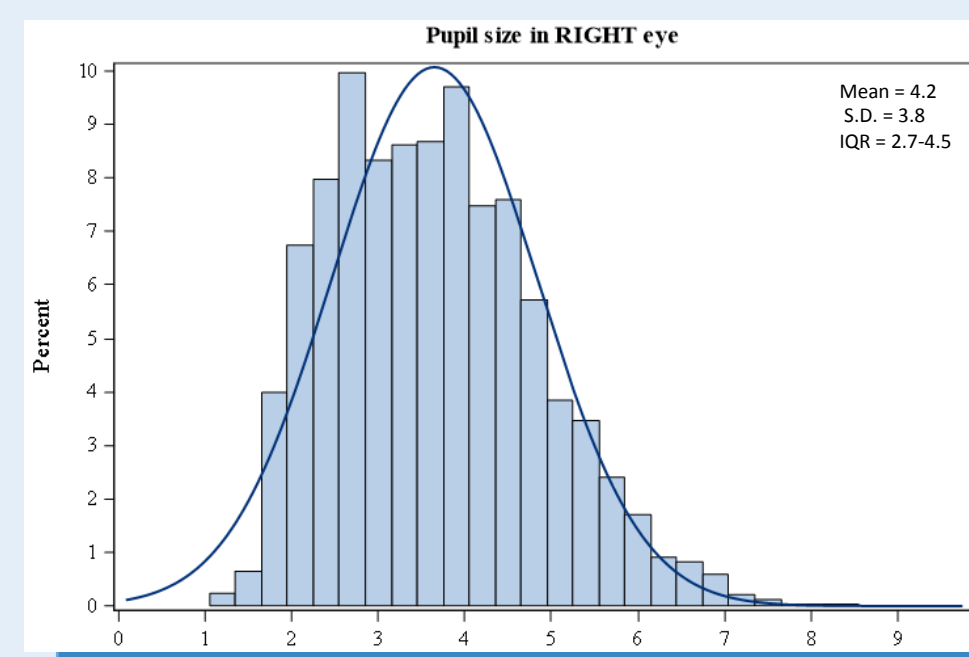
**Desired state** Set the foundation to answer:

1. What is a normal pupil size and when should I be concerned?
2. What is a normal NPi and when should I report findings as being abnormal?
3. What is a normal CV and when should I report findings as being abnormal?

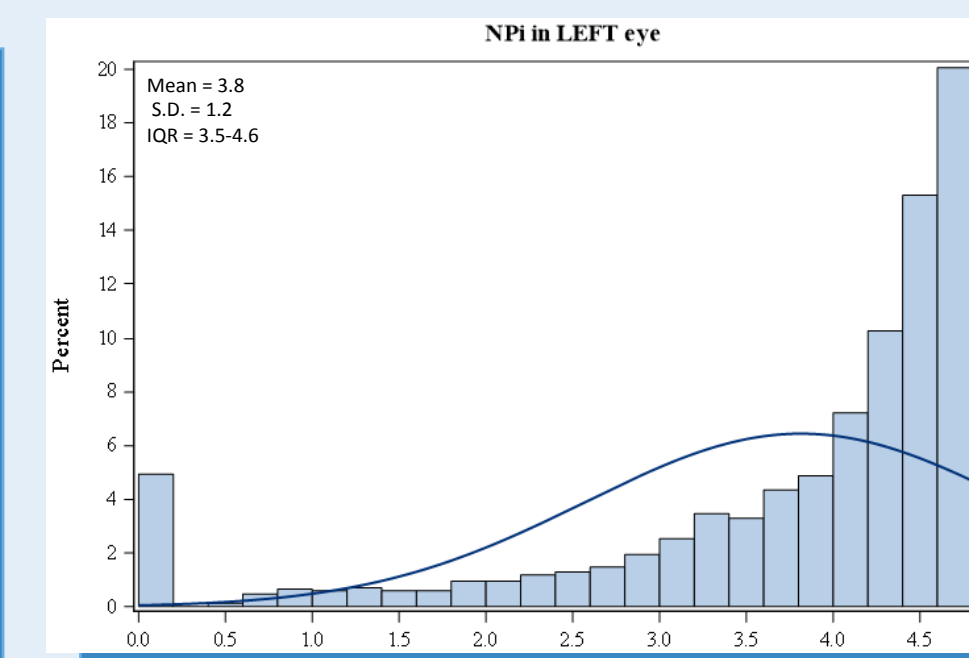
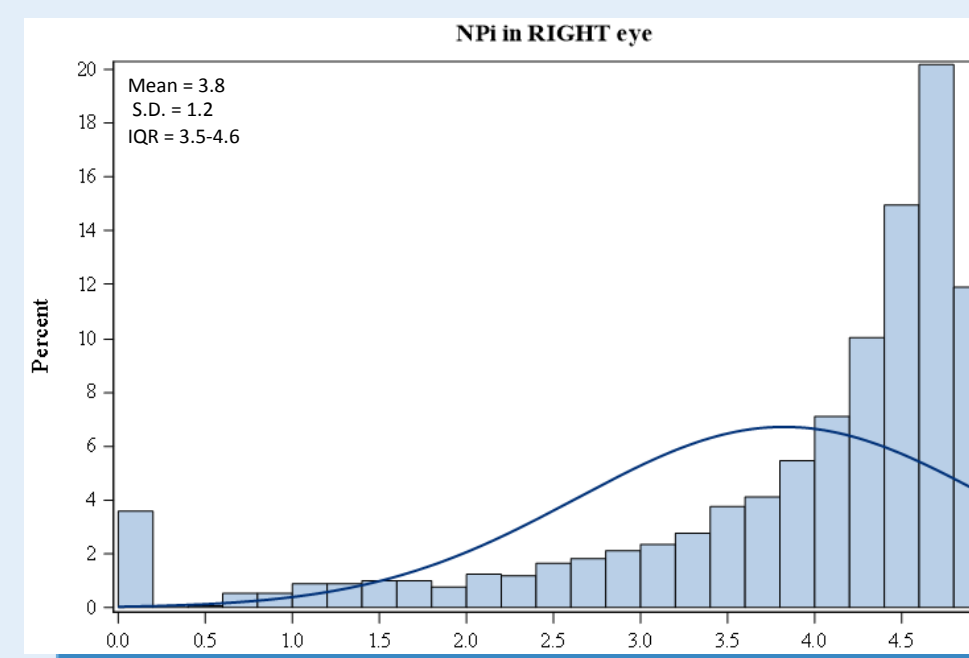
**Gaps to be addressed** This poster provides a foundation for a better understanding of the pupil norms when using a pupillometer and when an NPi is considered abnormal.



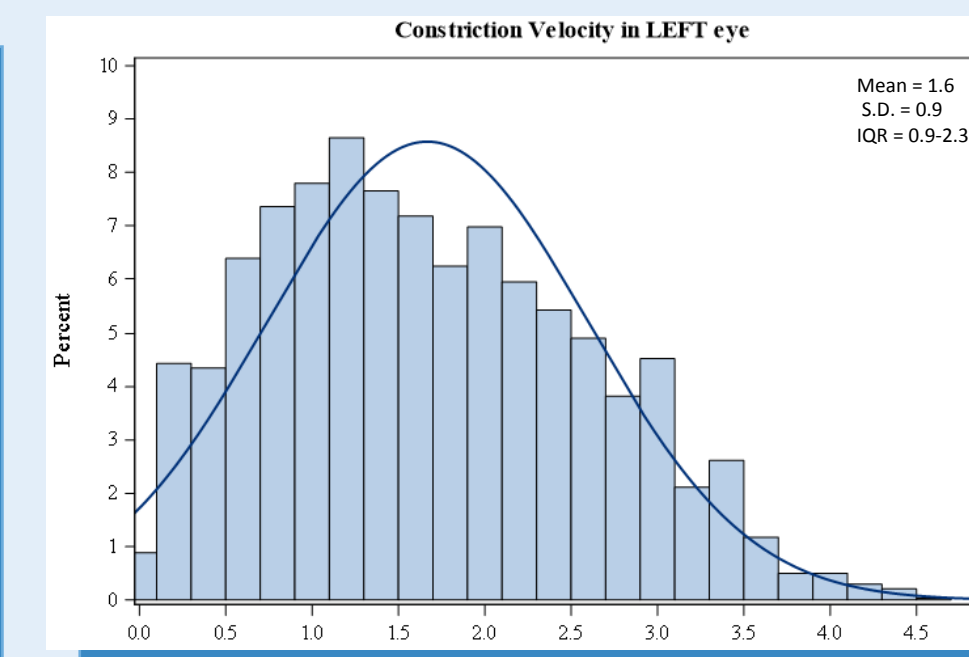
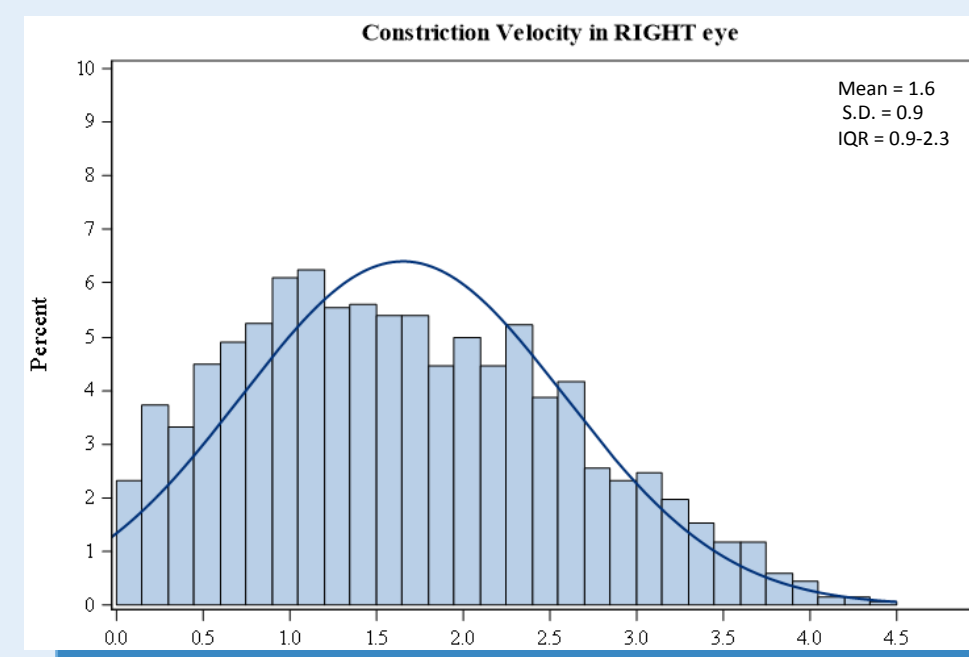
## Pupil Size



## NPi



## Constriction Velocity



## Methods

The data collection preparation process was two-fold. First, the clinical team prepared to integrate the pupillometer into standard of care by developing and implementing a clinical pupillometer procedure. The research team then observed the clinical team procedure and integrated steps to collect pupil assessments daily. The clinical procedure involved assessing the pupils via the pupillometer on admission and at least once every 4 hours thereafter. The pupil size and NPi were recorded in the medical record. The research protocol involved collection of pupil readings from every patients that had orders for daily pupil exams. A member of the research team would go to the ICU daily to perform pupil readings on each of these patients, move the data from the SmartGuard Reader to the research database, then abstract data from the electronic medical record to correspond with the ICU stay.



## Take Home Messages

1. This is the largest known database of pupillometer data available to date.
2. Our findings may not represent those at every hospital.
3. This database helps to define a baseline normalcy.