

Supplement

Pupillary Effects of High-dose Opioid Quantified with Infrared Pupillometry

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Method: An expanded scientific analysis was conducted of data collected from 10 **healthy** volunteer subjects in the aforementioned study. In review, Remifentanyl infusion was administered slowly until the subjects became lethargic and oxygen saturation reached 85%.¹ This was considered the peak effect and it corresponds to time zero in the plots. Remifentanyl infusion was immediately stopped after this moment and pupil measurements were taken at regular intervals.

Results and rationale: Opioid administration reduced the diameter of the pupil, however pupillary light reflex remained brisk even at the peak effect. The reflex amplitude decreased but it did as a function of pupil diameter and its decrease was linearly related to (and depended on) pupil diameter. The NPi was not affected by the change of pupil size.

Conclusions: Opioid administration constricts the pupil and, as a consequence, decreases other variables such as percent amplitude. However, the neurological pathway to the pupil is left unaltered and normal and light reflex is not affected. In fact, NPi remained constant during the entire measurement.

Supplement analysis (not covered in the original paper): The decrease of pupil size (due to opioids administration) not only affected the percent amplitude of the light reflex but it did also affect the constriction velocity, CV. In fact, CV and pupil size are closely correlated. See Figure below; it shows this correlation. At the peak effect (time zero) pupil was small and CV was low. See how significantly both CV and size decreased compared to the pre-drug baseline. As the effect of the opioid faded out with time, pupil size increased and, consequently, CV also increased. However, NPi was not affected, it remained constant (and close to the initial pre-drug) all the time.

Take away message: CV is affected by drug administration; NPi is not.

