Title: The Effects of Ketamine in *Drosophila* Retinas

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Introduction:

Ketamine, an N-methyl-D-aspartate (NMDA) receptor antagonist, is widely used in pediatric anesthesia. Overactivation of the NMDA receptor has been implicated as a factor in the pathogenesis of ischemic injury in the central nervous system[1]. Some studies showed that ketamine might have neuroprotective effects after ophthalmology surgery in rabbit retinas[1,2]. The speculation might be that the antagonist effect of ketamine attenuates the ischemic injury in the retinas. The purpose of this study was to investigate the effect of ketamine on *Drosophila* retinas by using electroretinogram (ERG) assay.

Methods:

Young wild type adult male flies *(w(CS10)* , 1 day after eclosion) were feed by adding 75 μl ketamine solution (600 mg/kg) six times per day in standard food. Fourty minutes after final feeding, we observed the flies retinas response to light by ERG. The recording electrode was placed on the eye surface and the reference electrode was inserted in the neck of the fly[3]. Flies were dark adapted for 5 minutes and stimulated by a train of five pulses of white light (2 seconds in duration), delivered at 6-second intervals. The amplitude of the on /off transient was calculated as the difference (△ERG) between the highest voltage reached after lights on/off and this baseline value.

Results:

Light on response showed that electronic potentials of control group and ketamine group were 3.7±0.4 and 2.2±0.2 ($p<0.01$), respectively. When light off, the electronic potentials of control group and ketamine group were 7.4±0.5 and 5.8±0.4 ($p<0.05$) respectively. The △ERG potentials (Fig.1) of control group and ketamine group were 23.5±1.5 and 17.4±1.3, respectively ($p<0.01$). Lower △ERG about 30% was observed in ketamine group compared with control group.

Discussion:

Ketamine has been used in pediatric anesthesia for decades. Prolonged exposure of ketamine results in neurodegeneration and neurocognitive deficits in the neonatal rodents[4]. However, recent data suggest that ketamine might have neuroprotective

effect on retinas[2]. We used *Drosophila*, a model for studying neurodegenerative diseases[5], to determinate the effects of ketamine by examining ERG. We suggest that ketamine may have protective effects on retinas by decreasing ERG potential in *Drosophila*. For considering the risk of ischemic injury in pediatric ophthalmology surgery, ketamine might be a better choice for general anesthesia. However, further investigation would be study effects of ketamine on retinas and neurons.

Reference:

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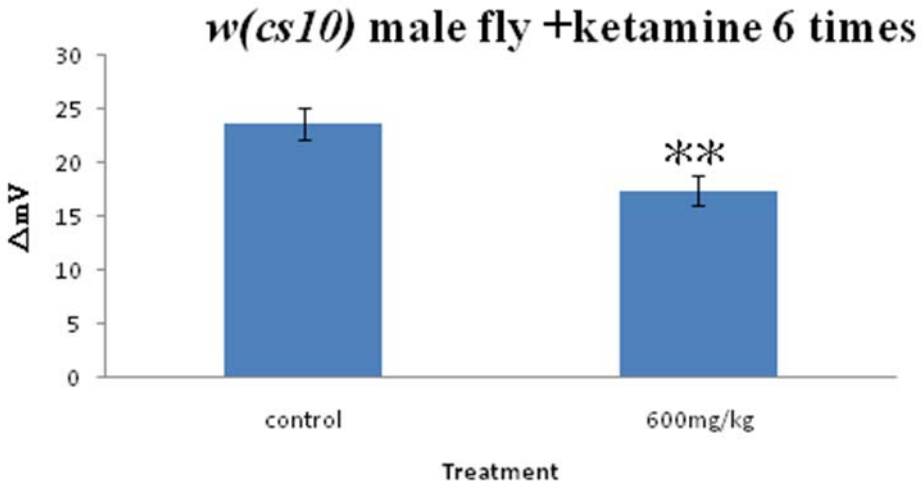

Fig. 1

Fig. 2

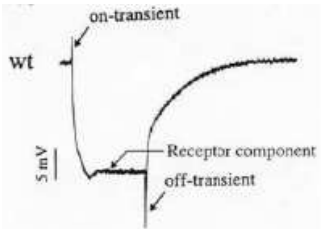

Fig. 1