

AB014. What is the role of sildenafil in repairing retinopathy of prematurity?

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Background: Oxygen therapy provided to support the lungs of premature newborns often leads to damages to the retina called retinopathy of prematurity (ROP) and long-term visual impairments. Current treatments for ROP are invasive and aim at preventing further progression of the damages to the retina, but do not repair these damages. Our goal is to investigate the therapeutic effect of sildenafil on retinal structure in a rat model of ROP.

Methods: Sprague-Dawley rats were exposed to hyperoxia (i.e., 80% oxygen) interrupted by three 0.5-hour periods of normoxia (i.e., 21% oxygen) (hyperoxic animals) per day or room air only (i.e., 21% oxygen) (control animals) from post-natal day 4 (P4) to 14 (P14). Pups were then housed in room air. Sildenafil (50 mg/kg) or vehicle was given per os twice daily after oxygen exposure (from P15 to P21). At P30, retinas were extracted, and sectioned. For retinal histology, eyes were stained with toluidine blue to measure the thicknesses of the different retinal layers. Immunohistochemistry was also performed to count the number of retinal ganglion cells and bipolar cells in the inner retina, as well as the number of astrocytes and microglia within the different retinal layers.

Results: Hyperoxia caused a reduction in thickness of the outer plexiform layer (OPL) and a decrease in the number of bipolar cells in some parts of the retina, compared to control animals ($P < 0.05$); in addition, the number of microglia cells was significantly increased in the rats exposed to hyperoxia, compared to controls ($P < 0.05$). Sildenafil improved OPL thickness in ROP animals, but did not change the number of bipolar cells. In hyperoxic rats treated with sildenafil, the number of microglia were similar to control rats. The number of retinal ganglion cells and astrocytes did not differ significantly between the groups.

Conclusions: Treatment with sildenafil following oxygen exposure provided some recovery of the structure of the retina. This beneficial effect may be modulated by a decrease of inflammation within the retina.

Keywords: Neonates; hyperoxia; retinopathy of prematurity (ROP); neuroscience; vision health

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