

FULL TEXT LINKS



PLoS One. 2014 Jun 10;9(6):e99299. doi: 10.1371/journal.pone.0099299. eCollection 2014.

# Hydrogen-rich saline promotes survival of retinal ganglion cells in a rat model of optic nerve crush

Jing-chuan Sun <sup>1</sup>, Tao Xu <sup>1</sup>, Qiao Zuo <sup>1</sup>, Ruo-bing Wang <sup>2</sup>, Ai-qing Qi <sup>3</sup>, Wen-luo Cao <sup>3</sup>, Ai-jun Sun <sup>3</sup>, Xue-jun Sun <sup>4</sup>, Jiajun Xu <sup>3</sup>

Affiliations

PMID: 24915536 PMCID: [PMC4051757](#) DOI: [10.1371/journal.pone.0099299](#)

[Free PMC article](#)

## Abstract

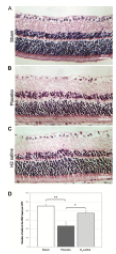
**Objective:** To investigate the effect of molecular hydrogen (H<sub>2</sub>) in a rat model subjected to optic nerve crush (ONC).

**Methods:** We tested the hypothesis that after optic nerve crush (ONC), retinal ganglion cell (RGC) could be protected by H<sub>2</sub>. Rats in different groups received saline or hydrogen-rich saline every day for 14 days after ONC. Retinas from animals in each group underwent measurements of hematoxylin and eosin (H&E) staining, cholera toxin beta (CTB) tracing, gamma synuclein staining, and terminal deoxynucleotidyltransferase-mediated dUTP nick end labeling (TUNEL) staining 2 weeks post operation. Flash visual evoked potentials (FVEP) and pupillary light reflex (PLR) were then tested to evaluate the function of optic nerve. The malondialdehyde (MDA) level in retina was evaluated.

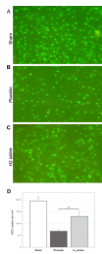
**Results:** H&E, gamma synuclein staining and CTB tracing showed that the survival rate of RGCs in hydrogen saline-treated group was significantly higher than that in saline-treated group. Apoptosis of RGCs assessed by TUNEL staining were less observed in hydrogen saline-treated group. The MDA level in retina of H<sub>2</sub> group was much lower than that in placebo group. Furthermore, animals treated with hydrogen saline showed better function of optic nerve in assessments of FVEP and PLR.

**Conclusion:** These results demonstrated that H<sub>2</sub> protects RGCs and helps preserve the visual function after ONC and had a neuroprotective effect in a rat model subjected to ONC.

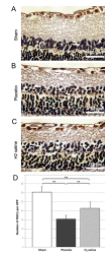
## Figures



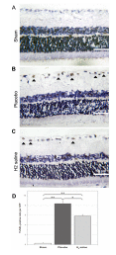
**Figure 1. H&E staining of representative retinas.**



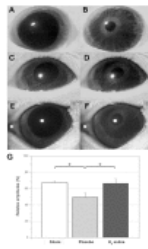
**Figure 2. Morphometry of RGCs in representative...**



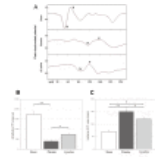
**Figure 3. Gamma synuclein staining of representative...**



**Figure 4. TUNEL staining of the representative...**



**Figure 5. Video images of pupils recorded...**



**Figure 6. Flash visual evoked potential (FVEP)...**

All figures (7)

## Related information

[PubChem Compound \(MeSH Keyword\)](#)

## LinkOut - more resources

### Full Text Sources

[Europe PubMed Central](#)

[PubMed Central](#)

[Public Library of Science](#)

### Other Literature Sources

[The Lens - Patent Citations](#)

[scite Smart Citations](#)

### Medical

[MedlinePlus Health Information](#)

### Research Materials

[NCI CPTC Antibody Characterization Program](#)