An official website of the United States government
Here's how you know

FULL TEXT LINKS

Karger Free Final Version

Cell Physiol Biochem. 2015;36(2):585-98. doi: 10.1159/000430122.

Hydrogen Suppresses Hypoxia/Reoxygenation-Induced Cell Death in Hippocampal Neurons Through Reducing Oxidative Stress

Rong Wei, Rufang Zhang, Yewei Xie, Li Shen, Fang Chen

PMID: 25997722 DOI: 10.1159/000430122

Free article

Abstract

Background & aims: Deep hypothermic circulatory arrest (DHCA) is a cerebral protection technique that has been used in the operations involving the aortic arch and brain aneurysm for decades. We previous showed that DHCA treated rats developed a significant oxidative stress and apoptosis in neurons. We here intend to investigate the protective the effect of hydrogen against oxidative stress-induced cell injury and the involved mechanisms using an in vitro experimental model of hypoxia/reoxygenation (H/R) on HT-22 cells.

Methods: The model of H/R was established using an airtight culture container and the anaeropack. Measurement of mitochondrial membrane potential (MMP) and reactive oxygen species (ROS) production was used H2DCFDA and JC-1 staining. Western blot was used for the quantification of Akt, p-Akt, Bcl-2, Bax and cleaved caspase-3 proteins. The microRNA (miRNA) profile in hippocampal neurons from rat model of DHCA was determined by miRNA deep sequencing.

Results: The elevation of ROS and reduction of MMP were significantly induced by the treatment with hypoxia for 18 h followed by reoxygenation for 6 h. Hydrogen treatment significantly reduced H/R-caused cell death. The levels of p-Akt (Ser 473) and Bcl-2 were significantly increased while Bax and cleaved caspase-3 were decreased by hydrogen treatment on the model of H/R. The expression of miR-200 family was significantly elevated in model of DHCA and H/R. Hydrogen administration inhibited the H/R-induced expression of miR-200 family in HT-22 cells. In addition, inhibition of miR-200 family suppressed H/R-caused cell death through reducing ROS production.

Conclusions: These results suggest that H/R causes oxidative stress-induced cell death and that the hydrogen protects against H/R-induced cell death in HT22 cells, in part, due to reducing expression of miR-200 family.

© 2015 S. Karger AG, Basel.

Related information

PubChem Compound (MeSH Keyword)

LinkOut - more resources

Full Text Sources

S. Karger AG, Basel, Switzerland

Research Materials