

POSTER PRESENTATION

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Enhancement mechanism of antioxidant enzyme gene expression by hydrogen molecules

Tomoya Kinjo¹, Takeki Hamasaki², Hanxu Yan¹, Hidekazu Nakanishi¹, Tomohiro Yamakawa¹, Kiichiro Teruya^{1,2}, Shigeru Kabayama³, Sanetaka Shirahata^{1,2*}

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Background

Redox regulation system protects our body from oxidative stress-injury and keeps redox homeostasis. The hydrogen molecules (H₂) exist as stable gas in the ordinal temperature and atmosphere. Recent study reports H₂ improve ischemia-reperfusion injury, glaucoma, Parkinson's disease and atherosclerosis of animal models. It is supposed from these improvement results that H₂ participate in reduction of the oxidation stress, however, the reaction mechanism has not been clarified thoroughly. We surmised that intracellular redox regulation system is activated by H₂ thereupon antioxidative activity is generated. Thus, we tried to find the effect of H₂ on the Nrf2 pathway, one of the redox regulation systems.

Materials and methods

HT1080 cells, a human fibrosarcoma cell line, were incubated in a gas incubator at an atmosphere of 75% N₂/20%O₂/5%CO₂ or 75%H₂/20%O₂/5%CO₂ for 24 h. Then, after the cells were treated with H₂O₂ or fixative solution for 30 min or 15 min, the intracellular H₂O₂ and Nrf2 were determined by In cell analyzer and Confocal laser microscope using a BES-H₂O₂ or anti-Nrf2 antibody, respectively. Furthermore, after extraction of mRNA from the treated HT1080 cells, the gene expressions were examined by using Real-time PCR.

Results

The quantity of intracellular H₂O₂ increased by hydrogen peroxide treatment was significantly decreased by pretreatment of H₂. H₂ enhanced the expression of

catalase, glutathione peroxidase, Cu/Zn-superoxide dismutase, Nrf2 genes and Nrf2 protein.

Conclusions

It was suggested that H₂ induced the expression level of antioxidant enzyme genes like catalase and glutathione peroxidase by increasing the expression level of the Nrf2 protein and decreased the amount of intracellular H₂O₂ induced by the H₂O₂ treatment in HT1080 cells.

Authors' details

¹Graduate School of Systems Life Sciences, Kyushu University, Fukuoka 812-8581, Japan. ²Department of Bioscience and Biotechnology, Faculty of Agriculture, Kyushu University, Fukuoka 812-8581, Japan. ³Nihon Trim Co. Ltd., Osaka 531-0076, Japan.

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* Correspondence: sirahata@grt.kyushu-u.ac.jp

¹Graduate School of Systems Life Sciences, Kyushu University, Fukuoka 812-8581, Japan

Full list of author information is available at the end of the article