

POSTER PRESENTATION

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Enhancement mechanism of antioxidant enzyme gene expression by hydrogen molecules

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Background

Redox regulation system protects our body from oxidative stress-injury and keeps redox homeostasis. The hydrogen molecules (H_2) exist as stable gas in the ordinal temperature and atmosphere. Recent study reports H_2 improve ischemia-reperfusion injury, glaucoma, Parkinson's disease and atherosclerosis of animal models. It is supposed from these improvement results that H_2 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 H_2 thereupon antioxidative activity is generated. Thus, we tried to find the effect of H_2 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% N_2 /20% O_2 /5% CO_2 or 75% H_2 /20% O_2 /5% CO_2 for 24 h. Then, after the cells were treated with H_2O_2 or fixative solution for 30 min or 15 min, the intracellular H_2O_2 and Nrf2 were determined by In cell analyzer and Confocal laser microscope using a BES- H_2O_2 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 H_2O_2 increased by hydrogen peroxide treatment was significantly decreased by pretreatment of H_2 . H_2 enhanced the expression of

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

Conclusions

It was suggested that H_2 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 H_2O_2 induced by the H_2O_2 treatment in HT1080 cells.

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