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Hydrogen protects rats from dermatitis caused by local radiation

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Abstract

Background: Radiation therapy produced unwanted side effect on normal tissues, such as radiodermatitis. Hydrogen was previously shown capable of radiation protective in both animals and cell cultures. The effect of hydrogen was now to be investigated on radiation-induced cutaneous.

Objective: Development of dermatitis is a frequent side effect of radiotherapy of patients with head-and-neck cancer. Here we analyzed the radioprotective efficacy of hydrogen under conditions of local, single-dose or fractionated radiation treatment, and its possible molecular mechanisms.

Methods: Rats received either single-dose or fractionated irradiation of the head-and-neck area with or without subcutaneous injection of hydrogen solution before irradiation. In vitro, the effect of hydrogen medium on radiation-induced cell viability, apoptosis, and biochemical assays was measured.

Result: Hydrogen significantly reduced the severity of dermatitis, accelerated tissue recovery, and reduced the extent of radiation-induced weight loss in rats after a single dose of 15 or 20 Gy but not 25 Gy of radiation. Hydrogen was also protective from cumulative doses of 30 Gy delivered in three fractions, respectively. Hydrogen also protect HaCaT cells from radiation-induced injury, it could significantly inhibit ionizing injury.

Conclusion: These results suggest that hydrogen has a positive effect on acute radiodermatitis.

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