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Investigation of protective effect of hydrogen-rich water against cisplatin-induced nephrotoxicity in rats using blood oxygenation level-dependent magnetic resonance imaging

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Abstract

Purpose: The aim of this study was to assess the mechanism of the protective effect of hydrogen-rich water (HW) against cisplatin (CP)-induced nephrotoxicity in rats using blood oxygenation level-dependent (BOLD) magnetic resonance imaging (MRI).

Materials and methods: Apparent transverse relaxation time-weighted images (T2 WI) were acquired in 28 rats. The control group (n = 7) had free access to standard water (SW) and no CP injection. The CP group (n = 7) had free access to SW and was given a CP injection on day 0. The CP+HW group (n = 7) had free access to HW and had a CP injection. The HW group (n = 7) had free access to HW and no CP injection. The apparent transverse relaxation rate (R2) was estimated from T2 WI.

Results: In the CP+HW group, the R2 value in the medulla normalized by the value of the day 0 was significantly greater than that in the CP group on days 4 and 7. The creatinine and blood urea nitrogen levels in the CP group were significantly higher than those in the control, CP+HW, and HW groups.

Conclusion: BOLD MRI may be useful for demonstrating the change in R2 in CP-induced nephrotoxicity in rats. The changes in the CP+HW group were suspected to be due to a reduction of cytotoxic oxygen radicals.

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