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Enhanced induction of mitochondrial damage and apoptosis in human leukemia HL-60 cells due to electrolyzed-reduced water and glutathione

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Abstract

Electrolzyed-reduced water (ERW) is a higher pH and lower oxidation-reduction potential water. In the present study, we examined the enhanced effect of ERW in the apoptosis of leukemia cells (HL-60) induced by glutathione (GSH). An enhanced inhibitory effect on the viability of the HL-60 cells was observed after treatment with a combination of ERW with various concentrations of GSH, whereas no cytotoxic effect in normal peripheral blood mononuclear cells was observed. The results of apoptotic related protein indicated that the induction of HL-60 cell death was caused by the induction of apoptosis through upregulation of Bax and downregulation of Bcl-2. The results of further investigation showed a diminution of intracellular GSH levels in ERW, and combination with GSH groups. These results suggest that ERW is an antioxidant, and that ERW, in combination with GSH, has an enhanced apoptosis-inducing effect on HL-60 cells, which might be mediated through the mitochondria-dependent pathway.

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