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Acute toxic effects of sonodynamic therapy on hypertrophic scar fibroblasts of rabbit ears

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ABSTRACT. The objective of this study was to observe the acute cytotoxic effects of hematoporphyrin monomethyl ether sonodynamic therapy (HMME-SDT) on hypertrophic scar fibroblasts of rabbit ears. We first assessed the effects of different irradiation times and HMME concentrations on the survival of hypertrophic scar fibroblasts using the 3-(4,5-dimethylthiazol-2-yl)-2,5-diphenyltetrazolium bromide (MTT) assay to determine the optimum irradiation time and HMME concentration. The hypertrophic scar fibroblast cell suspensions of the rabbit ears were divided into four groups, the survival rates were detected using the MTT assay, and the type of cell death was detected by Annexin V/propidium iodide (PI) double staining flow cytometry. Our results showed that HMME-SDT significantly reduced the viability of hypertrophic scar fibroblasts of rabbit ears at ultrasonic irradiation times of 30, 60, and 90 s, but not 10 s ($P < 0.05$). HMME alone had no significant effect on the cell survival rate at any irradiation time ($P > 0.05$). In contrast, the cell survival rate was significantly decreased at an irradiation time of 10 s and HMME concentrations of 20 and 50 µg/mL ($P < 0.05$). Furthermore, Annexin V/PI double staining showed both

necrosis and apoptosis of the hypertrophic scar fibroblasts. Given our results, HMME might be an effective sound-sensitive agent for SDT as it has a significant lethal effect on hypertrophic scar fibroblasts of rabbit ear cultured *in vitro*. HMME-SDT may therefore provide a new method for the treatment of hypertrophic scar formation.

Key words: Sonodynamic therapy; Hypertrophic scar; Necrosis; Hematoporphyrin monomethyl ether; Apoptosis

