



高吸水性树脂联合超声造影剂对HIFU杀伤棘球蚴原头节的增效作用

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Enhancement of in Vitro Protoscolicidal Effects of High-intensity Focused Ultrasound by a Superabsorbent Polymer and Ultrasound Contrast Agent

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摘要

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摘要 为探索高吸水性树脂 (superabsorbent polymer, SAP) 与超声造影剂 (ultrasound contrast agent, UCA) 协同增强高强度聚焦超声 (high intensity focused ultrasound, HIFU) 杀伤棘球蚴原头节的效果, 将30管棘球蚴原头节悬液 (各含约6 000~7 500个原头节) 分为5组, 分别为A组 (对照组, 仅给予无功率HIFU普通超声辐照)、B组 (单纯HIFU辐照, 50 W)、C组 (HIFU辐照+10 μl UCA)、D组 (HIFU辐照+0.01 g SAP) 和E组 (HIFU辐照+10 μl UCA+0.01 g SAP)。结果显示, B组超声图像灰度变化明显, 悬液温度和原头节死亡率 (26.0 °C±0.2 °C、30.4%) 均比A组的 (18.0 °C±0.1 °C、1.9%) 高 (P<0.01)。C、D组的超声图像灰度变化比B组更为明显, 悬液温度 (27.0 °C±0.2 °C、28.2 °C±0.2 °C) 和原头节死亡率 (49.96%, 53.69%) 也比B组的高 (P<0.01)。E组悬液温度 (28.4 °C±0.3 °C) 与C、D组的差异无统计学意义 (P>0.05), 但原头节死亡率 (69.7%) 远高于C、D组 (P<0.01), 且死亡的原头节结构破坏较其余3组更为严重, 内部结构消失。

关键词: 高吸水性树脂 超声造影剂 高强度聚焦超声 棘球蚴 原头节

Abstract: This study evaluated whether or not a superabsorbent polymer (SAP) combined with ultrasound contrast agent (UCA) could enhance damage efficacy of high intensity focused ultrasound (HIFU) on Echinococcus granulosus protoscoleces in vitro. Thirty test tubes each with 6 000-7 500 protoscolices were divided into 5 groups: group A (blank control) without HIFU treatment, group B treated with HIFU (50 W) only, group C treated with 10 μl UCA and HIFU, group D treated with 0.01 g SAP and HIFU, group E treated with 10 μl UCA, 0.01g SAP, and HIFU. In group B, echo enhancement of ultrasound image, suspension temperature (26.0 °C±0.2 °C) and protoscoleces mortality (30.4%) were higher than that of group A (18.0 °C±0.1°C, 1.9%) (P<0.01). Compared with group B, the echo enhancement of ultrasound image, suspension temperature (27.0 °C±0.2 °C, 28.2 °C±0.2 °C) and protoscoleces mortality (50.0%, 53.7%) of groups C and D increased significantly (P<0.01). In group E, more protoscoleces were stained in red and their internal structures were indistinct. By chi-square test, the protoscoleces mortality of group E (69.7%) was higher than that of groups C and D (P<0.01). There was no significant difference in suspension temperature among the 3 groups.

Keywords: Superabsorbent polymer Ultrasound contrast agent High intensity focused ultrasound (HIFU) Hydatid Protoscolex

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