Attenuation of interleukin-1beta by pulsed electromagnetic fields after traumatic brain injury.

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Abstract

Traumatic Brain Injury (TBI) is a major cause of morbidity and mortality in civilian and military populations. Interleukin-1beta (IL-1β) is a pro-inflammatory cytokine with a key role in the inflammatory response following TBI and studies indicate that attenuation of this cytokine improves behavioral outcomes. Pulsed electromagnetic fields (PEMF) can reduce inflammation after soft tissue injuries in animals and humans. Therefore, we explored whether PEMF signals could alter the course of IL-1β production in rats subjected to closed-head contusive weight-drop injuries (Marmarou method) and penetrating needle-stick brain injuries. Protein levels, measured by the Biorad assay, were not altered by injuries or PEMF treatment. In addition, we verified that IL-1β levels in cerebrospinal fluid (CSF) were proportional to injury severity in the contusion model. Results demonstrate that PEMF treatment attenuated IL-1β levels up to 10-fold in CSF within 6h after contusive injury and also significantly suppressed IL-1β within 17-24h after penetrating injury. In contrast, no differences in IL-1β were seen between PEMF-treated and control groups in brain homogenates. To the authors' knowledge, this is the first report of the use of PEMF to modulate an inflammatory cytokine after TBI. These results warrant further studies to assess the effects of PEMF on other inflammatory markers and functional outcomes.

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