

The effect of ultrasound for increasing neural differentiation in hBM-MSCs and inducing neurogenesis in ischemic stroke model

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The purpose of this study was to evaluate the effect of ultrasound in air at a frequency of 0.04 MHz and an intensity of 50 mW/cm² on neural differentiation of hBM-MSCs in vitro and on neurogenesis in an ischemic stroke model. Cells exposed to ultrasound exhibited neural morphology, in particular a thin and spindle-like shape. The LDH assay results revealed no difference between the controls and cells treated with ultrasound. In cells that were treated with ultrasound, mRNA levels of neural genes and of calcium channel markers were increased relative to controls. Further, neural proteins, p-ERK, and p-CREB were increased in cells that were treated with ultrasound. In histological and immunohistochemical analysis of an ischemic stroke model, inflammatory cells were observed around the infarct area in the Cell, Cell/Ultrasound group and the brain infarct volume in the Cell/Ultrasound group was smaller than in the sham group.

Key word: ultrasound, neurogenesis, hBM-MSCs, stroke model