

New therapeutic applications of ultrasounds: a preliminary study

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Ultrasound is well known for its imaging role in medicine. Recently, a new role of non-thermal ultrasound has been investigated concerning the central nervous system. Effectively, ultrasound treatment is able to modulate brain functions in humans (1), as well as the opening of the blood brain barrier in primates and rats, with the absence of tissue damage (2). Furthermore, an in vitro study has demonstrated the role of focused ultrasound in regulating neuronal sprouting in human neurons (3). The aim of this study is to evaluate, for the very first time, the effects of diagnostic ultrasound (12 MHz, 1 cycle) on murine microglial cell line (BV-2). For this purpose, BV-2 cells were stimulated with ultrasound (12 MHz, 1 cycle) for 3 minutes. Cell viability assay and western blotting, morphological, and immunofluorescence analyses were performed. Our results show that ultrasound stimulation did not affect cell viability. Conversely, western blotting analysis, as well as immunofluorescence staining, revealed a decrease in B7-2 (CD86) expression, and this latter feature was confirmed by morphological analysis, highlighting an increase in resting-ramified cells, with the capability to survey the surrounding area. Taken together, these results demonstrate that ultrasound safely affect the central nervous system in normal (physiological) condition. Furthermore, ultrasound own the features of temporary change the morpho-functional state of microglial cells, reinforcing their new role in the field of neuroscience.

References

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Keywords

Ultrasound; microglia BV-2 cell line; B7-2 (CD86).