

OBSERVATIONS ON DENDRITE MORPHOLOGY IN RAT HIPPOCAMPAL NEURONS EXPOSED TO HIGH POWER MICROWAVES

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In previous studies we have reported a decrease in the content of the cytoskeletal protein tubulin in endothelial cells exposed to multiple pulses of high power microwaves (HPM). It may be assumed that a downregulation of tubulin could affect the complex structure of neuronal dendrites. In this study we have examined the effect of HPM in cultures of neurons from the hippocampus of rat embryos. The neurons were exposed to 1.6 GHz HPM pulses with a duration of 0.55 microseconds and a field strength of 21.7 kV/m. The spacing between the pulses was 3.3 ms and the cells were exposed for 10 seconds - 12 minutes. This relation between pulse duration and spacing is not assumed to produce heating in the tissue. The cultures were fixed and labeled with antibodies against tubulin and MAP2 (a microtubule associated protein) after 2, 6, 24 or 72 hours. The specimens were examined with a confocal microscope. The results showed extensive changes in dendrite structure in cultures exposed for more than 90000 pulses. This effect could be observed already 2 hours after exposure. Dendrite structure was gradually but not completely restored. A very large part of a neuron is located in the dendrites and the surface membrane has an important role in neuronal communication. The observed effects may therefore indicate that exposure such large numbers of HPM pulses could have functional effects. However, it may be questioned if the number of required pulses is realistic for practical use of HPM weapons.