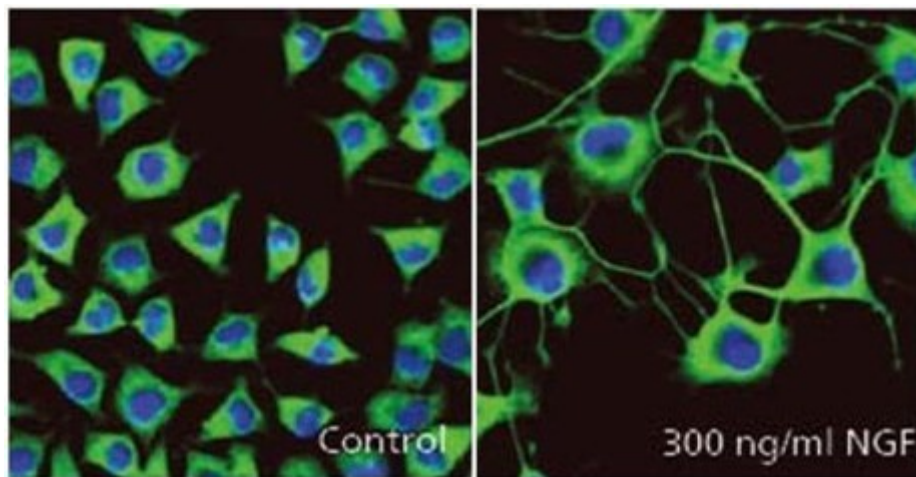


Medical PEMF Studies



WOUND HEALING

Pulsed electromagnetic fields potentiate neurite outgrowth in the dopaminergic MN9D cell line.



1. J Neurosci Res. 2014 Jun;92(6):761-71. doi: 10.1002/jnr.23361. Epub 2014 Feb 12.

Lekhraj R(1), Cynamon DE, DeLuca SE, Taub ES, Pilla AA, Casper D.

Author information:

(1)Department of Neurological Surgery, Montefiore Medical Center and the Albert Einstein College of Medicine, Bronx, New York.

Pulsed electromagnetic fields (PEMF) exert biological effects and are in clinical use to facilitate bone repair and wound healing. Research has demonstrated that PEMF can induce signaling molecules and growth factors, molecules that play important roles in neuronal differentiation. Here, we tested the effects of a low-amplitude, nonthermal, pulsed radiofrequency signal on morphological neuronal differentiation in MN9D, a dopaminergic cell line. Cells were plated in medium with 10% fetal calf serum. After 1 day, medium was replaced with serum-containing medium, serum-free medium, or medium supplemented with dibutyryl cyclic adenosine monophosphate (Bt2 cAMP), a cAMP analog known to induce neurite outgrowth. Cultures were divided into groups and treated with PEMF signals for either 30 min per day or continuously for 15 min every hour for 3 days. Both serum withdrawal and Bt2 cAMP significantly increased neurite length. PEMF treatment similarly

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increased neurite length under both serum-free and serum-supplemented conditions, although to a lesser degree in the presence of serum, when continuous treatments had greater effects. PEMF signals also increased cell body width, indicating neuronal maturation, and decreased protein content, suggesting that this treatment was antimitotic, an effect reversed by the inhibitor of cAMP formation dideoxyadenosine. Bt2 cAMP and PEMF effects were not additive, suggesting that neurite elongation was achieved through a common pathway. PEMF signals increased cAMP levels from 3 to 5 hr after treatment, supporting this mechanism of action. Although neuritogenesis is considered a developmental process, it may also represent the plasticity required to form and maintain synaptic connections throughout life.

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