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**Experiments showing that electromagnetic fields can be used to treat inflammatory diseases.**

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While it is well known that electromagnetic fields (EMFs) can induce repair of non-healing bone fractures, EMF therapy remains confined to orthopedic clinics mainly because the biological and physical mechanisms underlying the therapy are unknown. However, it is generally believed that non-invasive, EMF therapy might have a broad, albeit currently unrecognized clinical potential. In support of this view, we report that 0.1 mT, 60 Hz EMFs induce a 20% mean-increase in anti-CD3 binding to T cell receptors (TcRs) of Jurkat cells, a T lymphocyte cell line. Additionally, we show that 60 Hz sinusoidal EMFs and a commercial bone healing EMF modulate signal transduction pathways that regulate lymphocyte proliferation and that are normally triggered by activating the Jurkat TcR. Similar EMF effects are shown in human peripheral blood lymphocytes (hPBLs), exposed to EMFs in culture and in rat PBLs, when donor animals are exposed to a bone healing field (21 days, 4 hr/day). Although we do not yet satisfactorily understand the differences we obtain in cell and animal based experiments, our findings clearly demonstrate that EMFs can regulate lymphocyte proliferation in vitro and in vivo. Since T cells are key modulators of inflammation, the development of EMF based therapeutic devices to regulate their activity can be expected to provide important tools to treat numerous human inflammatory diseases such as psoriasis and arthritis.

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