

## **Effects of weak electromagnetic fields on biological systems. Review of potential mechanisms of action and experimental exploration for therapeutic applications.**

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### **Abstract:**

Over the past decades, evidence has shown that time-varying electromagnetic fields (EMFs) up to several tens of GHz can be useful in treating human pathologies, such as bone non-union fractures, pain and inflammation. However, the acceptance and further development of therapeutic applications of EMFs requires a better understanding of their mechanisms of action on biological systems.

In the first part of the talk, the main coupling mechanisms of EMFs to biological materials will be exposed. The mechanisms based on established biological effects will first be summarized, then several physical mechanisms proposed in the literature and often related to the effects of weak EMFs (under the current safety standards) will be presented and briefly discussed.

Some research on EMF therapeutic applications has been carried out at Indiana University School of Medicine in Terre Haute. In the second part of the talk, our most recent studies will be presented: the effects of several EMFs, especially one inferred to modulate the immune system, have been tested on the oxidative activity of human macrophages.