

# **BioInitiative Report:**

## **A Rationale for a Biologically-based Public Exposure Standard for Electromagnetic Fields (ELF and RF)**

### **Steps to the clinic with ELF EMF**

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**Reba:** I've been doing research on controversial scientific problems all my professional life. Independent scientists have an especially high burden when they do scientific investigations into the big questions of biology that sometimes produce results that upset established paradigms. EMF has been one of those areas. I think we have an obligation to translate our scientific findings into useful information for public health, even if we do not yet have all the answers. Science is never done. Certainty is never static. This paper helps to highlight that EMF can be both a harmful exposure, and a healing or therapeutic exposure, depending on how it is delivered to the body. In order to understand the biological consequences of EMF exposure, one must know whether the effect is cumulative, whether compensatory responses result, and when homeostasis will break down. Such findings will have great potential for use in translation medicine at the clinic level without being invasive.

### **Abstract**

There have been many models to identify and analyze low-frequency motions in protein and DNA molecules. It has been successfully used to simulate various low-frequency collective motions in protein and DNA molecules. Low-frequency motions in biomacromolecules originate from two common and intrinsic characteristics; i.e., they contain 1) a series of weak bonds, such as hydrogen bonds, and 2) a substantial mass distributed over the region of these weak bonds. Many biological functions and dynamic mechanisms, including cooperative effects have been reported. In this regard, some phenomenological theories were established. However, differences in experimental outcomes are expected since many factors could influence the outcome of experiments in EMF research. Any effect of EMF has to depend on the energy absorbed by a biological organism and on how the energy is delivered in space and time. Frequency, intensity, exposure duration, and the number of exposure episodes can affect the response, and these factors can interact with each other to produce different effects. In addition, in order to understand the biological consequence of EMF exposure, one must know whether the effect is cumulative, whether compensatory responses result, and when homeostasis will break down. Such findings will have great potential for use in translation medicine at the clinical level without being invasive.

**Keywords:** Electromagnetic fields; Hsp70; Interaction mechanisms; Low-frequency collective motion