

Insights Into Electromagnetic Interaction Mechanisms

REBA GOODMAN AND MARTIN BLANK - Department of Pathology, Columbia University Health Sciences, New York, New York  
- Department of Physiology, Columbia University Health Sciences, New York, New York

Low frequency (<300 Hz) electromagnetic (EM) fields induce biological changes that include effects ranging from increased enzyme reaction rates to increased transcript levels for specific genes. The induction of stress gene HSP 70 expression by exposure to EM fields provides **insight into how EM fields interact with cells and tissues**. Insights into the mechanism(s) are also provided by examination of the interaction of EM fields with moving charges and their influence on enzyme reaction rates in cell-free systems. Biological studies with in vitro model systems have focused, in general, on the nature of the signal transduction pathways involved in response to EM fields. **It is likely, however, that EM fields also interact directly with electrons in DNA to stimulate biosynthesis. Identification of an EM field-sensitive DNA sequence in the heat shock 70 (HSP70) promoter, points to the application of EM fields in two biomedical applications: cyto-protection and gene therapy.** **EM field induction of the stress protein hsp70 may also provide a useful biomarker for establishing a science-based safety standard for the design of cell phones and their transmission towers.**