

Electromagnetic Fields, Water, and Biology

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Abstract

The power and telecommunications industries have used two arguments to support their view that human exposures to non-thermal non-ionizing radiation is inoffensive. First, the radiation is non-ionizing. Second, the energy quanta of the radiation are too weak to overcome the competing energy of thermal motion in aqueous media. Those arguments rest on the Arrhenius equation (1889) and on the concept of energy of activation.

Later scientific developments such as the Eyring equation (1935) and the Bennett-Chandler (1977-1978) equation on reaction rates, and the Second Law of Thermodynamics, recognized in living systems by Schrödinger as “negentropy”, all undermine these arguments.

The Second Law of Thermodynamics supplies the ionization claimed by industry to be lacking, allowing charges straying from the electron transport chain to flow through water and form Reactive Oxygen Species. The flow of protons (without counter ions) through the mitochondrial inter-membrane space and through ATP synthase’s alpha water channel creates a second antenna receptive to external electromagnetic fields. These currents magnify the sensitivity of biological tissues to external electromagnetic fields by a factor of 200 beyond the expected sensitivity of redox reactions in inorganic materials.

The health effects of low levels of non-ionizing radiation observed at current environmental levels are in fact completely supported by physics. Furthermore, the expansion of extra-low frequency radiation and wireless transmission in living spaces is in direct conflict with preservation of a healthy environment, particularly because of the effects on diabetes.