

# **Environmental Magnetic Fields Inhibit the Antiproliferative Action of Tamoxifen and Melatonin in a Human Breast Cancer Cell Line**

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We have previously reported that environmental-level magnetic fields (1.2 uT {12 milligauss}, 60 Hz) block the growth inhibition of the hormone melatonin ( $10^{-9}$  M) on MCF-7 human breast cancer cells in vitro. We now report that the same 1.2 uT, 60 Hz magnetic fields significantly block the growth inhibitory action of pharmacological levels of tamoxifen ( $10^{-7}$  M). In biophysical studies we have taken advantage of Faraday's Law of Current Induction and tested whether the 1.2 uT magnetic field or the associated induced electric field is responsible for this field effect on melatonin and tamoxifen. We observe that the magnetic field component is associated with the field blocking effect on melatonin and tamoxifen function. To our knowledge the tamoxifen studies represent the first experimental evidence for an environmental-level magnetic field modification of drug interaction with human breast cancer cells. Together, these findings provide support to the theory that environmental-level magnetic fields can act to modify the action of a drug or hormone on regulation of cell proliferation. Melatonin and tamoxifen may act through different biological pathways to down-regulate cell growth, and further studies are required to identify a specific biological site of interaction for the 1.2 uT magnetic field.