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Static Magnetic Field Induced Stochastic Resonance in Gene Expression MEGAN BRADY, Binghamton University, PAUL FRISCH, Memorial Sloan-Kettering, KENNETH MCLEOD, CRAIG LARAMEE, Binghamton University — Biological systems are naturally complex, making singular responses difficult to detect. However, when the emergent behavior is investigated, the collective properties may be observed and characterized. These responses to external stimuli at are often evident at the genomic level. When an optimal dose of external noise is used to perturb the system, it may work in synergy with the system's intrinsic noise to produce a change in stable state. This phenomenon, known as stochastic resonance (SR), is responsible for shifts in gene expression. This paper proposes that static magnetic fields (SMFs) elicit a SR genomic response in biological systems under environmentally relevant exposures. Using single reporter biomarkers as well as gene expression microarrays, the responses of three cell model systems (MCF-10A; Rat-1; Caco-2) to SMF exposure were examined. Results show that while responses for a single gene do occur, they are difficult to replicate and are near the detection cutoff limits. However, the system as a whole displays a shift in the pattern of gene expression. The replication of this pattern across different experimental platforms provides evidence that the cells are responding to the noise presented by the SMFs.

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