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Electrical noise gives away presence of cancer or toxins in culture
DAVID RABSON, DOUGLAS LOVELADY, CHUN-MIN LO, University of South Florida — Since 1984, electric cell-substrate impedance sensing (ECIS) has been used to monitor cell behavior in culture and has proven sensitive to morphological changes and cell mobility. Several authors have associated fluctuations in the measured impedance with cellular micromotion; however we are unaware of any previous work applying statistical techniques in order to distinguish two different cell types. We have now demonstrated a method for distinguishing cancerous from non-cancerous cultures of human ovarian surface epithelial cells;[1] applying similar ideas, we have also determined the presence and concentration of the toxin cytochalisin B in cultures of 3T3 fibroblasts at levels lower than the detection thresholds of other techniques. Measures indicative of both short-time (autocorrelation) and long-time ($1/f^{\alpha}$ noise in the power spectrum and Hurst and detrended-fluctuation-analysis exponents) show statistically significant differences between the populations. Our measures confirm that the noise from non-cancerous cultures has a higher degree of temporal order, order which we argue must arise from greater coordination of motion between healthy cells than between cancerous ones.

[1]D.C. Lovelady *et al.*, *Phys. Rev. E* **76**, 041908 (2007).

David Rabson
University of South Florida

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