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An approach to collective behavior in cell cultures: modeling and analysis of ECIS data DAVID RABSON, EVAN LAFALCE, DOUGLAS LOVELADY, University of South Florida, CHUN-MIN LO, National Yang-Ming University — We review recent results in which statistical measures of noise in ECIS data distinguished healthy cell cultures from cancerous or poisoned ones: after subtracting the “signal,” the $1/f^\alpha$ noise in the healthy cultures shows longer short-time and long-time correlations. We discuss application of an artificial neural network to detect the cancer signal, and we demonstrate a computational model of cell-cell communication that produces signals similar to those of the experimental data. The simulation is based on the q -state Potts model with inspiration from the Bak-Tang-Wiesenfeld sand-pile model. We view the level of organization larger than cells but smaller than organs or tissues as a kind of “mesoscopic” biological physics, in which few-body interactions dominate, and the experiments and computational model as ways of exploring this regime.

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