

Abstract Submitted  
for the MAR15 Meeting of  
The American Physical Society

**Collective Calcium Signaling of Defective Multicellular Networks**

GARRETT POTTER, BO SUN, Oregon State University — A communicating multicellular network processes environmental cues into collective cellular dynamics. We have previously demonstrated that, when excited by extracellular ATP, fibroblast monolayers generate correlated calcium dynamics modulated by both the stimuli and gap junction communication between the cells. However, just as a well-connected neural network may be compromised by abnormal neurons, a tissue monolayer can also be defective with cancer cells, which typically have down regulated gap junctions. To understand the collective cellular dynamics in a defective multicellular network we have studied the calcium signaling of co-cultured breast cancer cells and fibroblast cells in various concentrations of ATP delivered through microfluidic devices. Our results demonstrate that cancer cells respond faster, generate singular spikes, and are more synchronous across all stimuli concentrations. Additionally, fibroblast cells exhibit persistent calcium oscillations that increase in regularity with greater stimuli. To interpret these results we quantitatively analyzed the immunostaining of purigenic receptors and gap junction channels. The results confirm our hypothesis that collective dynamics are mainly determined by the availability of gap junction communications.

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Date submitted: 11 Nov 2014

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