Characterizing Calcium Signaling in T cells

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Elevation of intracellular free Ca^{2+} is one of the key triggering signals for T-cell activation by antigen. A remarkable variety of this triggering signals ranging from infrequent spikes to sustained oscillations and plateaus is shaped by the interactions of the different Ca^{2+} sources and sinks in the cell.

We present a new approach to study Ca^{2+} signalling in T-cells at a large scale an in parallel fashion for a better understanding of the proteins and their interaction to generate this Ca^{2+} triggers. Synchronized T-cells and knock out T cell lines were exposed to a surface, coated with stimulatory and non stimulatory antibodys. The assay yielded a data set of several thousand calcium traces from which parameters like number of spikes or length of plateaus were extracted and used to cluster the data hypothesis free (Figure 1).

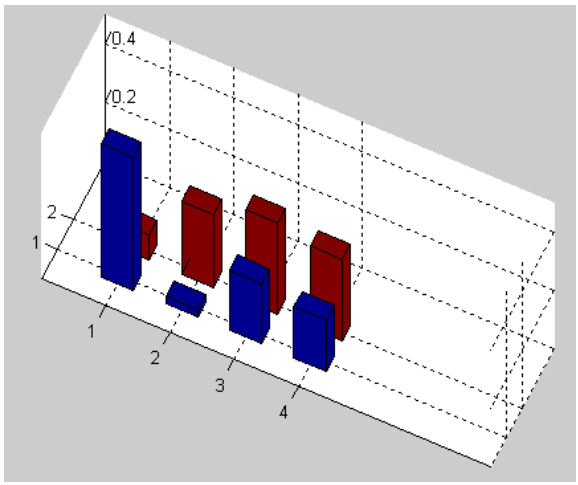

Figure 1: Result of data clustering from Ca^{2+} traces obtained for 2 different cell lines and 2 different stimuli. Traces for different stimuli and cell lines are represented differently in the obtained clusters providing the means to separate and identify the effects of stimuli and knock down of proteins on Ca^{2+}-signalling (x-axis: clusters 1-4, y-axis: stimuli 1 and stimuli 2, z-axis: contribution to each cluster.