Characterization of RANKL-mediated Cell-Cell Fusion *in vitro*

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Osteoclasts are cells responsible for destruction of mineralized tissues, such as bone and teeth. Monocytes/macrophages differentiate and fuse to form multinucleated osteoclasts when stimulated with a pro-resorptive cytokine RANKL. In vitro, this osteoclast differentiation process can be divided into two stages: early osteoclast-commitment stage, and late cell-cell fusion stage. Although it takes days for a fusion event to be initiated, the actual fusion, including cell-cell searching, contacting, and cell-cell membrane merge is a transient process that occurs rapidly. By using time-lapse live cell imaging techniques, we observed that during the cell-cell fusion stage osteoclast-like cells form specific cytoplasmic structures (which we term fusopods) that extend the search for other cells that are fusion-competent. We have data characterizing the number of fusopod extensions per cell, the fusopod lifetime, its maximal length, and whether the fusopod completes a fusion event. The aim of our research is to elucidate the mechanism and characterize the behaviour of RANKL-mediated cell-cell fusion. In particular we are looking for a mathematical model that would characterize cells with fusion potential and predict an impending cell-cell fusion event based on the fusopod characteristics.

Background literature

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