

Modelling cellular aggregation induced by chemotaxis and phototaxis.

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Abstract

We use a generic agent-based model to investigate cellular aggregation in response to cell-cell interactions. Cells secrete soluble chemokines that are detected by other cells which carry specific receptors for this chemokine. In a process termed 'chemotaxis' the direction of motility of cells is determined by the concentration gradient of chemokines. 'Phototaxis' relies on the detection of light by intracellular receptors. In particular, we consider the case where intercellular signalling is induced by light that is emitted by the cells themselves. While chemotaxis is a frequently analysed and modelled intercellular communication path, phototaxis is only rarely investigated. We characterize and compare the collective response of cells to these mechanisms and show that chemotaxis and phototaxis can be distinguished by the emerging aggregation profile. This result provides a guideline to differentiate between these cell-cell interactions under specific circumstances in experiment.

Involved units

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Leibniz-HKI-Authors



Marc Thilo Figge

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