Dynamical mechanisms of B-cell selection and characterization of protein binding properties: theoretical and experimental investigations

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Mammals possess immune systems to resist disease. In order to identify a foreign organism, such systems exploit the protein binding activity of antibodies. In dependence on the invader, highly specialized antibodies are secreted by suitable B-cells which are selected out of a large cell pool and induced to expand their population. The project aims at answering questions like: What are the mechanisms governing the selection of most suitable cells, and how are the selected cells improved during the course of an acute immune response? Furthermore, what recognition properties must a set of antibodies possess to be able to locate any invading pathogen? The project pursues an interdisciplinary ansatz: The dynamic behavior of B-cells in the tissues where selection occurs is investigated experimentally and by means of computer simulations and data analysis. Furthermore, recognition capabilities of antibodies are measured using protein microarrays. The thus measured features are used to set up a disease diagnosis method and also serve as input data for mathematical models describing the cooperative action of antibody mixtures in blood serum.

Projektbeteiligte

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