Minisymposium 26 - Mathematics in the Biosciences

Dynamic gene-regulatory networks in T lymphocytes

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T cells are critical players in immune responses whose activation is tightly regulated. I will discuss networks of gene regulation and intercellular signalling involved in the control of T cell proliferation and differentiation of memory T cells. Cell-biological research has identified multiple feedbacks loops acting both within the cells and in an autocrine fashion via secreted signals. Mathematical models will be introduced that demonstrate how feedbacks can support all-or-none cellular decisions and the imprinting of immunological memory. Moreover, a model of intercellular communication between T cell subsets suggests that signalling via readily diffusible cytokines - the main messengers in the immune system - can be strongly controlled in spatial range by autocrine feedbacks. Experimental approaches that were triggered by the theoretical work will be discussed.