

INSTITUTUL DE MATEMATICA “SIMION STOILOW” AL ACADEMIEI ROMANE

**Seminariile BIOMAT**

*Mathematical modeling of lymphocytes selection  
in the germinal center*

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**Abstract:** Lymphocyte selection is a fundamental operation of adaptive immunity. In order to produce B-lymphocytes with a desired antigenic profile, a process of mutation-selection occurs in the germinal center, which is part of the lymph nodes. Numerous pathologies are associated with a malfunction of this mechanism. We introduce in this article a simplified mathematical model of this process, taking into account the main mechanisms of division, mutation and selection. This model is written as a non-linear, non-local, inhomogeneous second order partial differential equation, for which we develop a mathematical analysis in the case of piecewise-linear coefficients. We assess, mathematically and numerically, the performance of the biological function by evaluating the duration of this production process as a function of several parameters such as the mutation rate or the selection profile, in various asymptotic regimes.

