

# A QUANTITATIVE APPROACH TO HOMEOSTATIC REGULATION OF NAÏVE T CELL DIVERSITY AND NUMBER

**Hagit Alon and Zvi Grossman**

*Sackler School of Medicine, Tel Aviv University, Israel*

Despite fluctuations during infection or stress, the size of lymphocyte populations generally stays within a relatively narrow range, indicating the existence of homeostatic regulation. For naïve T cells, such regulation implies that the immune system acts to restore the balance between proliferation and replenishment by thymic output, on the one hand and loss by death and activation-induced differentiation, on the other.

The conventional mathematical model assumes that recent thymic emigrants (RTE) soon become kinetically indistinguishable from other naïve T cells. There is, however, indirect but compelling evidence that RTE are regulated differently than fully established naïve T cells.

We present a revised model in which the turnover of RTE is faster than that of established naïve and their incorporation is coupled to the regulation of diversity in the peripheral naïve population. We quantitatively analyze data that support extending the propositions regarding distinct turnover rates within the naïve populations, provide estimates for the relative size of the RTE compartment in healthy individuals as they age and for the relative contributions of thymic output and self-renewal division to naïve T-cell homeostasis.