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Lymphopenia and T-Cell Regeneration Mechanisms

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Chronic lymphopenia, more specifically, T-cell deficiency increases the risk of mortality from cancer, cardiovascular and respiratory diseases; serves as a risk factor for poor outcome in infections, such as COVID-19. Regeneration of T-lymphocytes is a complex multilevel process, many questions of which remain unanswered. The present review addresses two main pathways to increase the number of T-cells during lymphopenia: production in the thymus and homeostatic proliferation in the periphery. The literature data on the signals that regulate each pathway are summarized. Their contribution to the quantitative and qualitative restoration of the immune cell pool is considered. The features of the CD4⁺ and CD8⁺ T-lymphocyte regeneration are discussed.

Keywords: lymphopenia, regeneration, T-cells, thymus, lymphopenia-induced homeostatic proliferation