# Abstract

$CD8^+$ T cells play a crucial role in the adaptive immune response to combat infections and tumors. Previous research into T-cell heterogeneity has revealed that subsets of antigen-experienced $CD8^+$ T cells possess different functional properties. However, the functional diversity might already be predetermined in their naïve steady-state precursors. Recently, the Lab of Adaptive Immunity discovered a new and rare murine steady-state $CD8^+$ T-cell subset, known as Tpam cells ($CD8^+$ T cells with polyamine metabolism signature). Since polyamine metabolism has been linked to T-cell activation and differentiation, studying this novel subset can provide new insight into the fate of $CD8^+$ T cells upon TCR stimulation.

This diploma thesis aimed to characterize Tpam cells in terms of their origin, steady-state phenotype, fate after TCR stimulation, and potential functional role. We took advantage of various mouse models to investigate the formation of Tpam cells and found that they are dependent on a diverse TCR repertoire and are presumably formed by low-grade TCR signaling. We executed an adoptive transfer into T-cell deficient mouse model to examine their steady-state phenotype and performed an *ex vivo* TCR-mediated activation assay to observe their fate after activation. Our findings show that Tpam cells are a transient and reversible subset with an antigen-primed phenotype under steady-state conditions and have accelerated activation and proliferation upon TCR stimulation. Additionally, we discovered that their steady-state phenotype is part of the TCR-mediated activation pathway of naïve $CD8^+$ T cells and that Tpam cells are able to alter the activation of conventional naïve cells *ex vivo*.

Overall, this study discovered that Tpam cells represent a reversible subset of antigen-primed steady-state $CD8^+$ T cells as well as part of the activation pathway of naïve $CD8^+$ T cells. Moreover, in a broader context of the immune response, our findings revealed an early state of activated $CD8^+$ T cells defined by the usage of polyamine metabolism.



**Keywords:** $CD8^+$ T cells, T-cell heterogeneity, polyamine metabolism, TCR activation