

Mechanisms for Establishment of Transcriptional Memory

This project aims to discover novel mechanisms of transcriptional (cellular) memory. Memory is fundamental for multicellular life as it maintains gene expression during growth and in adulthood. Mechanisms by which cells achieve such memory are poorly understood.

In my prior work, I set up a robust system to study how cells remember previous environmental exposures. I discovered novel genes that show the effect and gained initial insights into the molecular mechanisms controlling initiation of cellular memory. I am now in a unique position to understand this problem in an unprecedented detail. I have the necessary tools, expertise and preliminary data to uncover novel mechanisms of cellular memory.

In this project, me and my future team will discover molecular and structural mechanisms required for the establishment of memory. Next, we will generalize the discoveries to maintenance of active gene expression and determine the role of memory mechanisms in macrophage innate immunity.

In summary, this project addresses a major knowledge gap and will lead to fundamental biological discoveries. It will bring about multidisciplinary training of future scientists and empower me to establish myself as a leader in the field. Insights from this research will uncover new avenues for manipulation of the innate immune system for the benefit of public health, with particular focus on macrophage based anti-cancer immunotherapies. This will pave the way for industrial collaboration and new jobs in the biotechnology sector.