Project for PhD thesis

Area: Molecular medicine, genetics, molecular and cell biology, immunology

Title: Phenotypic and genetic dissection of type I interferonopathies

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Summary: Type I Interferonopathies comprise a heterogeneous group of autoinflammatory and autoimmune diseases characterized by chronic overproduction of type I interferon (IFN-α/β). The type I IFN axis plays an important role in the innate immune defense against viral infections. However, uncontrolled type I IFN activation due to a dysregulation of pathways of the innate immune system can cause inflammation in the absence of infection. Despite significant advances in understanding the molecular pathology of type I interferonopathies, the mechanisms underlying inflammatory organ damage due to uncontrolled type I IFN activation remain poorly understood. The overall goal of the project is to identify and characterize novel genetic causes of type I IFN-driven autoinflammation and autoimmunity, and to unravel novel disease mechanisms, ultimately contributing to improved diagnosis and therapy.

The specific aims are to (1) validate candidate disease genes in heterologous cell systems and/or patient cells using gene editing tools for introduction and/or correction of gene mutations, (2) to systematically characterize patient cells using single-cell approaches, and to (3) functionally interrogate immune signaling pathways using immunological and cell biological tools.