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**Tracing the roots of leukemia - how pre-leukemic hematopoietic stem cells contribute to acute lymphoid and myeloid leukemias?**

*Popular science abstract:*

It is estimated that one million of new blood cells are produced each second in human body. All blood cells are derived from hematopoietic stem cells. Hematopoietic stem cells self-renew their own population and constitute regeneration potential of blood throughout life of the organism.

However, the longevity of hematopoietic stem cells may also possess negative effects: over the years hematopoietic stem cells accumulate mutations, which may lead to malignant transformation and development of leukemia. Therefore, it is thought that hematopoietic stem cells may be the first nexus in multistep process of leukemia development. Despite that hematopoietic stem cells harboring preleukemic mutations do not cause full-blown leukemia, their presence significantly increases the risk of malignant transformation.

This project aims to decipher mechanisms that are responsible for contribution of hematopoietic stem cells to development of leukemia. Our preliminary studies indicate that hematopoietic stem cells are a heterogeneous population. We want to verify whether there are fractions among hematopoietic stem cells that preferentially accumulate mutations and as the result contribute to leukemia development. We also plan to verify whether different fractions of hematopoietic stem cells are involved in development of various types of leukemias (acute myeloid leukemia and acute lymphoblastic leukemia) or in pediatric and adult leukemias.

The goal of next experiments is to identify the biological mechanisms that distinguish hematopoietic stem cells that possess preleukemic mutations from non-mutated stem cells. This will allow to better recognize why preleukemic hematopoietic stem cells often expand and gain advantage over non-mutated stem cells.

Concluding, upon completion of the project we will increase our knowledge about initial events of leukemia development. In the future, this knowledge might lead to new clinical strategies for the treatment of leukemia.