Decoding the secrets surrounding platelet production

Dr. Zoltan Nagy has been accepted into the prestigious Emmy Noether Programme by the German Research Foundation (DFG). The biologist will receive over 1.7 million euros in funding for a period of six years to establish a research group at the Institute of Experimental Biomedicine, University Hospital Würzburg to investigate the maturation process of blood-forming cells known as megakaryocytes.

Würzburg. Those with an increased risk of bleeding may require platelet transfusion in various medical situations such as after a severe injury or prior to major surgery, to prevent bleeding or excessive blood loss. Especially cancer patients depend on platelet donations, as therapies often disrupt blood cell formation. However, the demographic aging and the growing prevalence of cancer are met with a decreasing availability of blood and platelet donations, which is projected to lead to shortages in platelet concentrates for transfusion in the future. This imbalance poses an urgent challenge for healthcare systems, including Germany.

How can platelet production be improved?

Zoltan Nagy could contribute to the solution with his new research group, the establishment of which is funded by the DFG with more than 1.7 million euros as part of his Emmy Noether Programme entitled “Single-cell-roadmap of megakaryocyte development”. Megakaryocytes are among the largest cells in the human body, measuring up to 0.1 mm, which are responsible for platelet production. "The efficient generation of platelets in laboratory settings is hindered by our limited understanding of the maturation process through which precursor cells in the bone marrow transform into fully developed platelet-forming megakaryocytes," describes Nagy the starting point.

And this is exactly where Nagy's new Emmy Noether research group comes in. They aim to investigate the key factors and molecular mechanisms that control the development of megakaryocytes. For this purpose, Nagy and his team will analyse the genetic activity within individual cells at different stages of maturation using single-cell RNA sequencing.

In addition, the group intends to intervene in specific genes through gene manipulation experiments to observe their role in the maturation of megakaryocytes and thereby identify potential new targets for interventions to improve platelet production.

Megakaryocyte maturation in the bone marrow - an exceptional research environment in Würzburg

"I am very grateful to my colleagues both at the national and international level for their invaluable support and collaboration, which has significantly contributed to the success of this grant application", emphasises Zoltan Nagy. "In Würzburg, I have found an exceptional research environment with numerous promising opportunities that align well with the goals of my research programme. These include the recently established state-of-the-art Single-Cell Center Würzburg, which provided seed funding to support the development of our method. Additionally, I am excited to pioneer innovative approaches in megakaryocyte research together with teams from the Würzburg Platelet Group and the Rudolf Virchow Center (RVZ) for Integrative and Translational Imaging.”

"I am delighted to extend my sincere congratulations to Dr. Zoltan Nagy on his remarkable achievement," says Prof. Bernhard Nieswandt, Director of the Institute of Experimental Biomedicine, University Hospital Würzburg. "The acquisition of the renowned Emmy Noether grant highlights the exceptional quality of Dr. Nagy's research and underscores the

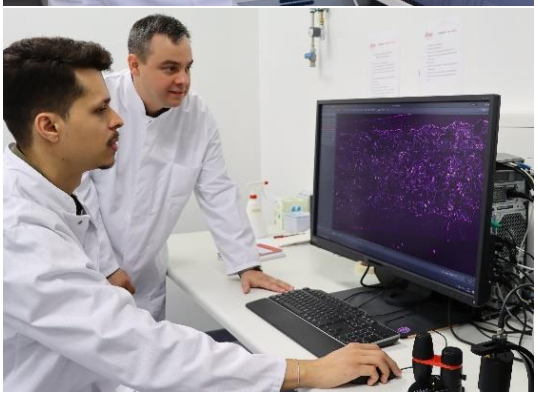
favourable environment at the Würzburg Platelet Group, where talented individuals can thrive."

About Zoltan Nagy: Exploring new frontiers in megakaryocyte research

After completing his biology studies in Szeged, Hungary, Zoltan Nagy carried out an internship at the Würzburg Platelet Group, where his fascination with platelets has begun. He obtained his PhD at the University College Dublin, Ireland, under the supervision of Dr. Albert Smolenski. Under the leadership of Prof. Yotis Senis at the University of Birmingham, UK, Dr. Zoltan Nagy conducted innovative research in platelet and megakaryocyte biology during his postdoctoral training, leading to significant contributions in the field. He focused on proteins that play a central role in the production and function of platelets, and implemented advanced methods for studying these cells.

In 2019, Nagy joined the research group of Prof. Bernhard Nieswandt at the University of Würzburg, and with the support of the PostDoc Plus funding from the Graduate School of Life Sciences, he initiated building his independent research programme dedicated to megakaryocytes. In 2021, his research efforts expanded further when he assumed the role of project leader in the DFG-funded Transregio/Collaborative Research Center 240 “Platelets”, where he played a pivotal role in establishing single-cell RNA sequencing methods for investigating megakaryocytes. These advancements form the solid foundation of his current programme.

Dr. Zoltan Nagy will be the head of a new research group at the Institute for Experimental Biomedicine at the University Hospital Würzburg. He is receiving DFG funding as part of the Emmy Noether Programme to set up the group. © Kirstin Linkamp / UKW



PhD student Gabriel H. M. Araujo (left) shows Zoltan Nagy his microscopic images of megakaryocytes in the bone marrow. © Kirstin Linkamp / UKW

PhD student Maximilian Englert (left) talks to Zoltan Nagy about his single-cell data analysis. © Kirstin Linkamp / UKW