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Master thesis of Bc. Karolína Vaničková

Title: Identification of novel mechanisms controlling emergency granulopoiesis in hematopoietic stem and progenitor cells

Karolína Vaničková joined my laboratory in September 2019 with the objective to perform her master thesis. She has been in the lab almost every day, performed her experimental work, helped her colleagues intellectually and experimentally, and actively participated in project reports and journal club sessions.

At the beginning she worked together with a postdoc in my lab (Dr. Petr Daněk) and investigated the role of the β -catenin/TCF-LEF transcription complex in granulocytic production. Karolína significantly contributed to the successful revision of the manuscript Dr. Daněk was working on, and her outstanding performance was acknowledged by including her as a co-author in the manuscript " β -catenin-TCF/LEF signaling promotes steady-state and emergency granulopoiesis via G-CSF receptor upregulation" (Danek et al, Blood 2020). The experiments performed by Karolína in regards to this manuscript have been included in her master thesis.

However, since Karolína showed a strong background in immunology, great ability to rapidly learn laboratory skills, and scientific independence, I decided to relocate her to a new, challenging, and technically complex project, which would be led by her. This project centered on understanding the process of emergency granulopoiesis, a surprisingly uncharacterized process. Emergency granulopoiesis is activated during acute infections and is responsible for the enhanced and fast production of granulocytes. Most studies investigating emergency granulopoiesis focus on the role of mature granulocytes in clearing the infection, or the rapid activation of myeloid committed precursor cells to cope with the high granulocytic demands. Yet, based on Karolína's preliminary results, we hypothesized that hematopoietic stem cells and multipotent progenitors play a crucial role in the early activation of the process. Thus, the main goal of the project was to identify the early molecular changes that occur in hematopoietic stem and multipotent progenitor cells at a single cell level. Karolína optimized all the protocols required to establish the project and successfully performed the single cell RNA-sequencing experiment (scRNA-seq). Additionally, despite her limited knowledge on bioinformatics at that time, she enthusiastically took the challenge and joined the bioinformaticians at IMG to explore and successfully analyze the scRNA-seq. Further, Karolína is currently collaborating with the group of Dr. Kateřina Rohlenová (IBT) to deepen the bioinformatic analysis. All her results related to this project have been included in her master thesis.

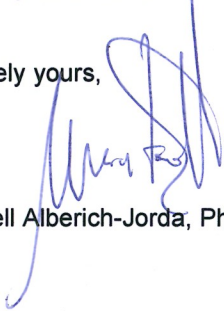
I believe that this thesis has provided very solid basis for further research into this topic in our laboratory, and I expect that the data generated by Karolína will be included in a future publication. In fact, I am extremely glad that Karolína decided to perform her Ph.D. studies in my lab and will continue exploring the molecular mechanisms driving the shift from steady-state to emergency granulopoiesis.

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During the course of her training I could appreciate the personal and scientific development of Karolína. She was responsible, dedicated to her project, and careful with her work. The written part of this thesis was entirely written by Karolína, using the available literature and her own results. The thesis was written in English and my contribution was rather small, with few linguistic adaptations. The result is a coherent and well written document, both formally and scientifically.

In conclusion, I state that Karolína Vaníčková proved her knowledge on the research topic, laboratory skills, and her ability to design, perform and evaluate complex datasets. She is able to critically evaluate the published data and her own results, and analyze everything in a broader context. She also proved a high degree of independence in the lab and in the writing of her master thesis. **In my opinion, this work clearly meets the requirements for the master thesis and I recommend its acceptance to the defense with excellent evaluation.**

Sincerely yours,



Merixell Alberich-Jorda, Ph.D