PhD project No. 8, Dr. Tavian

Scientific Area	Haematopoiesis and immune cell differentiation
Two project titles	A) Identification of genes implied in haematopoietic specification
Host country	France
Supervisor, institution	Dr Manuela Tavian, University of Strasbourg
Co-Supervisor, institution	To be confirmed
Mentor, institution	Dr Laura Fontenille, AZELEAD, Montpellier, France
Secondment institution	University of Strasbourg, France and INSERM UMR-S1113

Short description of the supervisor's lab with introduction to the topic

The Tavian research team studies the mechanisms underlying the emergence and proliferation of haematopoietic stem cells (HSC) during embryonic development. We previously showed that HSC emerge in the AGM (aorta, gonads and mesonephros) region inside the human embryo but pre-haematopoietic cells are detected earlier scattered in the subaortic mesoderm and are identifiable by the expression of the angiotensin converting enzyme (ACE / CD143) (see publications). Based on these results, we recently performed a transcriptomic analysis of different cell populations involved in the process of haematopoietic emergence: pre-HSC, HSC and microenvironmental endothelial cells. This has revealed differentially expressed genes between the different populations.

Topic description, including techniques to be used

Project A)

The focus of this project will be to understand the cellular and molecular events leading to the specification and activation of a haematopoietic program during human embryonic development from pre-HSC. The research program will have the following objectives: (i) validate the expression at the protein level of the genes selected by immunofluorescence, (ii) quantify their expression by flow cytometry and define the cell sorting protocols; (iii) carry out functional approaches on the sorted cells, by in vitro culture in order to define their hemogenic ability; (iv) validate the function of genes and signaling pathways selected by modulating their expression by shRNA-knockdown techniques or by over-expression models.

Techniques: culture of HSC and progenitors, flow cytometry sorting and analysis, immunohistochemistry and immunofluorescence, transcriptomic analysis, RT-qPCR.

Recommended applicant's training (technical expertise and knowledge)

Techniques: Flow cytometry, immunohistochemistry, immunofluorescence, confocal microscopy RT-PCR, cell culture.

Knowledge: Basic knowledge in Molecular and Cell Biology as well as in development/physiology skills in bioinformatics analysis are desirable.

Maximum two relevant publications

Julien, E., Biasch, K., El Omar, R., Freund, J.N., Gachet, C., Lanza, F., and Tavian, M., 2021, Stem Cells: Renin-angiotensin system is involved in embryonic emergence of hematopoietic stem/progenitor cells.

Sinka L, Biasch K, Khazaal I, Peault B, Tavian M., 2012, Blood: Angiotensin-converting enzyme (CD143) specifies emerging lympho-hematopoietic progenitors in the human embryo.

The EURIdoc programme has received funding from the European Union's Horizon 2020 research and innovation programme under the Marie Skłodowska-Curie grant agreement number 101034170.

Ethics description

1. Humans	
This research involves human participants.	YES ☐ / NO ☒
This research involves physical interventions on the study participants.	YES ☐ / NO ☒
2. Human Cells /Tissues	
This research involves human cells or tissues, such as blood.	YES ☒ / NO ☐
3. Personal Data	
This research involves personal data collection and/or processing.	YES ☐ / NO ☒
This research involves further processing of previously collected personal data (secondary use).	YES ☐ / NO ☒
4. Animals	
This research involves animals, such as mice.	YES ☒ / NO ☐

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