



RESEARCH TOPIC MEM2

Role of platelet heterogeneity and platelet-leukocyte interactions in coronary syndrome Curriculum MEM

Laboratory name

Cardiovascular department

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Abstract

Platelets play a key role in vascular homeostasis and in non-hemostatic fields, including immune response, tumor progression and other nonvascular diseases. Human platelets are a heterogeneous cell population differing with respect to their size, surface receptor expression, granule density and RNA-content. Recently, attention raised on a distinct pro-thrombotic subgroup of platelets: the immature or reticulated platelets (RPs). RPs are young, hyper-reactive platelets that are larger and contain more RNA compared to older platelets. RPs have emerged as promising biomarkers but the reason for their intrinsic hyper-reactivity and their association with ischemic adverse events is unknown as the biology of RPs still needs to be elucidated. Moreover, platelet-leukocyte aggregates (PLAs), which participate in cardiovascular diseases and are increased in acute and chronic coronary syndromes, could also be a potential marker of platelet activity, for monitoring antiplatelet therapy and possible predictors of adverse events. However, knowledge concerning the pathophysiology of PLAs is limited and further studies and methods are needed to shed light on PLAs role in cardiovascular disease.

The main purpose of our project is to investigate the biomolecular features and heterogeneity of platelet, leukocyte, and platelet-leukocytes aggregates in coronary artery disease. Specifically, we aim to characterize the expression phenotype of the prothrombotic platelet subgroup defined as Reticulated Platelets, and to determine which cell subpopulations are more prominent in coronary artery disease and whether they correlate with the disease and inflammatory state, or prothrombotic states which could increase the risk for major adverse cardiovascular events in coronary syndromes. To achieve this, we will employ a range of experimental techniques, including fluorescence-activated cell sorting (FACS), mass cytometry, single-cell RNA sequencing, and platelet function testing. To facilitate the research, the successful candidate will spend up to 18 months in a laboratory in Germany to gain access to specialized equipment and expertise in platelet biology.

Our experimental design will provide a detailed characterization of platelet and leukocyte subpopulations and will allow us to identify potential biomarkers and therapeutic targets in coronary artery disease.

Main technical approaches

Peripheral Blood handling and analysis

- FACS/Sorting
- RNA Isolation
- RNA-sequencing
- Single-cell RNA-Sequencing
- Mass Cytometry/Time of flight mass spectrometry
- Platelet Function Testing

Scientific references

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Type of contract

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