

QUANTIM- <u>Quantification of Innate Immune</u> **Function in Whole Blood Infection Assays**

Autoren

Oliver Kurzai Prinicipal Investigator Marc Thilo Figge Prinicipal Investigator Daniel Thomas-Rüddel Clinician Scientist Teresa Lehnert Scientist Ines Leonhardt Scientist Ronny Martin Scientist

Problem

- Marked heterogeneity of sepsis as a clinical syndrome
- Caused by highly diverse pathological conditions and shows variable kinetics in individual patients
- Classification of sepsis patients by their immune status is

Approach

Within this project, we will use data from a human whole blood model of infection combined with advanced mathematical modeling (Hünniger *et al.*, 2014 and Lehnert *et al.*, 2015):

Human whole-blood infection assay (WBIA)

Virtual infection models

necessary for immunomodulatory therapy approaches

Objectives

- Individual quantification of altered immune effector functions of septic patients
 - there pathogen-specific patterns of immune Are activation during whole blood infection?
- Are there immune effector functions that allow for the stratification of sepsis patients?

Results obtained during the funding period

WP1: Analysing pathogen association and immune activation in blood from healthy volunteers







• Activation patterns on immune cells





WP2: Quantification of immune effector mechanisms by biomathematical analyses



Model simulation results



Immune reaction rates



WP3: Analysing pathogen association and innate immune activation in blood from clinical samples

- In a pilot study blood, samples of patients that underwent cardiac surgery with extracorporeal circulation (heart-lung machine, HLM) were analysed
- Blood samples were obtained before cardiac surgery (pre-operative), immediately after surgery (post-operative), and 1 day after admission to ICU



- reduced post-operatively and one day after
- following stimulation by both pathogens at

Next steps...

GEFÖRDERT VOM

In ongoing experiments, we will analyze the behavior of neutrophils in more detail and visualize differences in immune effector functions using live cell imaging and advanced spatial biomathematical modeling. Once optimized, analyses of blood samples of patients from CandiSep cohort will follow in future studies.

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