ImmunoTools IT-Box-139 Award 2013

Farina Borken

PhD Supervisor: PD Dr. rer. nat. Ignacio Rubio

Interdisciplinary Center for Sepsis Research
Center for Sepsis Control and Care (CSCC)
Clinic for Anaesthesiology and Intensive Care Medicine
University hospital Jena
Erlanger Allee 101
07747 Jena, Germany

T-cell paralysis in human Sepsis

Sepsis - a complex systemic inflammatory response to infection with risk of vital functions - is a life threatening condition that often literally overruns the patients' natural defence systems. Due to improved intensive care and artificial organ replacement, many patients survive the critical acute step of excessive inflammatory respond to the infection, but are dependent on mechanical ventilation and renal replacement therapy beyond the acute hospital. These so called "chronically critically ill" patients have indicated inter alia serious immunological changes that are poorly studied and understood. These changes include immunosuppression and so-called anergy or paralysis of T-cells, which is characterized by the inability of the cells to respond adequately to antigenic stimulation, but are obviously inadequately understood precluding the development of a more effective and comprehensive therapy.

Therefore we investigate the functional status of magnetically isolated peripheral human T-cells from patients in the post-acute phase after surviving sepsis. To this end we use a panel of biochemical and molecular biological methods including FACS-measurement. By using the ImmunoTools *IT-box-139* we are able to measure the distribution of different T-cell subsets with the help of e.g. CD2, CD3, CD4 and CD8. In addition we can detect effector memory T-cells (CD44, CD45RO), naïve T-cells (CD62L, CD45RA) and regulatory T-cells (CD4, CD25, (FoxP3)) and their roles and alterations in human sepsis. Furthermore it is very important for us to characterize the activation status of T-cells after stimulating the cells with a panel of different stimuli. The expression pattern of activation marker like CD25, CD69, CD11a, CD134, CD45RO and others will be helpful, especially for the characterization of different stages of activation. Apoptosis is also an important process that can be detected with Annexin 5 and CD95.

Moreover sepsis also influences other immune cells and with the ImmunoTools *IT-box-139* we shall be able to analyze these other immune cells by different specific marker e.g. B-cells (CD19, CD21, CD38, CD40), antigen presenting cells (HLA-antibodies, CD80, CD86) or granulocytes (CD16, CD18, CD11b) and their activation and modifications in the post-acute phase of sepsis. Beyond the characterization of the functional status of T-cells these measurements will provide a concise and

specific overview of the immunological status during the protracted post-acute phase of immunosuppression in sepsis.

In sum, our aim is to understand the complex and aberrant immunological processes going on after an episode of sepsis, with a particular focus on the T-cell compartment. We hope this study will provide hints for new approaches and for the development of effective and comprehensive immunomodulatory therapies.

ImmunoTools *IT-Box-139.3* for **Farina Borken** includes 100 antibodies

FITC - conjugated anti-human CD1a, CD2, CD3, CD4, CD5, CD6, CD7, CD8, CD9, CD11a, CD11b, CD14, CD15, CD16, CD18, CD19, CD21, CD25, CD29, CD36, CD41a, CD43, CD45, CD45RA, CD46, CD52, CD53, CD54, CD58, CD62p, CD63, CD69, CD71, CD80, CD86, CD95, CD235a, HLA-ABC, HLA-DR, IL-6, Control-IgG1, Control-IgG2a, Control-IgG2b, Annexin V

PE - conjugated anti-human CD2, CD3, CD4, CD8, CD11b, CD14, CD15, CD18, CD19, CD20, CD21, CD22, CD27, CD33, CD34, CD37, CD38, CD40, CD42b, CD45, CD45RB, CD50, CD72, CD95, CD105, CD147, CD177, Control-IgG1, Control-IgG2a, Control-IgG2b, Annexin V

PE/Dy647 -tandem conjugated anti-human CD45

APC -conjugated anti-human CD3, CD4, CD7, CD8, CD10, CD11c, CD14, CD16, CD19, CD27, CD37, CD40, CD44, CD56, CD59, CD61, CD62L, CD62P, CD69, IL-6, Control-IgG1, Control-IgG2a, Control-IgG2b, Annexin V DETAILS

plus CD45RO-FITC