Department of Surgery
Division of Transfusion Medicine and Hemostaseology

Address
Krankenhausstraße 12
91054 Erlangen
Phone: +49 9131 8536972
Fax: +49 9131 8536973
www.transfusionsmedizin.uk-erlangen.de

Head of Division
Prof. Dr. med. Reinhold Eckstein
(updated until 30.9.2017)

Contact
Prof. Dr. med. Robert Zimmermann
Phone: +49 9131 8542110
Fax: +49 9131 8536973
robert.zimmermann@uk-erlangen.de

Research Focus
• Preparation and characterization of white cell-poor platelet concentrates by apheresis
• Collection of monocytes for the generation of dendritic cells (DC)
• Clinical research related to hemostaseology
• Clinical research related to hemotherapy
• Mesenchymal stromal cells (MSC)
• Optimization of collection procedures to get regulatory T cells (Tregs)
• Legislation of transfusion
• Platelet-derived growth factors for wound healing and angiogenesis

Structure of the Division
Professorships: 1
Personnel: 76
• Doctors (of Medicine): 6
• Scientists: 6 (thereof funded externally: 0)
• Graduate students: 20

Clinical focus areas
• Clinical transfusion medicine
• Blood component supply
• Immunohaematological and hemostaseological diagnostics
• Outpatient and inpatient coagulation counseling
• Production and storage of stem cell preparations

Research
Research in the Division of Transfusion Medicine and Hemostaseology focuses on the characterization of specific blood components, stem cell concentrates and new experimental cellular preparations. Clinical problems with respect to hemotherapy and coagulation management are also investigated. In the GMP laboratory of the Division, interdisciplinary experimental preparations for innovative clinical trials are produced and tested (Advanced Therapy Medicinal Products, ATMP).

Preparation and characterization of white cell-poor platelet concentrates by apheresis
PI: PD Dr. J. Zingsem, Prof. Dr. J. Ringwald
Platelet apheresis processing large blood volumes to produce platelet-rich plasma has become a standard procedure. A major research focus is the preparation of extremely white cell-poor platelet concentrates making additional filtration unnecessary. Apheresis procedures were developed for producing concentrates with standardized platelet content, but containing almost no residual white cells. Another research interest is the evaluation of quality control procedures detecting very low white cell-contaminations of cellular blood components. Additionally, the influence of different blood bags and of component volumes on the quality of stored platelets is examined.

Collection of monocytes for the generation of dendritic cells (DC)
PI: Prof. Dr. E. Strasser
Circulating monocytes are precursors of DC which play a key role in the immune system’s function by presenting antigens to specific lymphocytes. The collection and cultivation of these cells enables the development of new strategies in the treatment of malignant diseases. Members of the Division of Transfusion Medicine and Hemostaseology cooperate with colleagues in the Department of Dermatology to adjust the collection procedures optimally to the specific clinical and experimental demands of procedures aimed at the cultivation, expansion, and priming of DC.

Clinical research related to hemostaseology
PI: Prof. Dr. J. Ringwald, Prof. Dr. E. Strasser
Other research interests include thrombophilia, traveller’s thrombosis, and hemostasis dysfunctions resulting in bleeding disorders. Other current study objectives are preanalytical determinants of fibrinolysis tests, hemostasis tests in systemic lupus erythematoses, and other currently relevant topics.

Clinical research related to hemotherapy
PI: Prof. Dr. V. Weisbach, Prof. Dr. R. Zimmermann, Prof. Dr. J. Ringwald, Prof. Dr. E. Strasser
We examine antibodies against red cell antigens, characterize factors influencing the quality of stored red cell concentrates, and study the complex dysfunctions of the coagulation system.

Mesenchymal stromal cells (MSC)
PI: Prof. Dr. V. Weisbach, Dr. C. Klein
Mesenchymal stromal cells (MSC) are the predecessors of osteoblasts, chondrocytes, and adipocytes. The term “MSC” especially covers cells cultivated and expanded ex vivo. These cells are a mixture of stem and progenitor cells up to produce stroma cells and are named MSC according to a definition of the International Society of Cellular Therapy. It is expected that MSC will play a major role in future applications of regenerative medicine. The main focus of the working group is the preparation, characterization, and expansion of MSC especially from placental tissues.

Optimization of collection procedures to get regulatory T cells (Tregs)
PI: Prof. Dr. E. Strasser, Dr. J. Strobel
T cells play an important role in adaptive immune response in many diseases (infectious and inflammatory diseases, tumors). DC act as antigen presenting cells for specific T cells activation. The collection of circulating T cells as well as the culture and expansion of T cells, especially regulatory T cells (Tregs), enables the development of new strategies for the anti-inflammatory and immunosuppressive therapies. Members of the Division of Transfusion Medicine and Hemostaseology cooperate with colleagues from the Departments of Medicine 1, Dermatology, and Medicine 5 to optimally adjust the collection procedures to the specific clinical and experimental demands of procedures aimed at the cultivation and expansion of Tregs. In the context of cell preparation, analysis of factors responsible for cell damage (cell apoptosis and necrosis) is relevant to optimize the quality of leukocyte products.

Legislation of transfusion
PI: Prof. Dr. R. Zimmermann
Under the auspices of the Legal Counsel and Managing Director of the UK Erlangen, Dr. A.W. Bender, the Division of Transfusion Medicine and Hemostaseology is involved in publications on the legislation and law of blood transfusion in Germany. In the center of attention is the book "Transfusion Law", published by the Wissenschaftliche Verlagsgesellschaft Stuttgart, that has become the benchmark in this field of law.
and has found its way into the jurisdiction of the
German Federal High Court of Justice. Along-
side, book contributions and articles on different
aspects of the legislation and law of blood tran-
fusion are published.

**Platelet-derived growth factors for
wound healing and angiogenesis**

Pt: Prof. Dr. R. Zimmermann
Platelets contain growth factors which stimulate
wound healing, angiogenesis, and possibly
bone repair. Thus, these cells do not only initiate
coagulation at sites of injury, but induce the
processes of healing, too. A possible clinical ap-
plication of these findings is the local applica-
tion of concentrated platelets as a source of
growth factors for wound healing and bone re-
pair. Additionally, the phenomenon of growth
factor release from activated platelets to plasma
during procedures with extracorporeal circula-
tion is a focus of research.

**Teaching**

The Division of Transfusion Medicine and He-
mostaseology is involved in compulsory and op-
tional courses in the curricular teaching of
human and dental medicine. Particularly note-
worthy is the interdisciplinary teaching of labo-
atory diagnostics and clinical pathology to-
gether with the Department of Medicine 5 and
the Clinical Chemistry Laboratory and the partici-
partation in the block training in surgery.
We supervise MD and PhD theses.

**Selected Publications**

Eckstein M, Zimmermann R, Roth T, Hauck-Dilimi B, Stras-
ser EF, Xiang W. The effects of an overnight holding of
whole blood at room temperature on haemoglobin mod-
ification and in vitro markers of red blood cell aging. Vox
Sang 2015; 108: 359-67

Kraemer L, Raczat T, Weiss DR, Strobel J, Eckstein R, Ring-
wald J. Correlation of the hypotonic shock response and
extent of shape change with the new ThromboLUXTM.
Vox Sang 2015; 109: 194-6

Strobel J, Moellner I, Zingsem J, Hauck-Dilimi B, Eckstein
R, Strasser E. T-cell subsets in autologous and allogeneic
peripheral blood stem cell concentrates. Vox Sang 2015;
109: 375-86

Eckstein R, Zingsem J. Transfusion-related alloimmune neu-
tropenia with no pulmonary complications: one donor -
five cases. Transfusion 2016; 56: 84-90

Heider S, Strobel J, Memphis W, Eckstein R, Weisbach V.
Measuring lymphocyte proliferation in response to specific
antigen and mitogen stimuli using flow cytometry. Clin Lab
2016;62:1857-78

Kraus M-J, Seifert J, Strasser E, Gavaz M, Schäffer T, Rhein-
länder J. Comparative morphology analysis of live blood
platelets using scanning ion conductance and robotic dark-
field microscopy. Platelets 2016; 27:541-6