

Mechanisms and analysis of blood-cell activation at biomaterials

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Abstract

Medical devices in contact with streaming blood, such as vascular stents, -grafts, heart valves, tubes, or hemodialysis filters, have increasing applications in clinical medicine. As foreign materials, they tend to activate plasmatic and cellular defense systems of coagulation and inflammation. In blood, these reactions do not stay local but propagate into the whole body and may pose risks to remote organs. Understanding and analysing these reactions, therefore, is mandatory in order to improve the hemocompatibility of the materials.

Blood platelets and leukocytes are effector cells of blood coagulation and inflammatory responses, respectively. Upon activation, platelets induce clot formation by aggregation, propagation of the coagulation cascade, and exhibition of pro-coagulant properties. Activated leukocytes damage tissue by the release of proteases and reactive oxygen species; they also attract and activate more inflammatory cells via cytokine release.

This talk shall present the pathways of cell activation and their interplay. Test systems for in vitro screening of cell activation and suitable parameters for analysis shall be presented.

Biography

Manfred Maitz is a medical doctor by education. He has been working in the field of biomaterials for more than 20 years in institutes in Würzburg, Ulm, Rossendorf (Dresden), Chengdu, and Dresden. He is currently group leader for hemocompatible surfaces at the Leibniz Institute of Polymer Research Dresden, Germany, and guest professor at Southwest Jiaotong University, Chengdu, China.

With his co-workers he investigates pathways of blood-biomaterial interaction and analyses materials for blood-contacting devices. The focus of his research is on the development of auto-controlled, feedback-responsive materials which have high hemocompatibility due to their interaction with physiological pathways.

