A comparative study on the hemocompatibility of different tube materials and coating technologies

Background

There are many challenges in designing medical devices where biomaterials (for example vascular stents) contact the blood of patients. After implantation a biomaterial might remain in permanent contact with the human tissue, therefore implant devices must be haemocompatible. The tissue-biomaterial and blood-material interfaces are particularly important for optimization of haemocompatible vascular stents: when biomaterials come in contact with blood the interaction can range from minimal protein adsorption to activation of coagulation and destruction of blood cells. Therefore, our aim is to create a test model, which the most closely mimics the human vessel’s biological, anatomical and physical characteristics and provides us a deeper understanding of the interaction between the implant surface and the biological environment consisting of blood and vessel wall.

Description

The first step of the project is finding the most suitable coating for the tubing of our loop mode in which blood does not clot. In the project different tube materials (polymers and hydrogels) and coating technologies will be applied and compared to each other regarding hemocompatibility. To characterize the interaction between different surface coatings with blood cells, an in vitro closed loop (e.g. Chandler loop) model which provides a continuous blood flow through the tube will be used. Before and after circulation, porcine blood will be sampled into centrifuge tubes containing corresponding terminating media, following by blood plasma collection. On these samples ELISA test (enzyme linked immunosorbent assay) will be performed to analyse the hemocompatibility of the tubes, and the efficacy of coatings.

Start:
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