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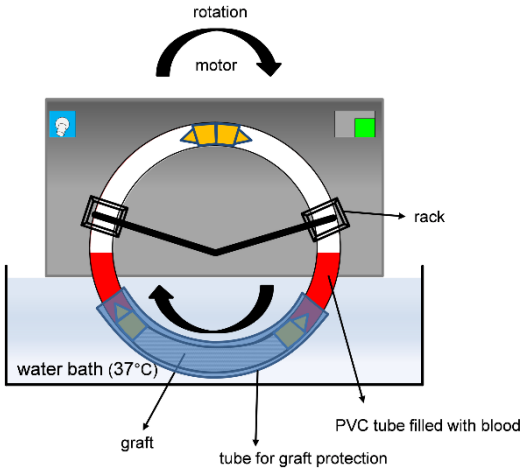
Master Thesis Announcement

Development of a loop model mimicking pulsatile blood flow with the purpose of studying hemocompatibility of vascular stents

Background

There are many challenges in the design of 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 (compatible with the presence of blood). 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 mimics as closely as possible the human vascular system's biological, anatomical and physical characteristics and provides us a deeper understanding when studying the environment consisting of blood and vessel wall.



Schematic representation of a closed loop model for the evaluation of hemocompatibility of biomaterials
Source: pone.0235168.g003

Description

Aim of the project is the development of a loop system containing porcine blood. An in vitro closed loop model will be developed to mimic continuous blood flow. The tubing system should be held at 37°C and operated for a longer period of time (60min<). The influence of the blood exposure time during dynamic hemocompatibility testing will be evaluated every 30 minutes; therefore, suitable valves should be implemented to the system. For the analysis of hemocompatibility markers ELISA (enzyme-linked immunosorbent assay) will be performed. Before (control) and after circulation, anticoagulated porcine blood will be sampled into centrifuge tubes containing corresponding terminating media, following by blood plasma collection. Finding the most suitable anticoagulant, that will be mixed with blood to combat formation of clot during this long period as well as biomarkers to be examined is also a part of the project.

Start:
01.04.2021

Supervisors:

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