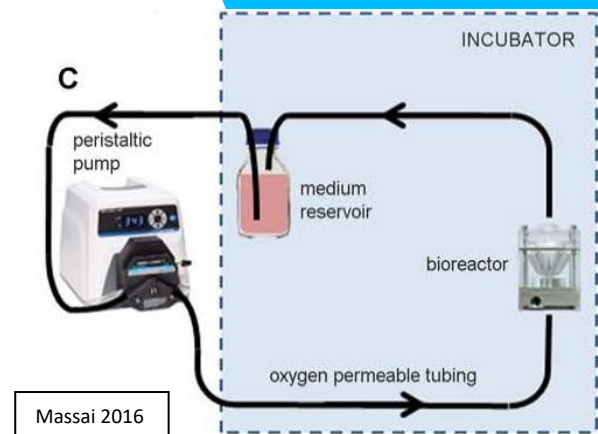


Development of a novel bioreactor system for endothelialization of decellularized and synthetic vessels

Background

Endothelialization of decellularized and synthetic vessels enables an *ex-vivo* testing of stent grafts and other cardiovascular implants under physiological conditions. This is not only important to obtain a more accurate understanding of intraluminal damage in the endothelium by implants, but also to study the stent-arterial wall (endothelial cells) interactions. To achieve this, endothelialization of the vessel model's lumen is a crucial prerequisite. As endothelial cells are exposed to a constant temperature (37°C) in the human body and need special, well defined circumstances to be able to grow and stay alive outside an organism a proper system is needed to achieve a successful endothelialization. Bioreactors have proven beneficial for reendothelialization, but current designs are typically limited to short term (few hours) usage or used for complete, larger organs. Therefore, a controllable system is required which can mimic the microenvironment of living organisms.



**Bachelor
Thesis
Announcement**

Description

The aim of this project is to develop a novel bioreactor system to endothelialize decellularized animal arteries as well as vessel models. After an introduction phase, the biological requirements will be defined in cooperation with our biology team to guarantee the proper conditions for the endothelialization. Various relevant parameters such as temperature, humidity, and the amount of N₂, CO₂ and O₂ should be taken into consideration in the bioreactor design. Pre-tests shall be performed to determine whether the parameter behaviour fluctuates within the system. If this is the case, different sensors to monitor and control the above-mentioned parameters should be implemented into the system using LabView as the user interface. Finally, the bioreactor with its components must be characterized and validated to guarantee a successful vessel recellularization.

Introduction phase → Requirements definition → Bioreactor design and construction → Parameter behaviour test → Sensor implementation → Bioreactor characterization and validation → Writing the thesis

Start:
immediately

Supervisors:

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