

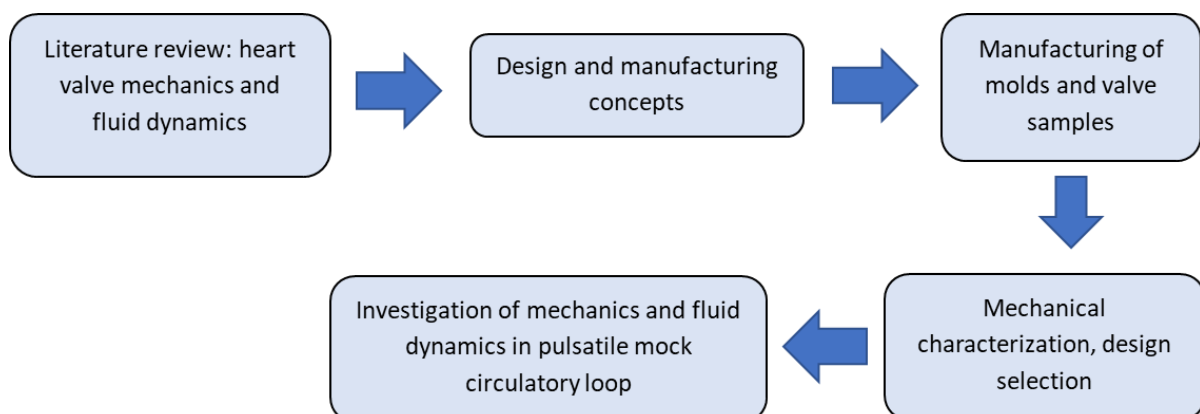
**Development and investigation
of hydrogel valves for application in a pulsatile
circulatory loop for endovascular implant investigation**



Background: Investigation of endovascular implants is normally performed in tubing systems where blood or blood-substitute flow is provided by a roller pump. Main limitations are the high blood contact surface, which affects the hemocompatibility results, and the pulsatile behavior of the roller pump, which substantially differs from the physiological pulsation of the heart.

At BMT, a novel miniaturized pulsatile pump is developed for in vitro studies in mock circulatory loops. The pump is made on hydrogel, aiming at a superior hemocompatibility and providing a physiological flow profile.

Aim: In the frame of this project, hydrogel valves will be conceived, designed and manufactured on the basis of natural heart valves. Research about heart valve mechanics and fluid dynamics sets the basis for the definition of a down-scaled model of the valves. According to basic requirements, the valves are designed in a range of geometrical and material parameters. Manufacturing tools are designed and use to realize the valves. After mechanical characterization, valves are connected to the pump and investigated in different pulsatile flow regimes. Mechanics and Fluid dynamics are evaluated by means of microscopy and ultrasound, allowing for the selection of best suitable parameters.



Start:
Immediately

Supervisor:
Prof. Giorgio Cattaneo