How to test viability of arterial segments ex vivo

How to test viability of arterial segments *ex vivo*

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Introduction

Narrowed arteries can be treated by PTCA. During PTCA high mechanical loads are induced locally, thus injuring the wall. This may result in renarrowing of the lumen.

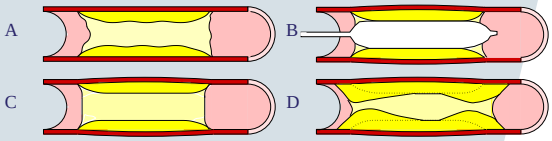


Figure 1 *A: stenosis B: PTCA C: opened lumen D: restenosis*

By refining the PTCA procedure restenosis may be prevented. Studying morphological and biochemical responses of the vascular wall and cells to PTCA may enable optimization of the procedure. A setup is built in which arterial segments can be conditioned and loaded under physiological conditions. In this *ex vivo* situation the viability of the arterial segments and the cells therein must be determined before studying intervention responses is possible.

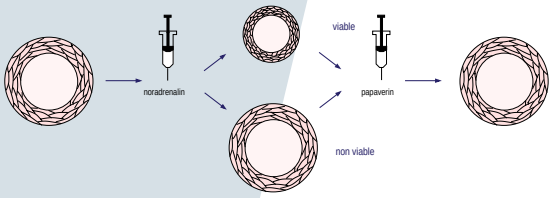
Objective

Qualification of arterial segment viability

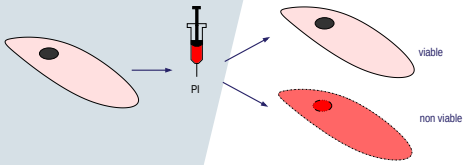
Methods

Viability of the arterial tissue and cells can be determined in four ways:

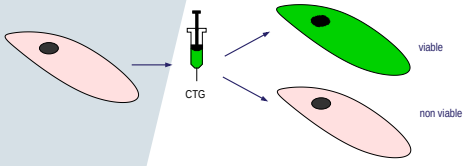
- smooth muscle cell (SMC) contraction



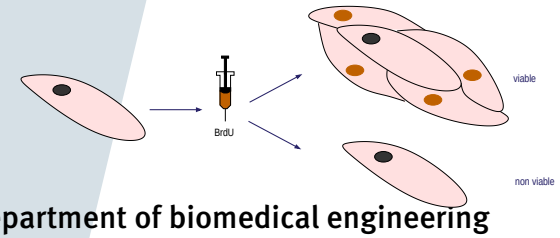
- cell membrane integrity



- intracellular esterase activity



- cell proliferation



For the contraction test fresh human arterial segments were used. Segments and cells from porcine coronary arteries (PCAS) were use in the other tests.

Results

SMCs from human arteries still contract after 6 hours incubation. They alse relaxed again.

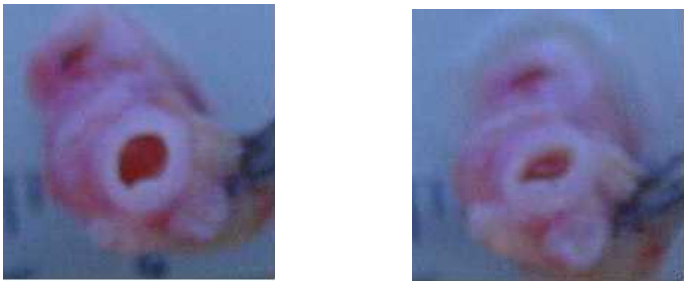


Figure 2 *Diameter changes before (l) and after (r) adding noradrenalin*

Many dead cells are detected in the middle part of the artery with PI. Because of autofluorescence of tissue structures no separate living cells can be identified.

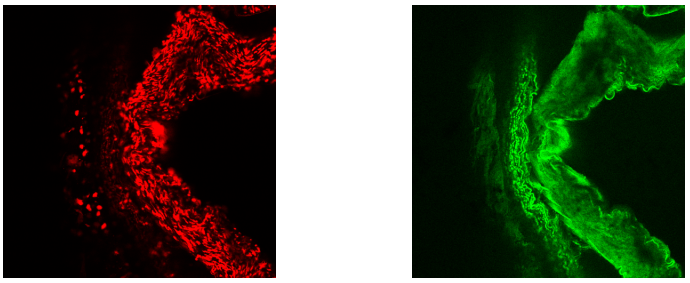


Figure 3 *PI (l) and CTG (r) in arterial tissue*

Cells were harvested from PCAS after three days of perfusion. They were stained for esterase activity and proliferation.

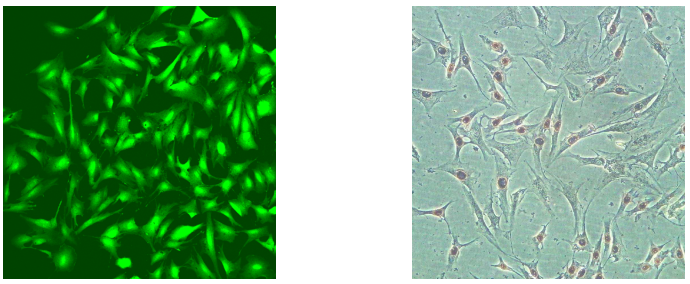


Figure 4 *Harvested cells incubated with CTG (l) and BrdU (r)*

Conclusions

- SMCs in human arterial segments maintain their functionality at least up to 6 hours in normal incubation
- Cells harvested from perfused PCAS are alive and can proliferate for at least 6 days
- Because of the autofluorescency of specific structures fluorescent markers, like CTG, cannot be used as viability stains in tissue

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