PREDICTING AAA GROWTH AND RUPTURE WITH A SKIN BIOPSY: IT CAN REFLECT SMOOTH MUSCLE CELL BEHAVIOR, GENES, BIOMARKERS AND AORTIC WALL BEHAVIOR

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AORTIC WALL STRUCTURE

VASCULAR SMOOTH MUSCLE CELLS (SMC)

PATHOPHYSIOLOGY OF AORTIC ANEURYSMS: KEY ROLE FOR SMOOTH MUSCLE CELLS

GENETIC MUTATIONS INVOLVING SMC
- Mutations in genes of the mechano-transduction complex: smooth muscle cells + environment
- 20% Familial thoracic aneurysms

DISCLOSURES
- National funding: ICAR-AIO grant
- Amsterdam Cardiovascular Sciences (ACS) grant

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SMOOTH MUSCLE CELLS HAVE A KEY ROLE IN AORTIC ANEURYSM DEVELOPMENT

Disturbed SMC contraction → Weakening of the aortic wall

DEVELOPED METHODS TO STUDY SMC CONTRACTION

TRACTION FORCE MICROSCOPY

ECIS: electric cell-substrate impedance sensor

Resistance of a cell monolayer
**SMOOTH MUSCLE CELLS NEEDED**

- Research on mutations only possible in smooth muscle-like cells
- Aortic Biopsy: invasive and expensive
- Through stem cells: expensive and slow

**RESULTS**

**SMC are less contractile in AAA**

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<th>N=12</th>
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<tbody>
<tr>
<td>Contraction</td>
<td>15%</td>
<td>30%</td>
<td>25%</td>
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<tr>
<td>Acute</td>
<td></td>
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<td>Elective</td>
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<td>Control</td>
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**AIM2 expression is correlated with CRP and leucocytes**

**RESULTS**

**SMC contraction is inverse correlated to inflammation**
CONCLUSION

- Our preliminary results show that a disturbed contraction of SMC has a key role in aortic aneurysm development.
- SMC can be made of skin biopsies with nearly similar contraction of SMC of the aorta.
- SMC from ruptured or symptomatic aneurysms have lower contraction forces.
- Transdifferentiated SMC from patients with a genetic mutation (MYH11, ACTA2, MYLK) have lower contractile forces. This functional test of genes affecting the aorta.
- Smooth muscle cells are a new focus for medical therapy.