

# **Is it time to stent the ascending aorta?**

Martin Czerny

# Content

## ► Basic insights into pathological process

Dissection induced geometry changes

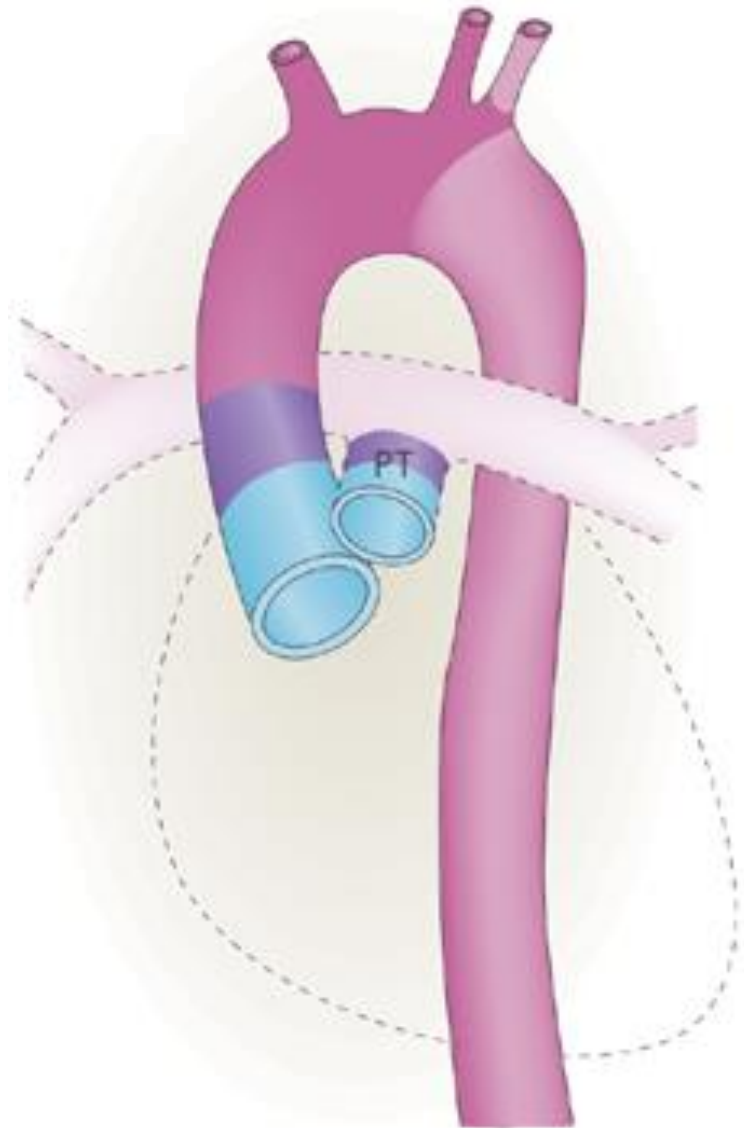
Initial attempts

Dedicated programme

Future developments

Summary

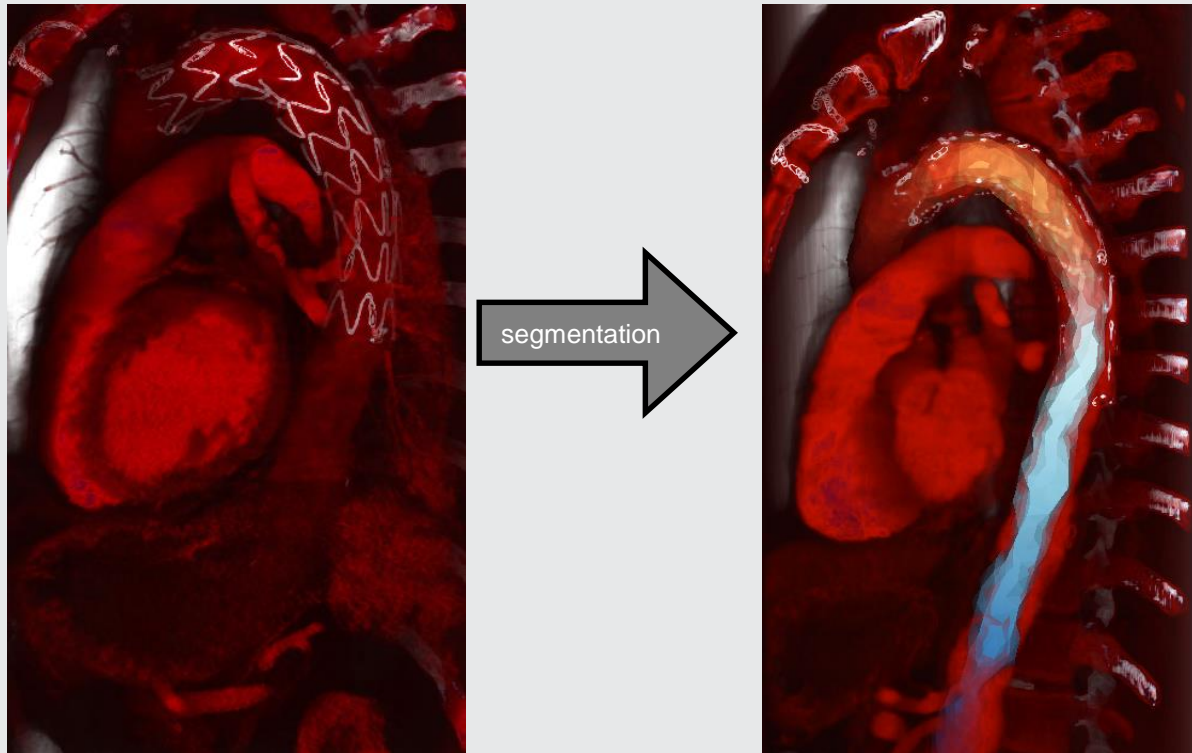
The aorta displays heterogeneity regarding developmental origin <sup>2</sup>



- Neural crest
- Secondary heart field SMCs
- Secondary heart field MMCs

# CT Angiography

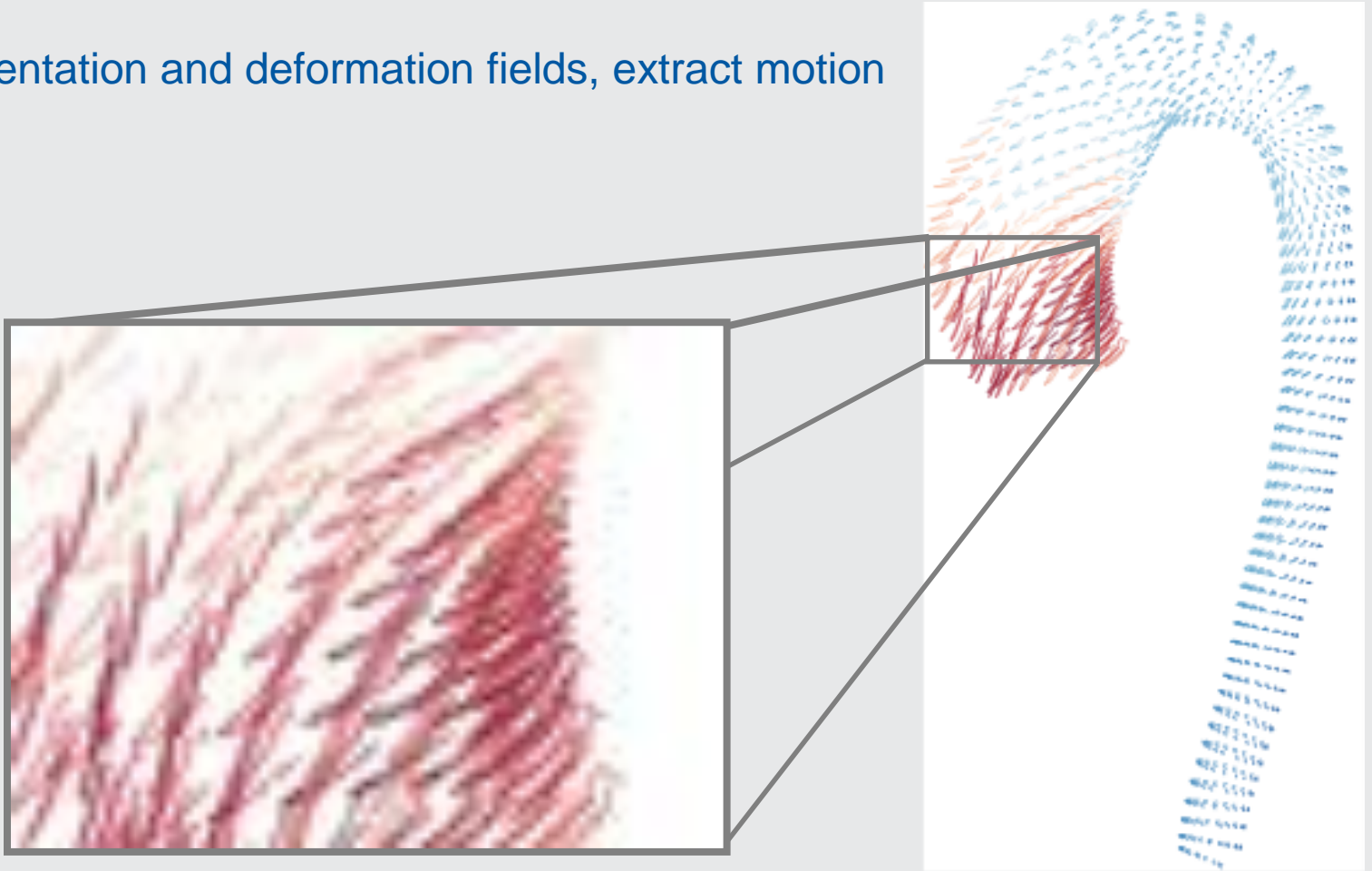
- ▶ From the first frame, segment aorta lumen



Schwartz, Czerny, Biomed Imag 2012

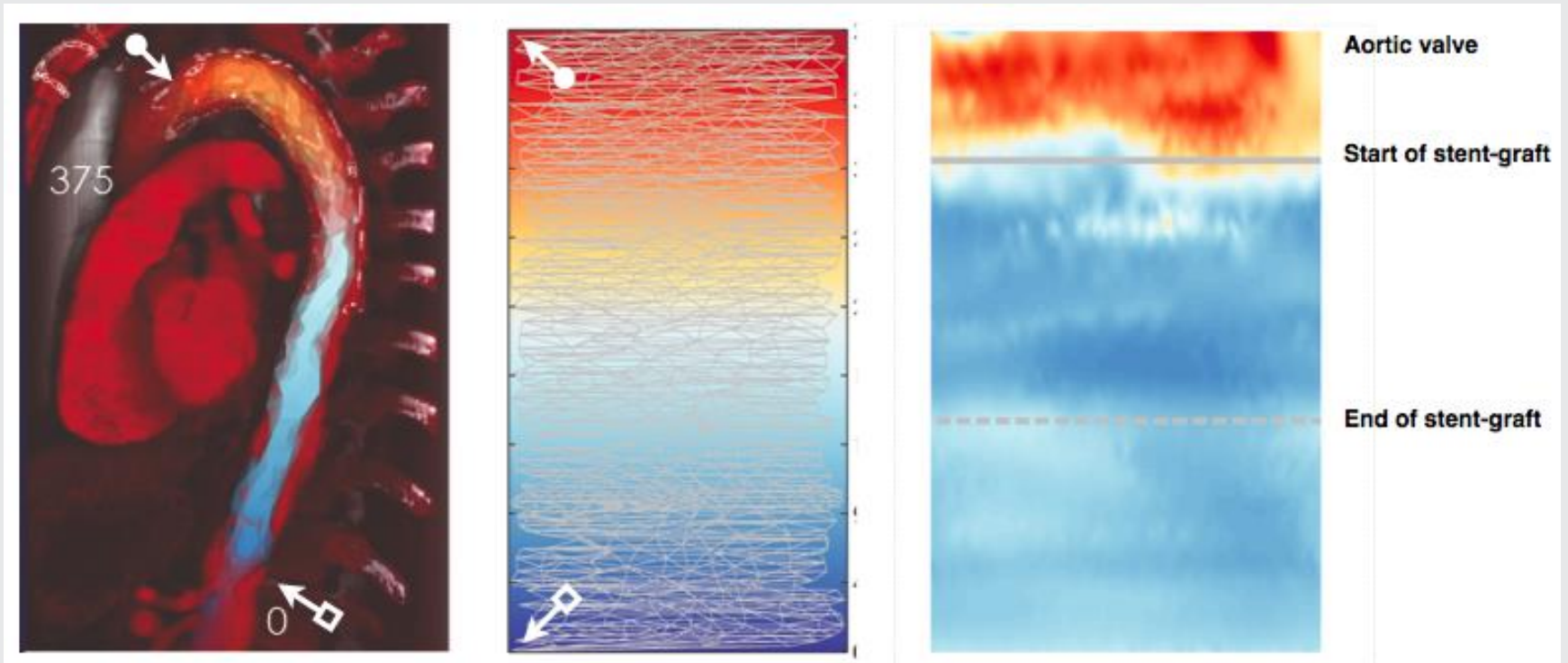
# CT Angiography

- From segmentation and deformation fields, extract motion



Schwartz, Czerny, Biomed Imag 2012

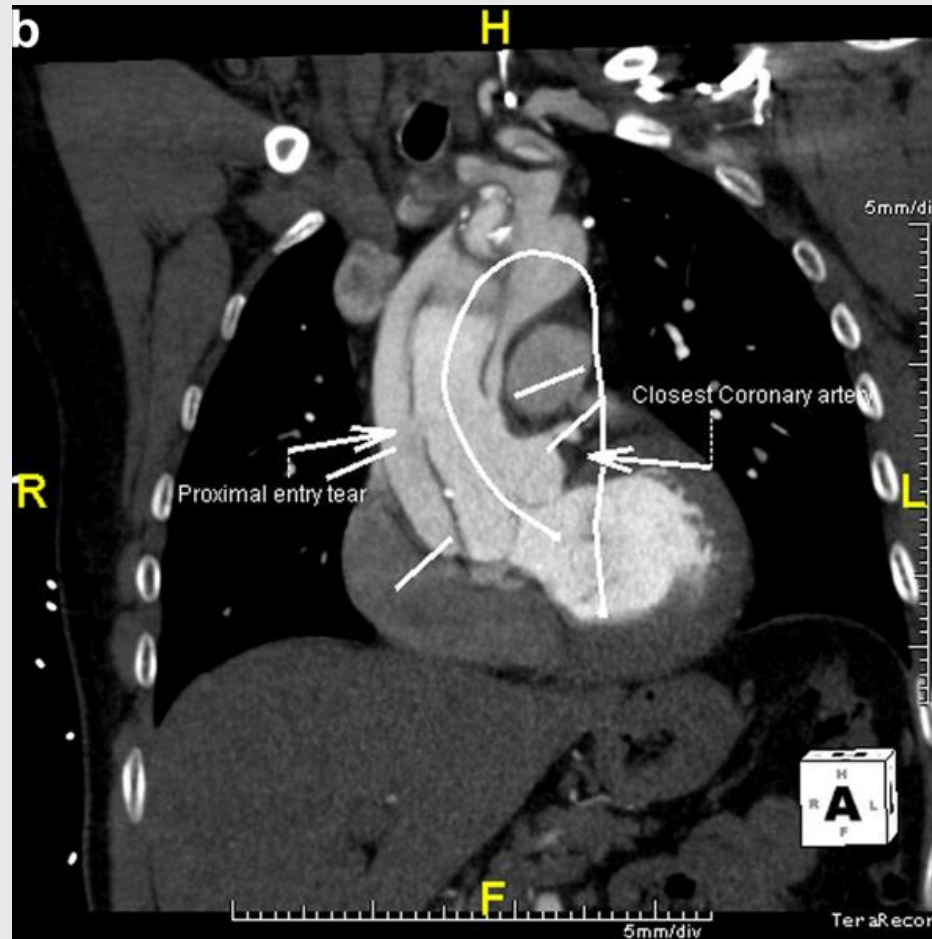
# Results



## Intraoperative view



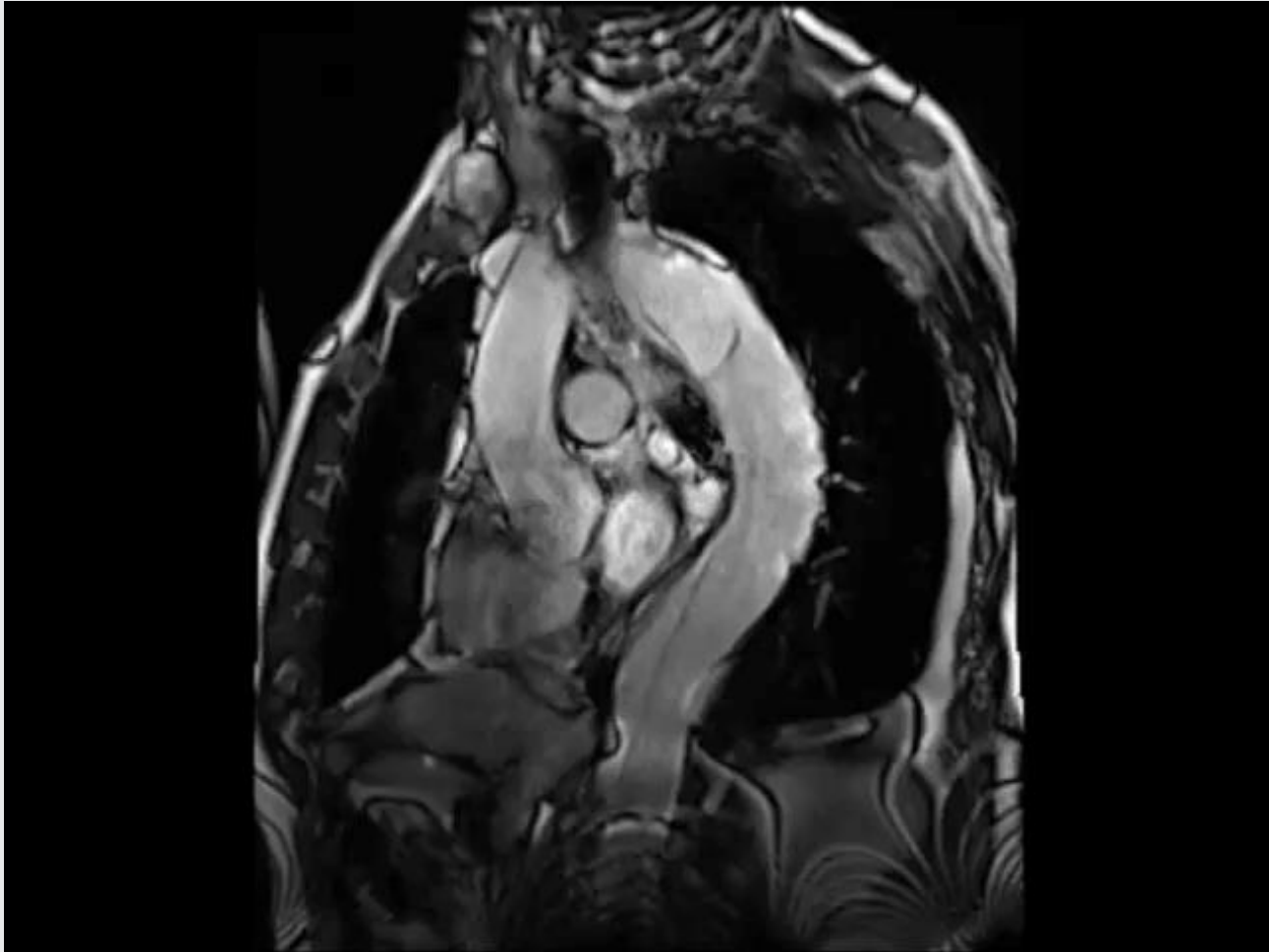
## Morphological correlate



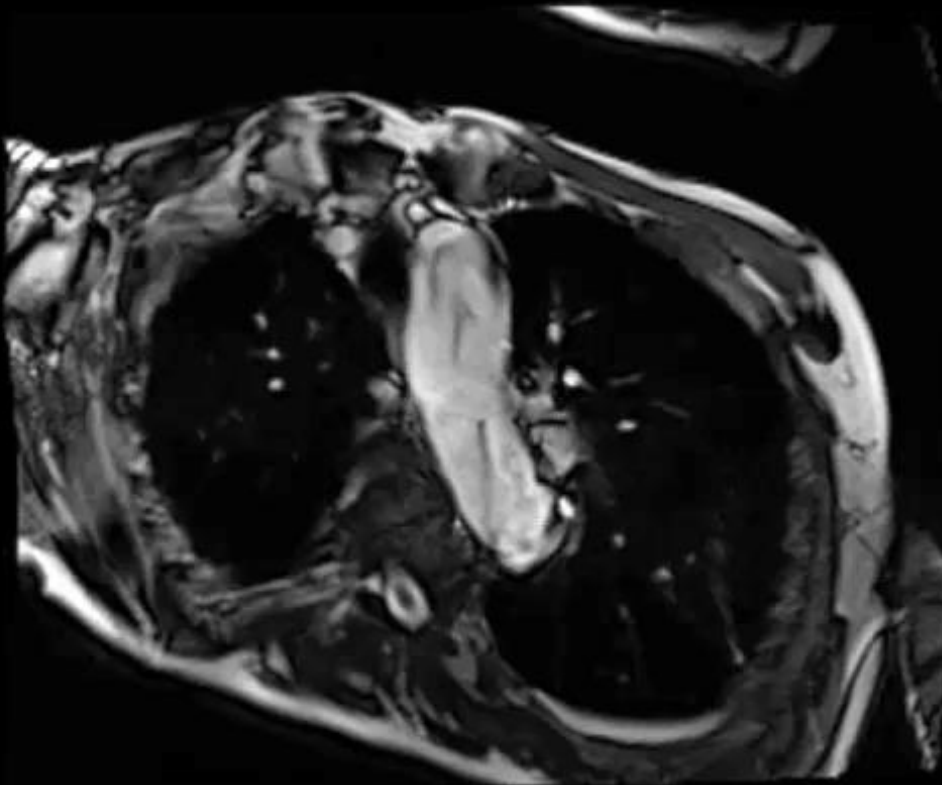
Sobocinski EJVES 2011



## Functional imaging



## Functional imaging



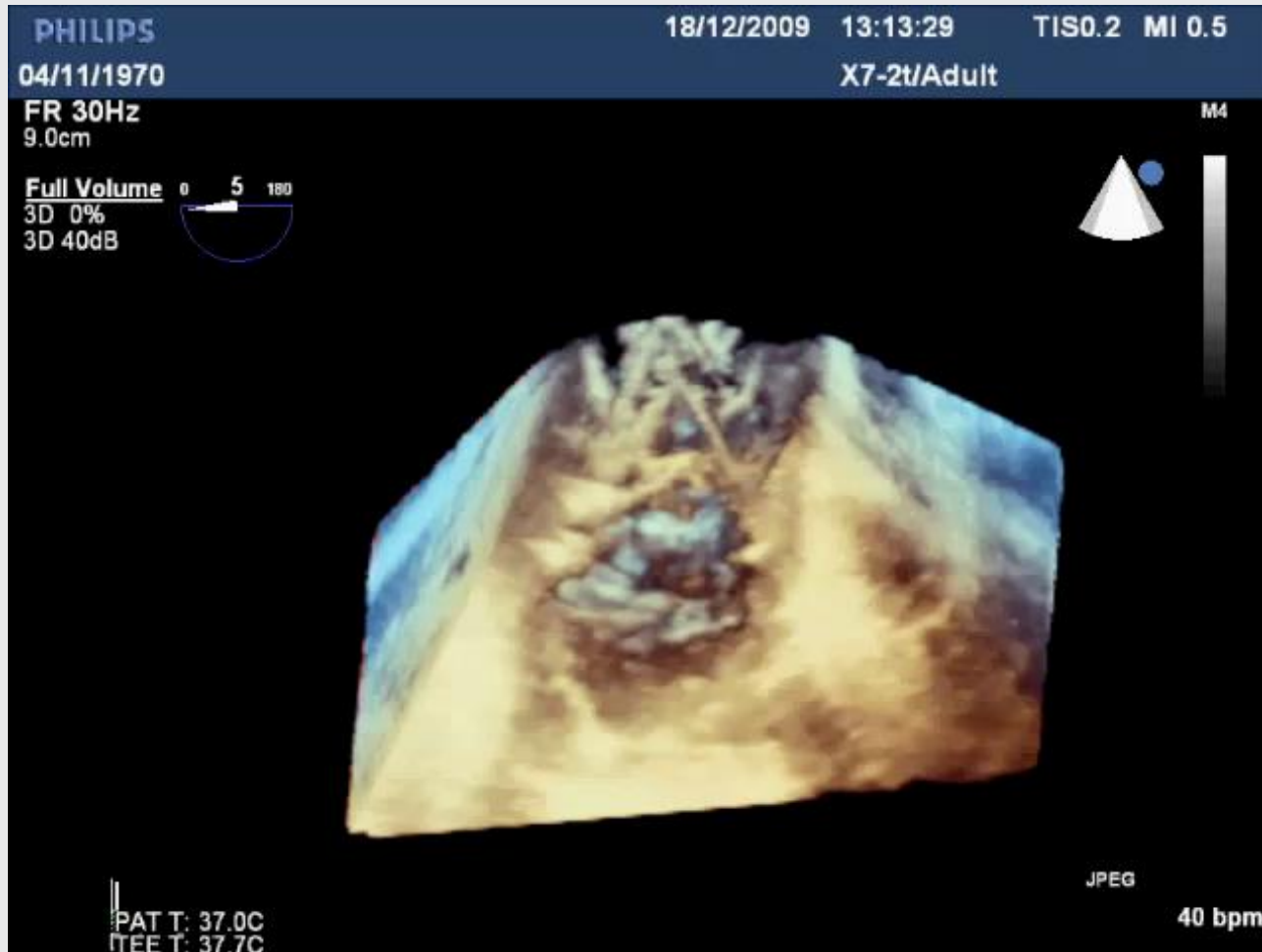
# Functional imaging



# Functional imaging



# Functional imaging



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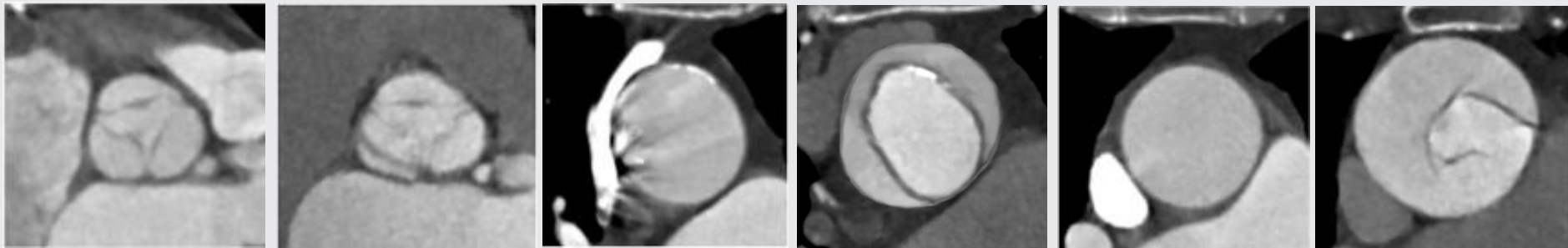
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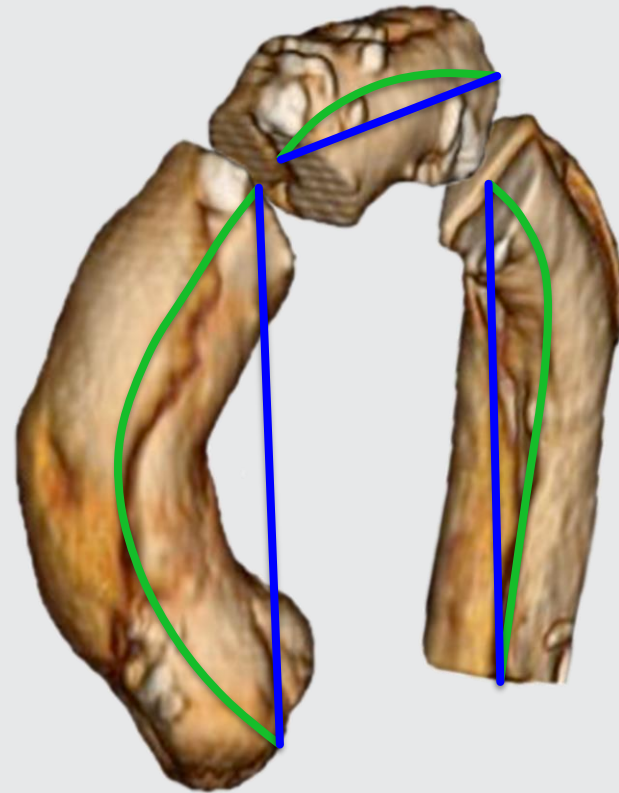
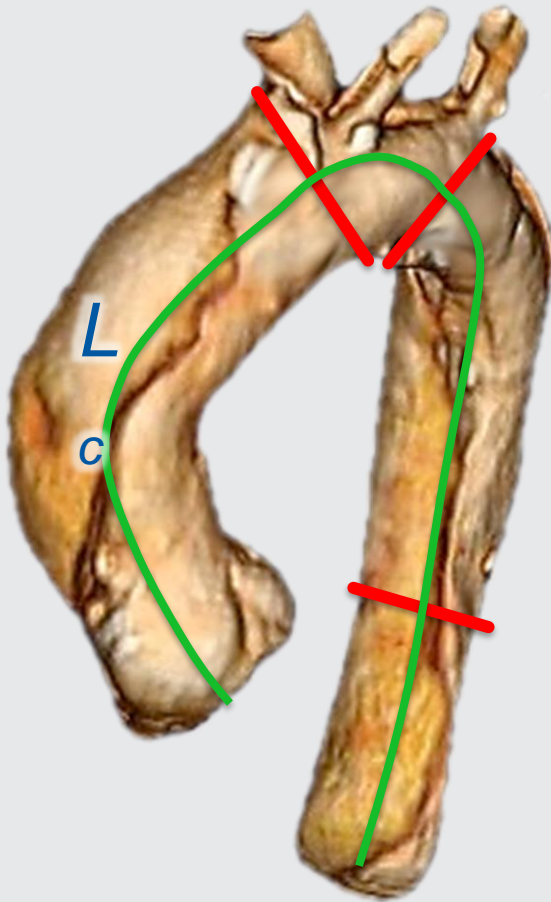
Summary

# Objective

- ▶ To assess the extent of changes in aortic geometry induced by the dissection process by means of computed tomography angiography (CTA) obtained prior and after acute type A aortic dissection

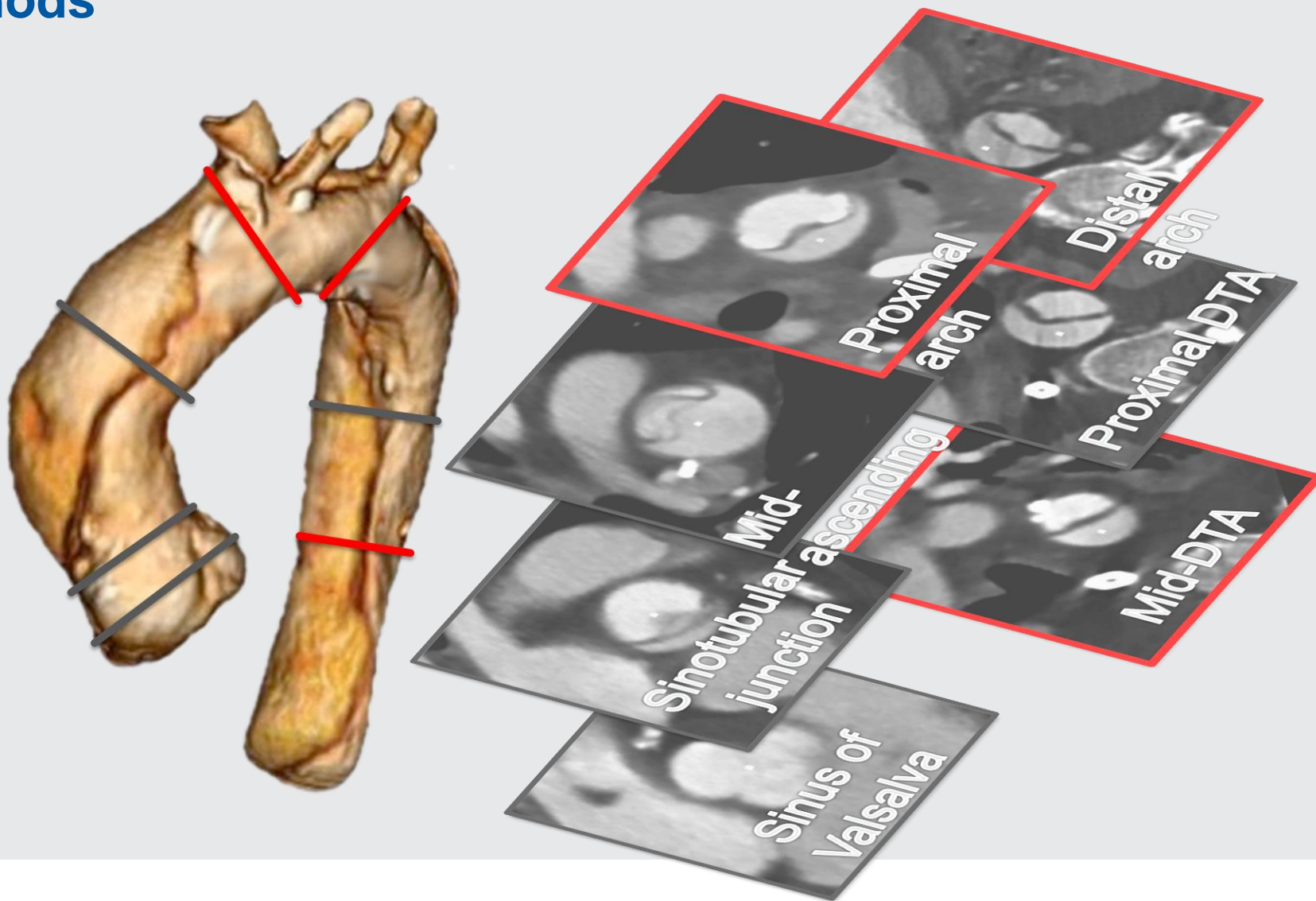


# Methods



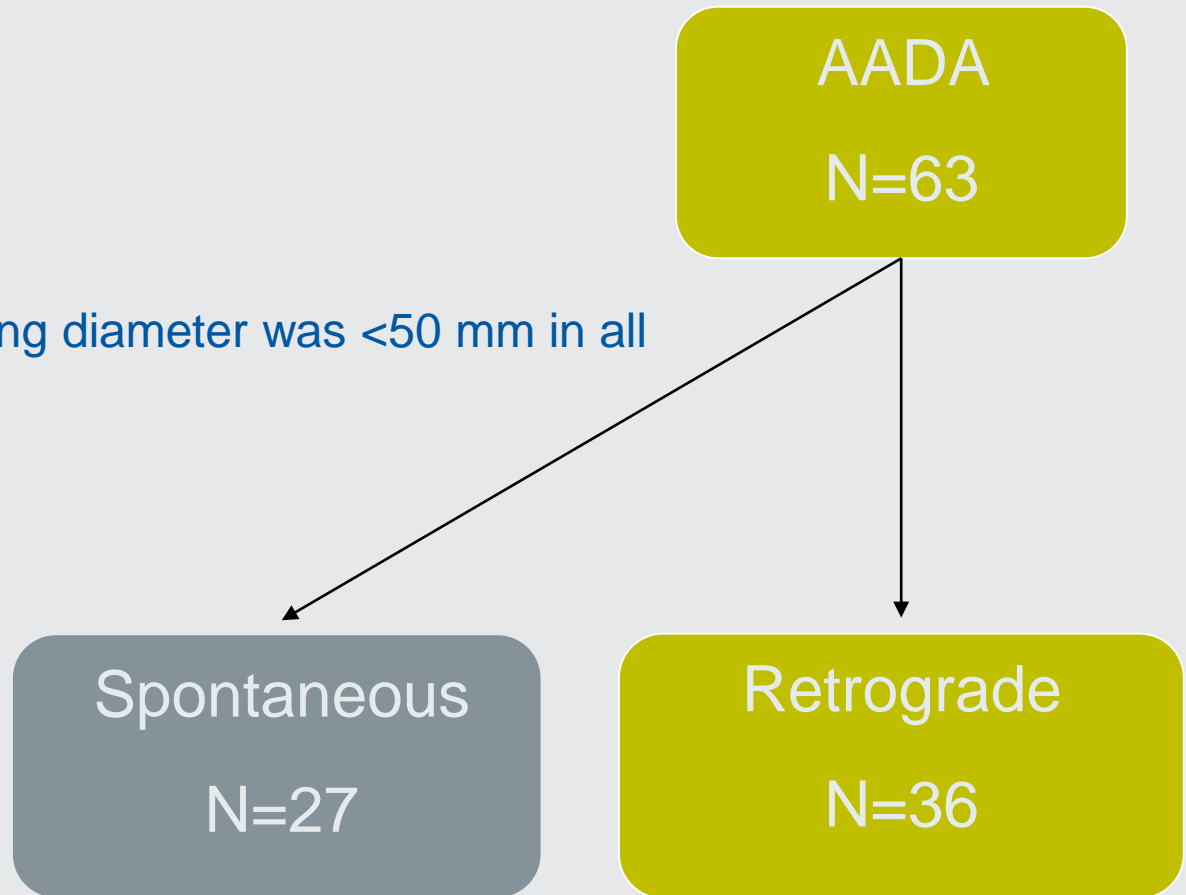


# Methods



# Results

- ▶ Overall 63 patients
- Median age 68 years
- 46% females
- Similar risk profile
- Pre-dissection ascending diameter was <50 mm in all

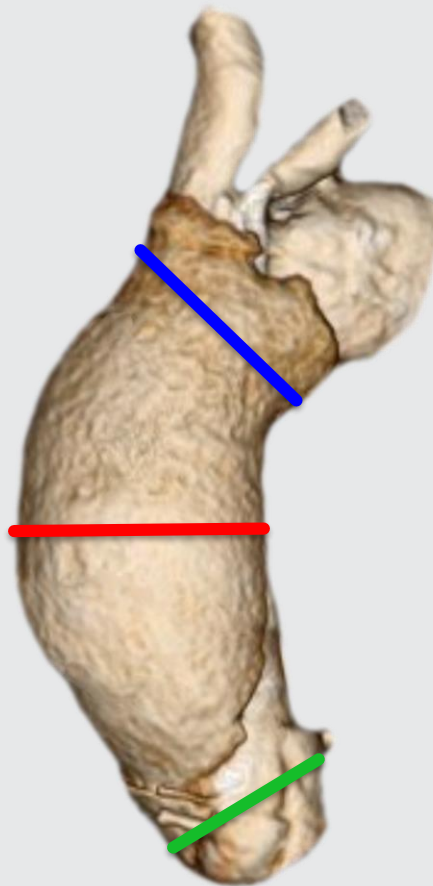
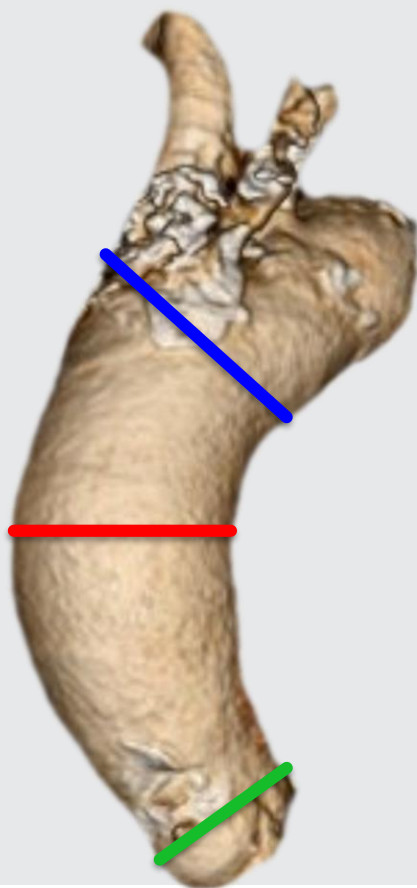


# Results



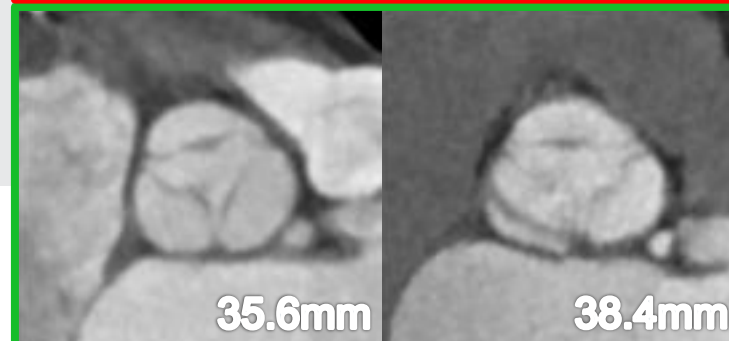
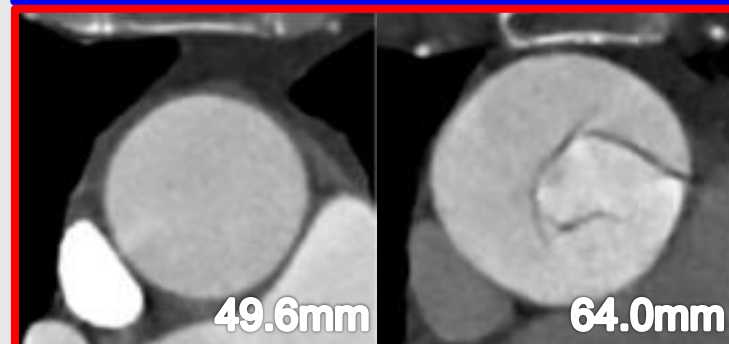
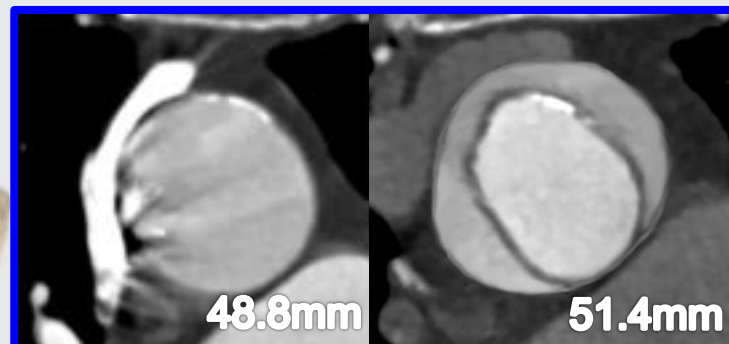
Pre-Dissection

Post-Dissection

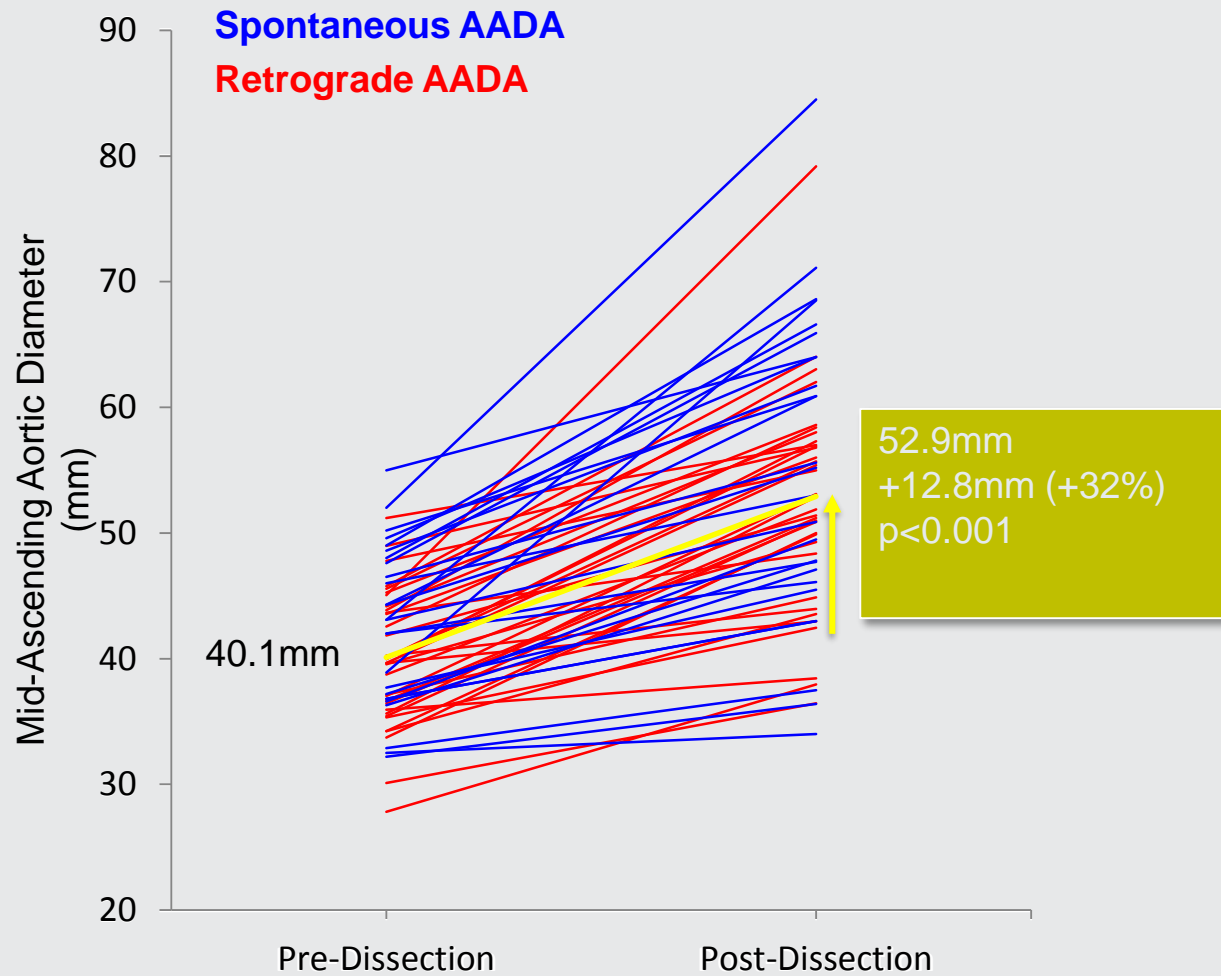


Pre-Dissection

Post-Dissection



# Results



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## Ideal clinical scenario



## Alternative approaches- still experimental





## Completion CT scan



Zimpfer, Czerny ATS 2006



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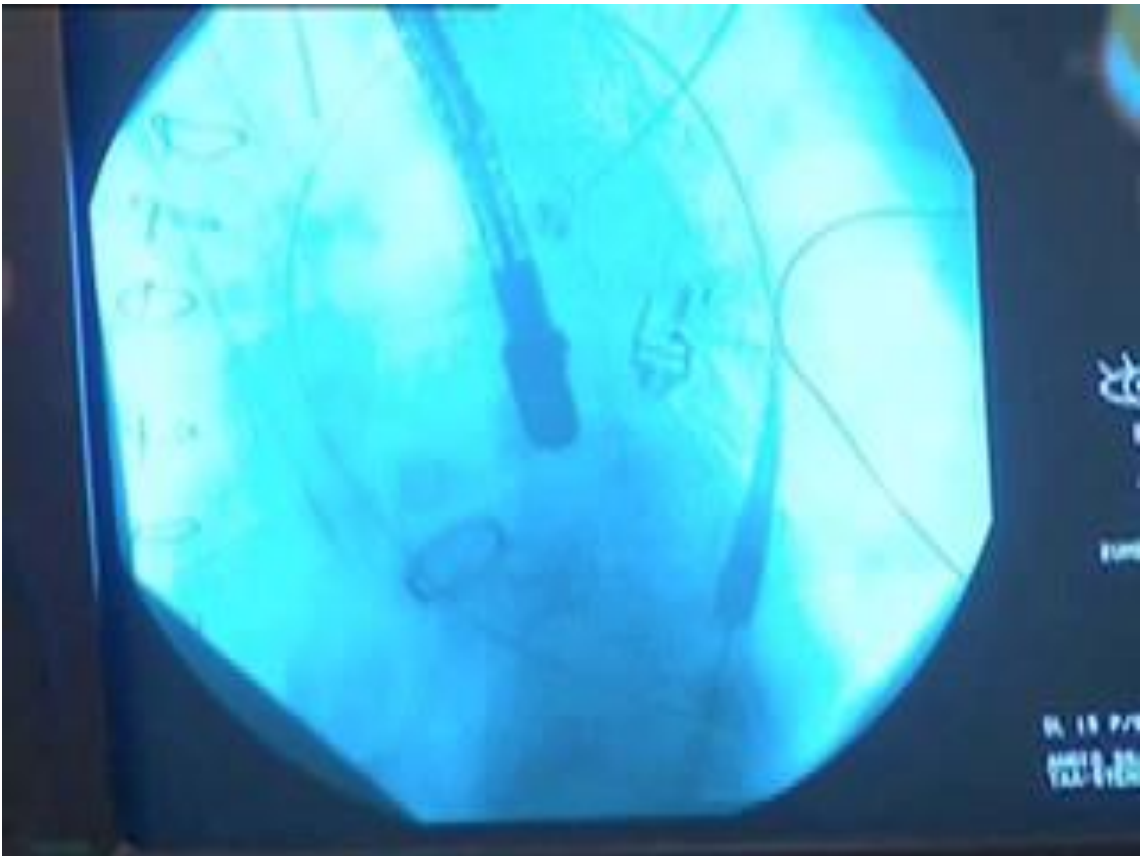
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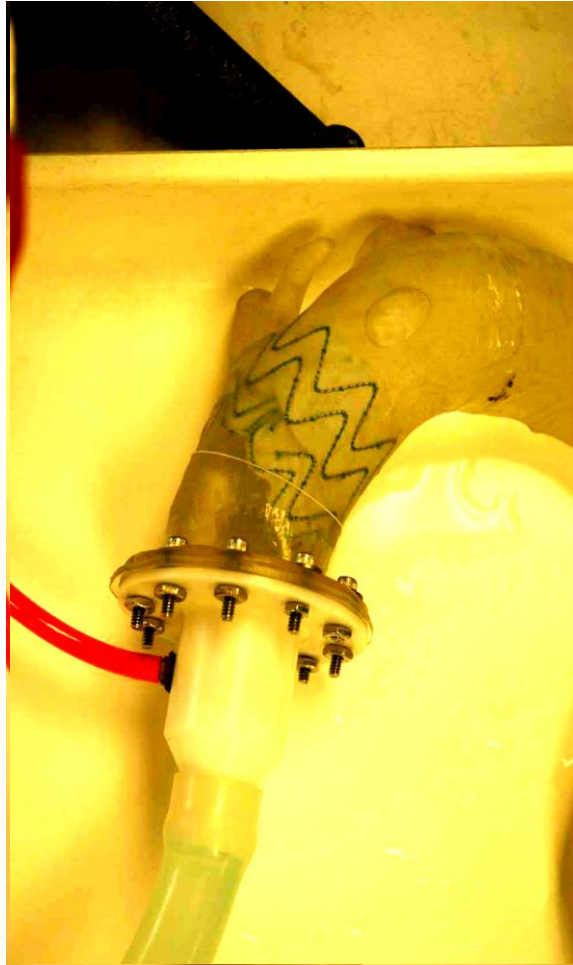


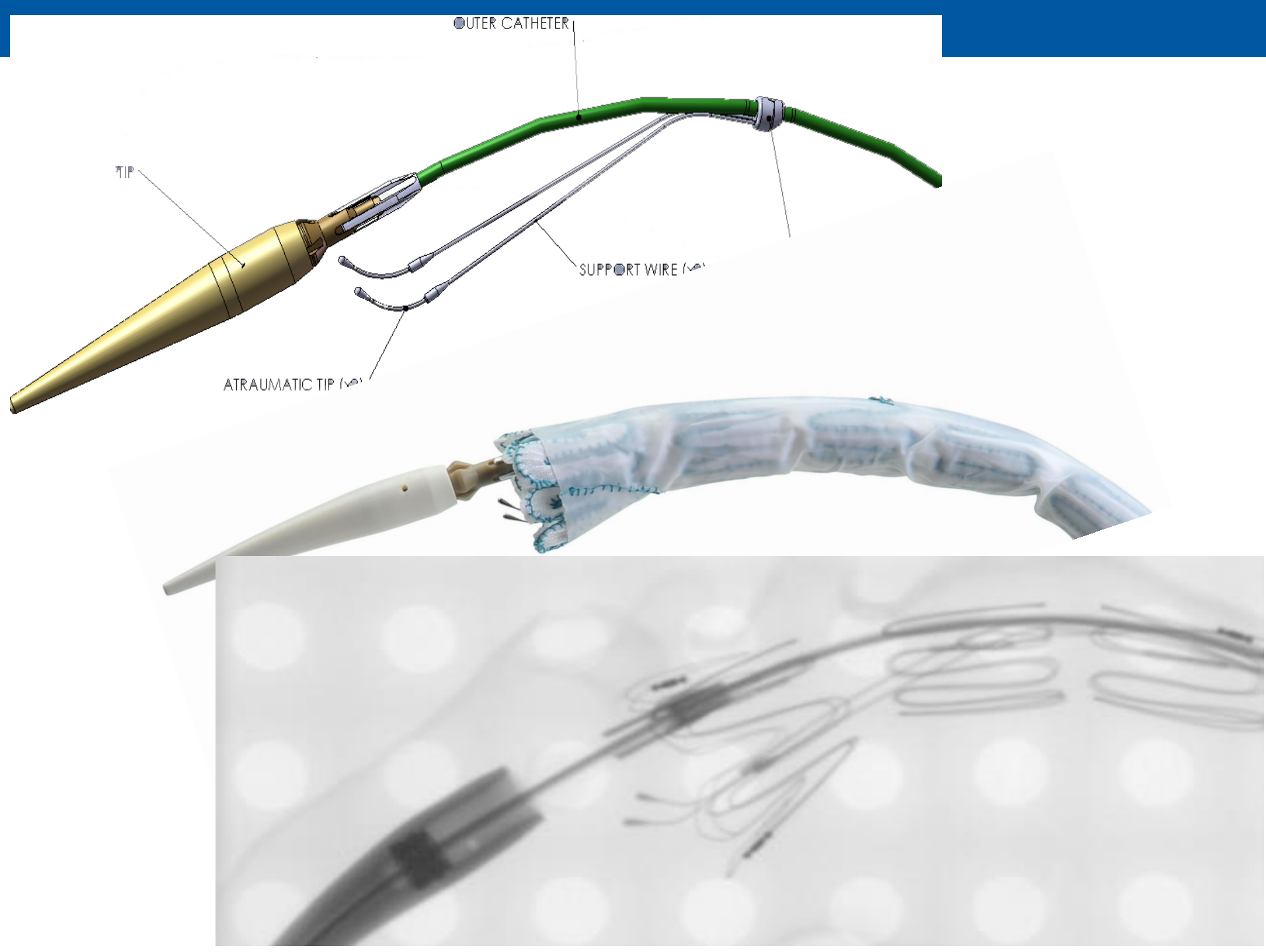
day 0

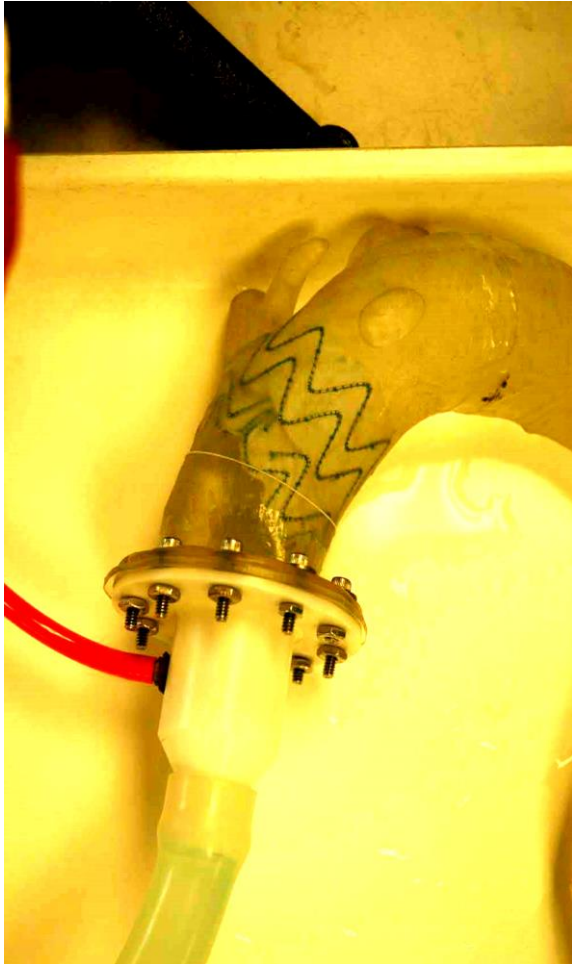


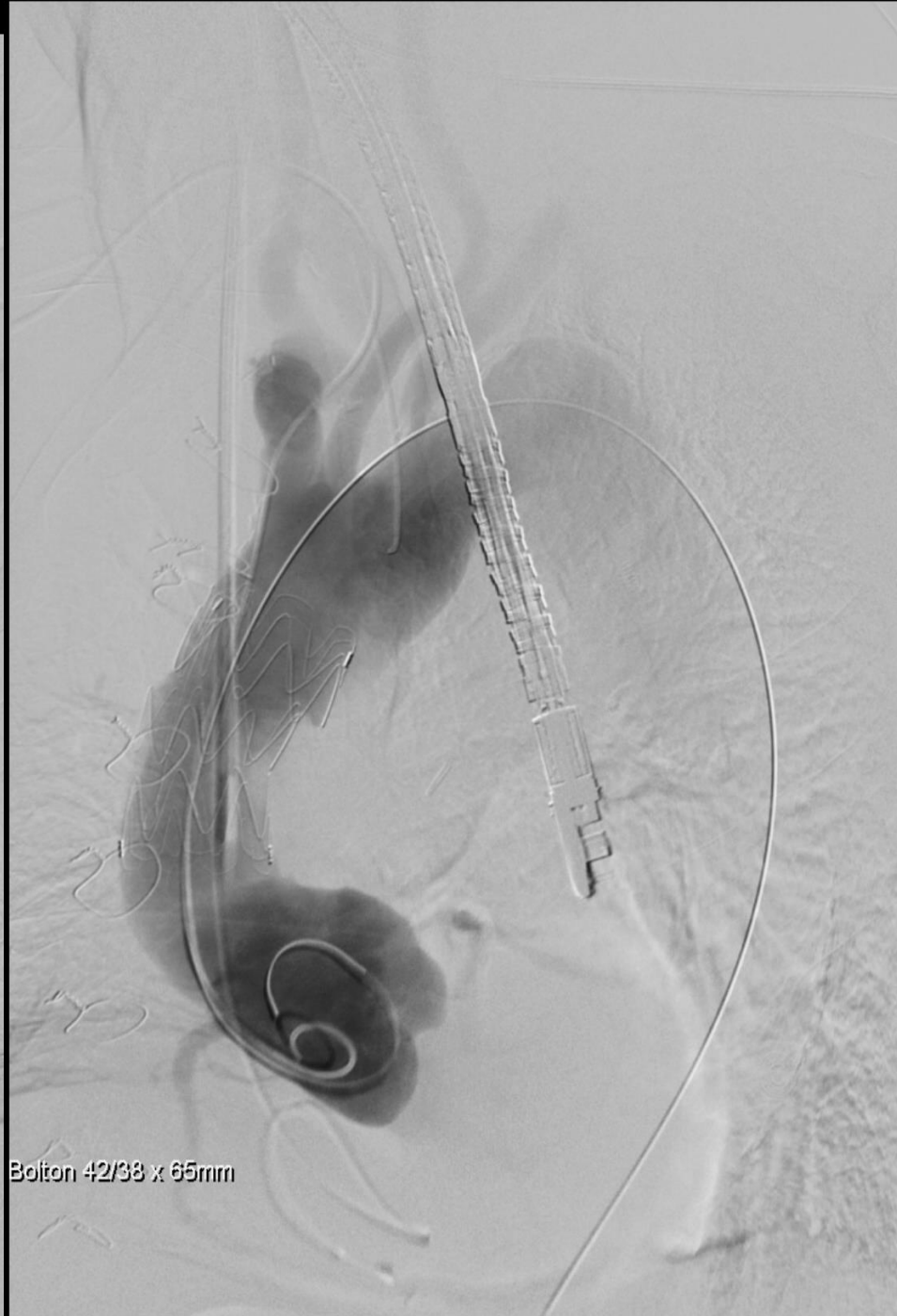
day 5











Bolton 42/38 x 65mm

Thin







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## Morphological correlate



# Concept Prototype

- ▶ Distal extension to cover to the level of the brachiocephalic trunk



Aortic valve

Perfusion

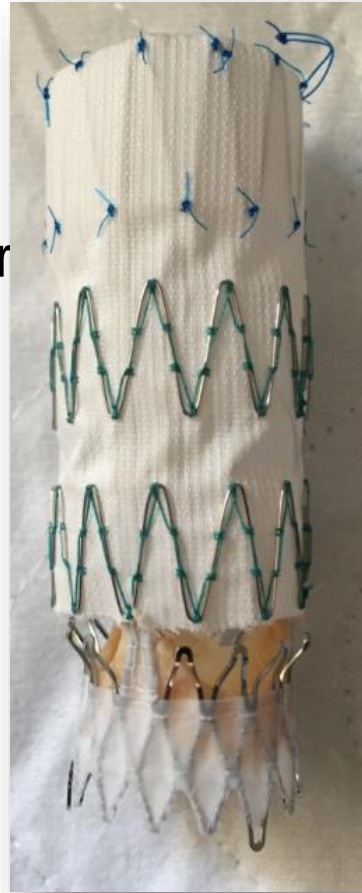
Covered to exclude entry



Describe any practical results achieved to date – ie., sales, profits, users, citations etc

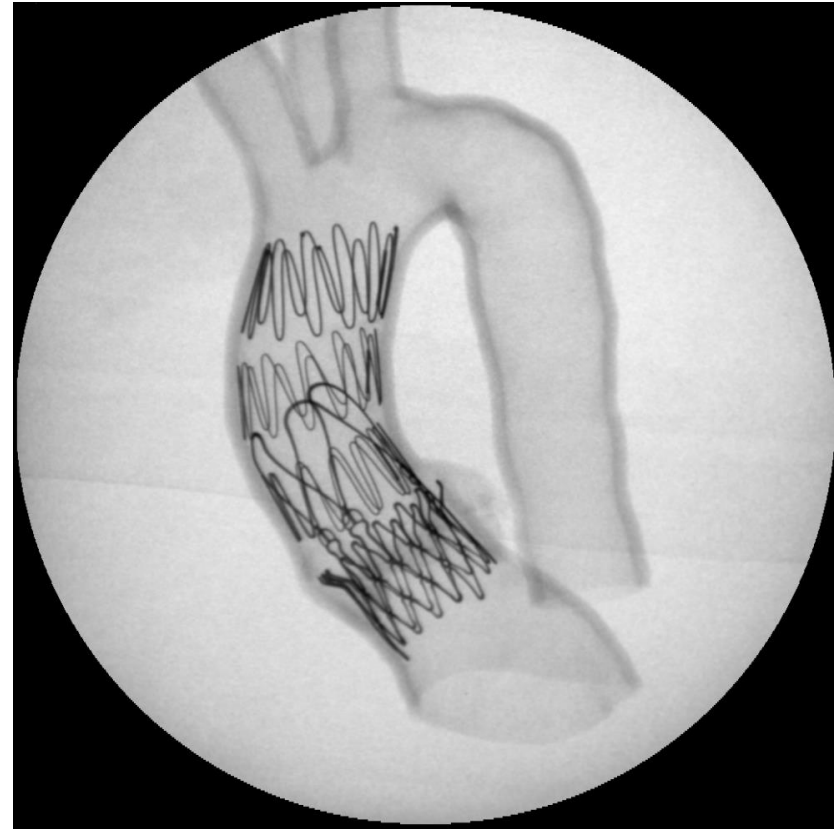
1. **The CT-feasibility study** was conducted according to the population of 1196 patients with severe aortic stenosis screened for TAVI (J Card Surg 2014;29:371-376)

2. Novel device prototype was made using Symetis TAVI Valve and Cook thoracic stentgraft and was **implanted into transparent 3D printed proximal aorta**



## Conclusions

Developing a **single-unit endovascular device for simultaneous ascending and aortic valve** is a question of time. A novel composite endovascular valved graft will extend the application of transcatheter techniques to patients denied TAVI due to a **concomitant ascending aneurysm** and those with **acute type A dissection** with high risk of mortality.



# Summary

► Thorough understanding of pathophysiology is key

Complexity is amplified as compared to distal aortic segments

A tube alone is not sufficient to treat the majority of patients

Efforts for a valved conduit are ongoing

Combining knowledge and technology will pave the way