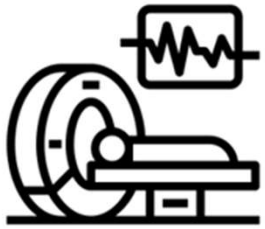
HAS 2026

Aortic Vulnerability Index: Wall Strength and Volumetric Analysis To Guide Therapy

RD Moore MD MSc FACS FRCSC
Professor, Vascular and Endovascular Surgery
Complex Aortic Program Co-Director

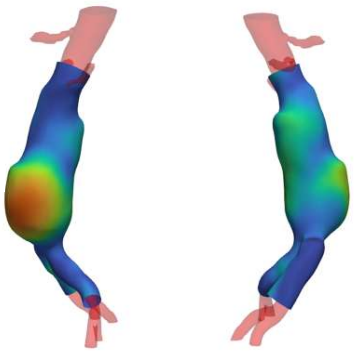
UNIVERSITY OF CALGARY

Aortic Wall Analysis:

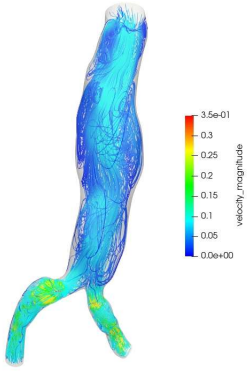


ECG-Gated Multiphase CT-Scan

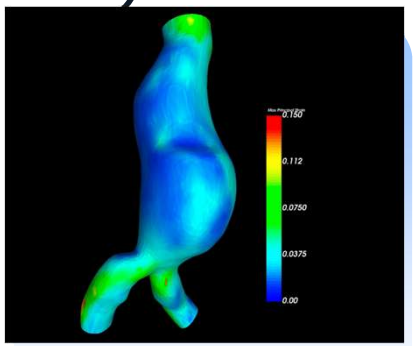
Cloud



Thrombus Analysis

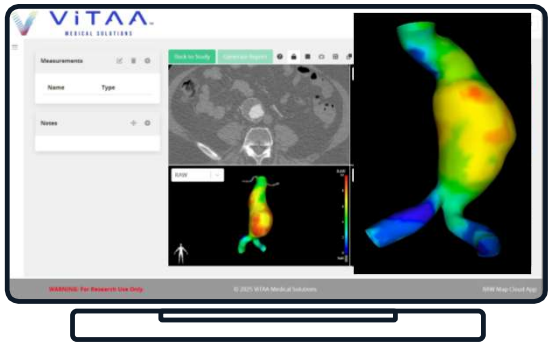


Fluid Analysis



Peak Tissue Strain

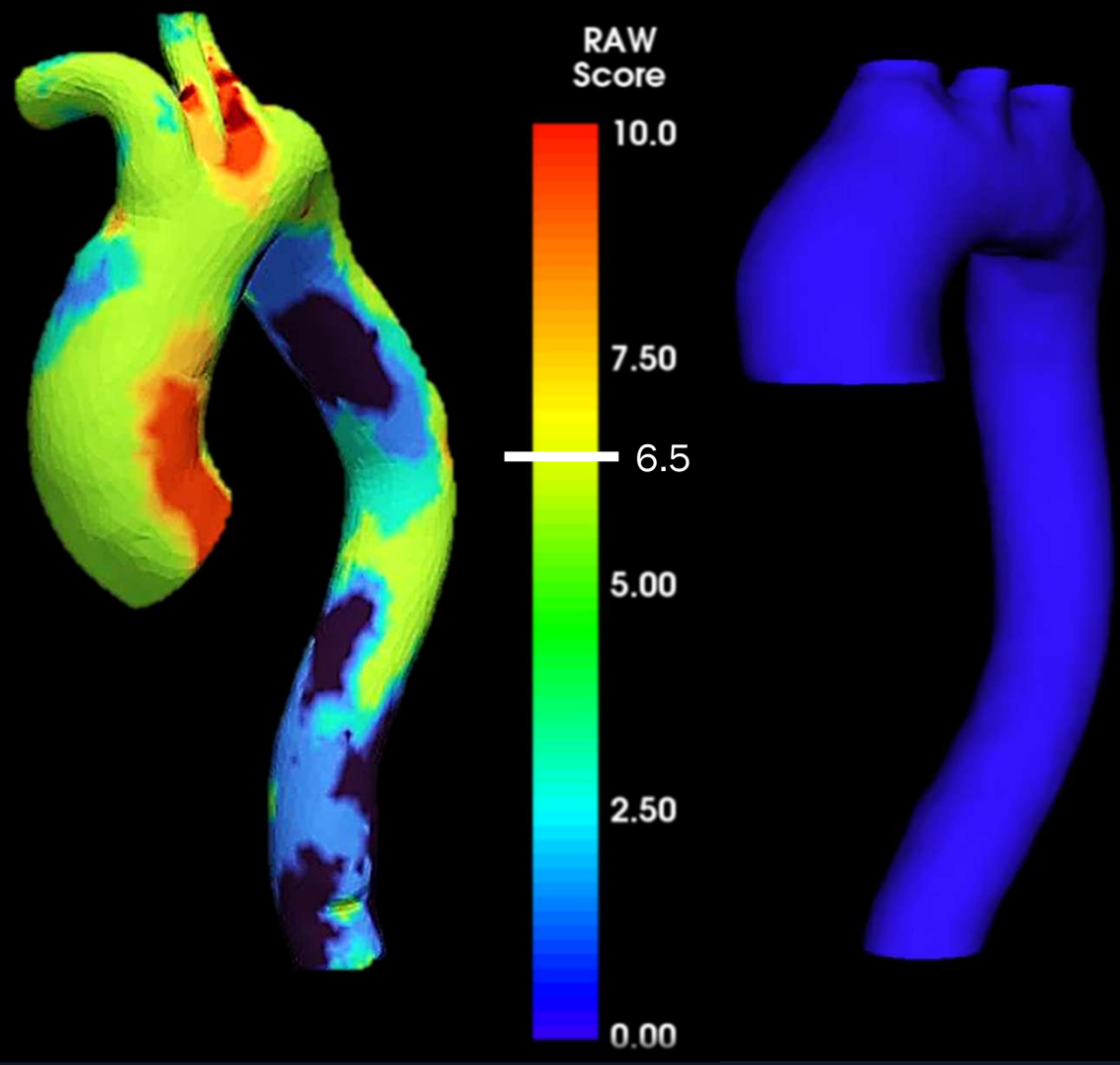
Regional Aortic Weakness MAP



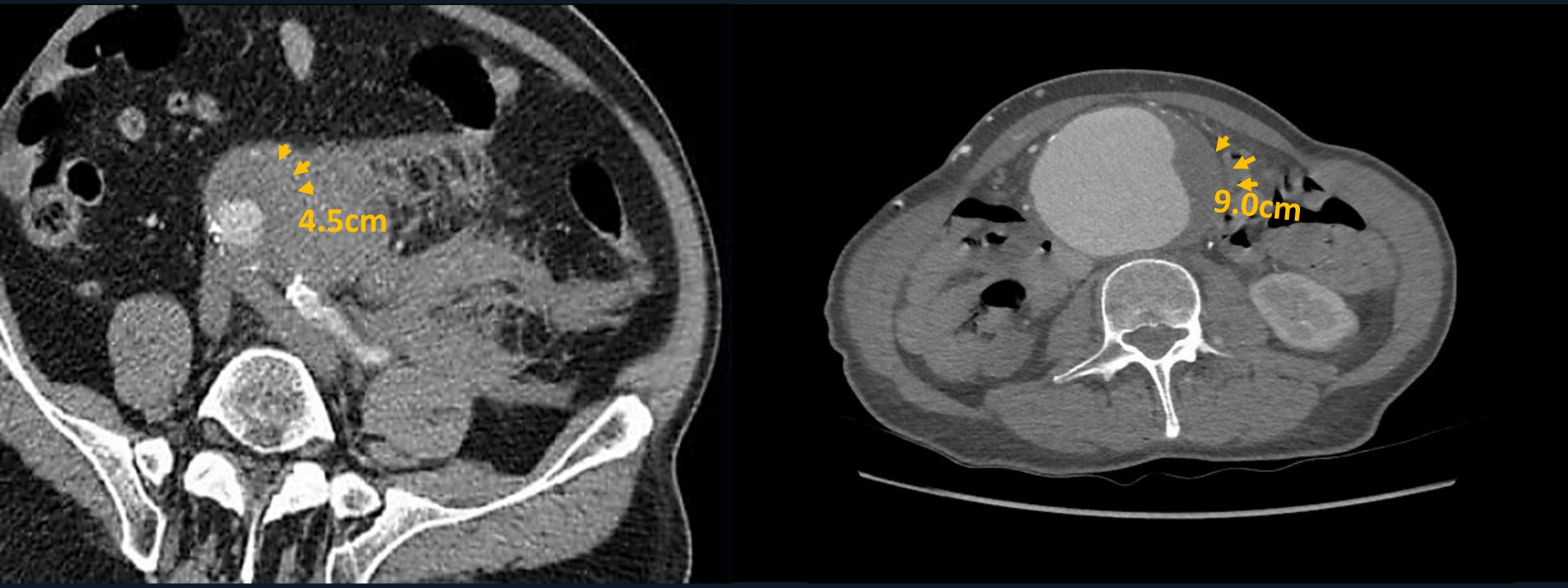
⚠ Research Use Only

"RAW Map"

Aortic wall analysis that provides wall tissue strength characteristics for the **individual** patient



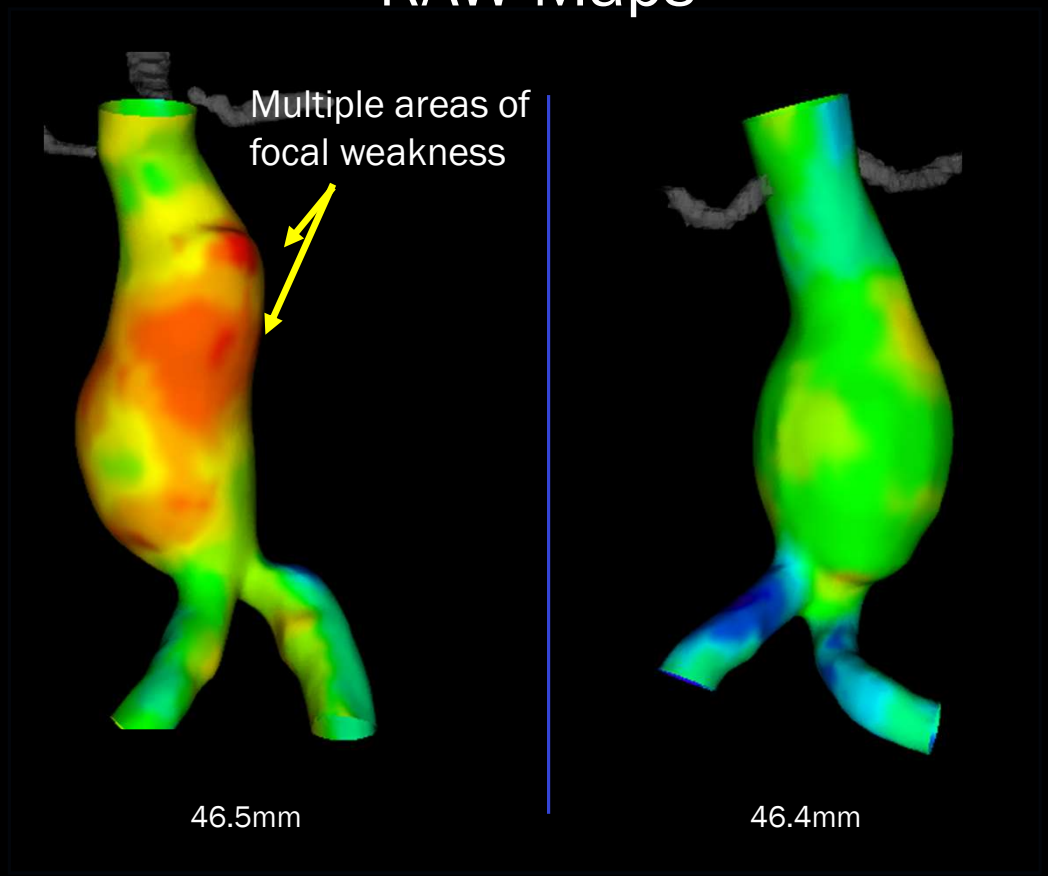
Small Aneurysms Rupture…
Large Ones Don't !!#*??!*



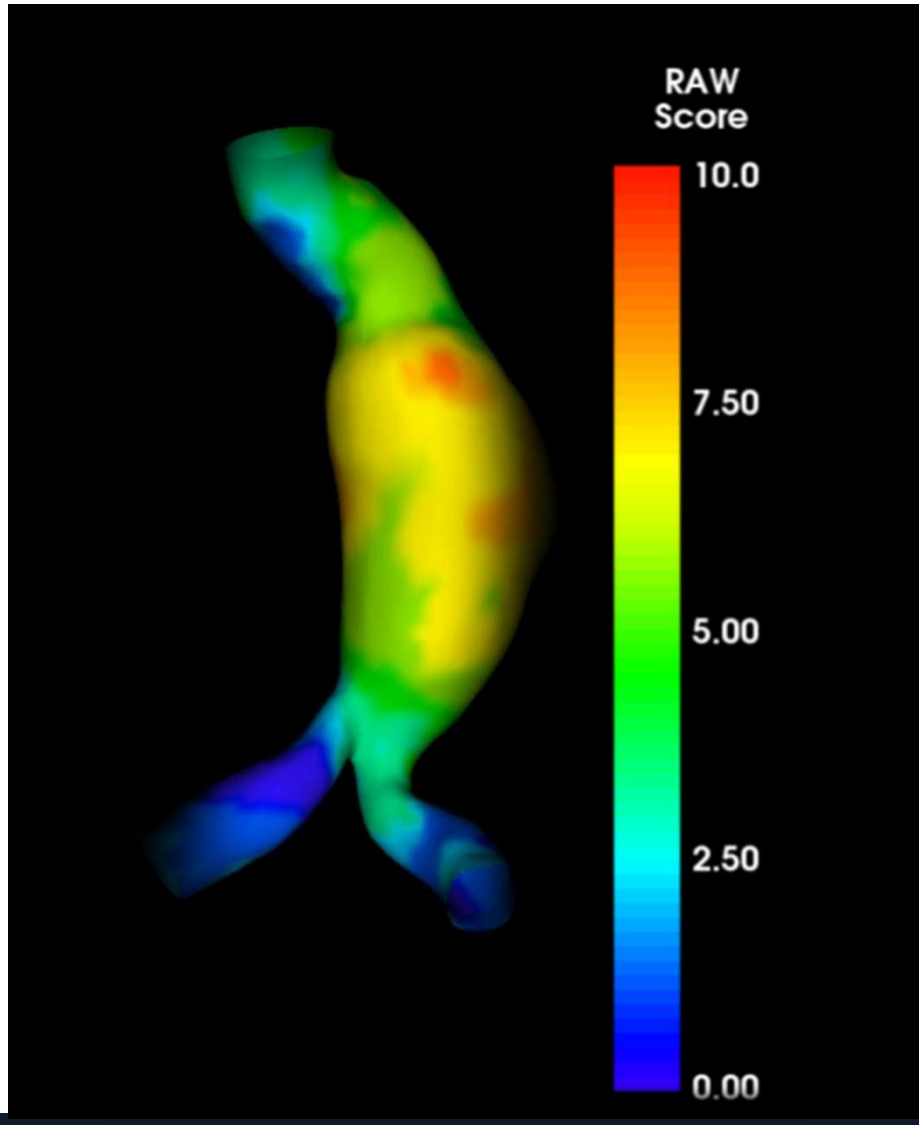
According to Current SVS Guidelines, these Two Aneurysms are the Same...

THEY ARE NOT!

RAW Maps



Diameter Alone is Inadequate...



RESEARCH USE ONLY

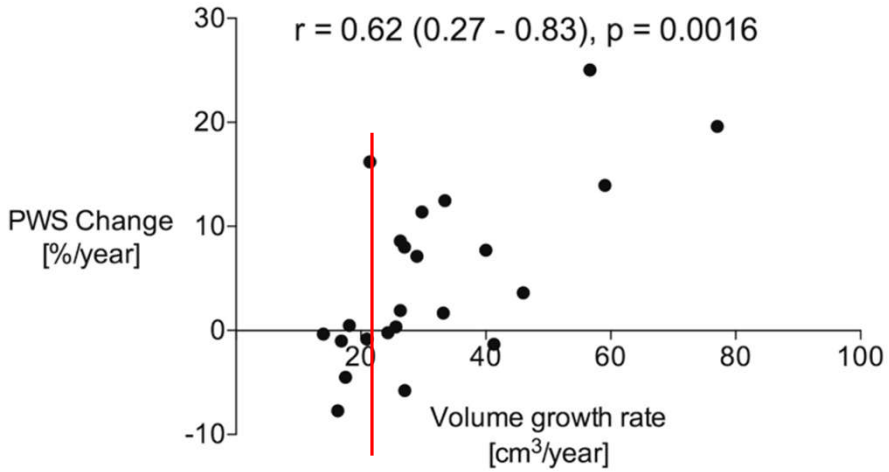
JVS Journal of Vascular Surgery | SVS Society for Vascular Surgery

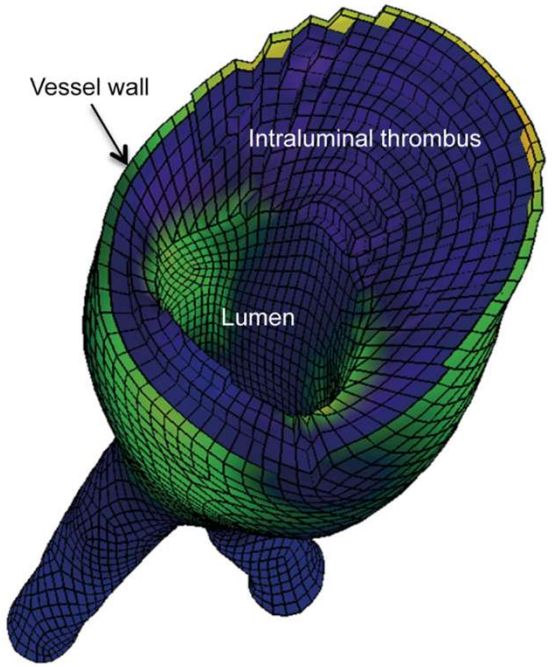
Articles Publish Topics Multimedia CME About Contact Subscribe

CLINICAL RESEARCH STUDY · Volume 63, Issue 6, P1434-1442.E3, June 2016 · *Open Archive* Download Full Issue

Volume growth of abdominal aortic aneurysms correlates with baseline volume and increasing finite element analysis-derived rupture risk

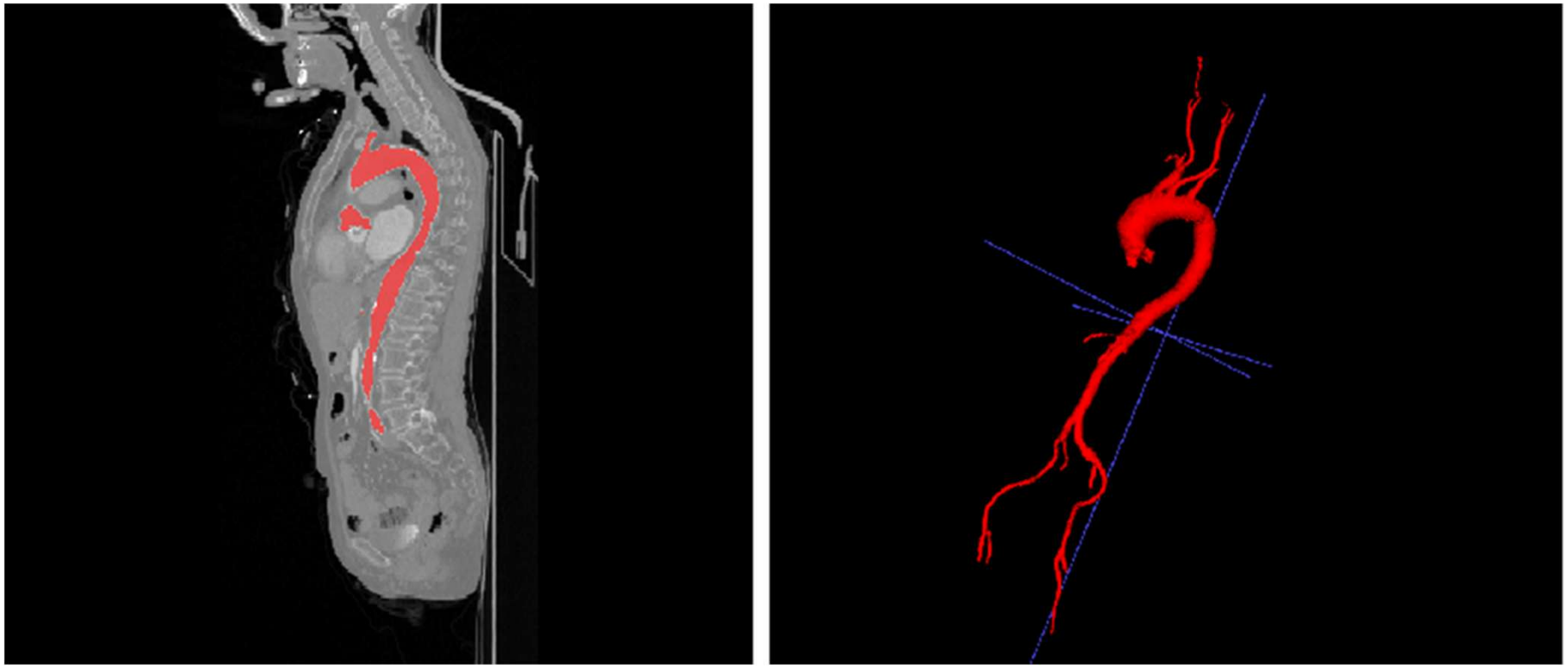
Moritz Lindquist Liljeqvist [a] · Rebecka Hultgren, MD, PhD [a,b] · T. Christian Gasser, PhD [c] · Joy Roy, MD, PhD [a,b]





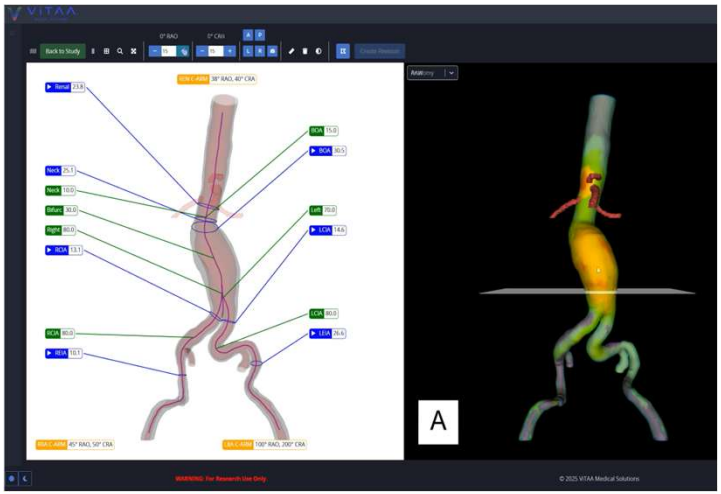
>20ml/year volume growth: Increased rupture risk.

Accurate segmentation is critical:

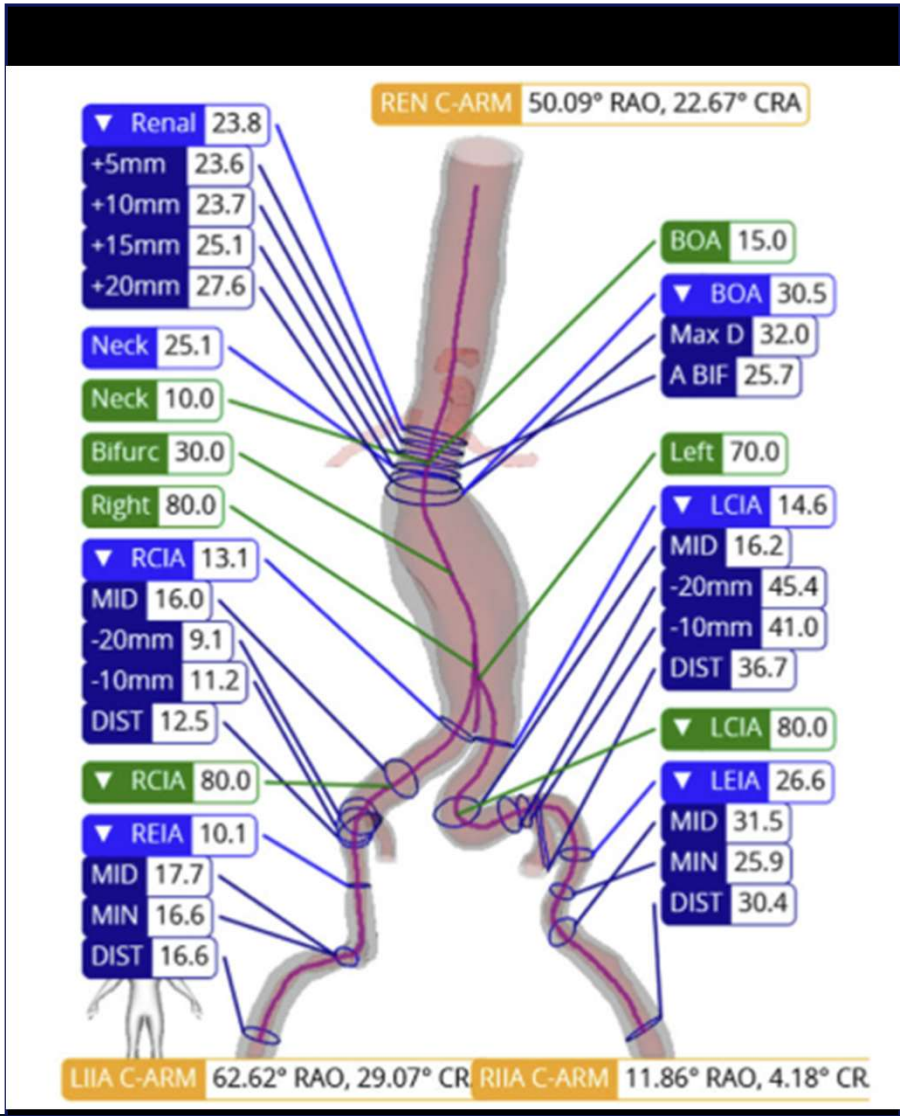


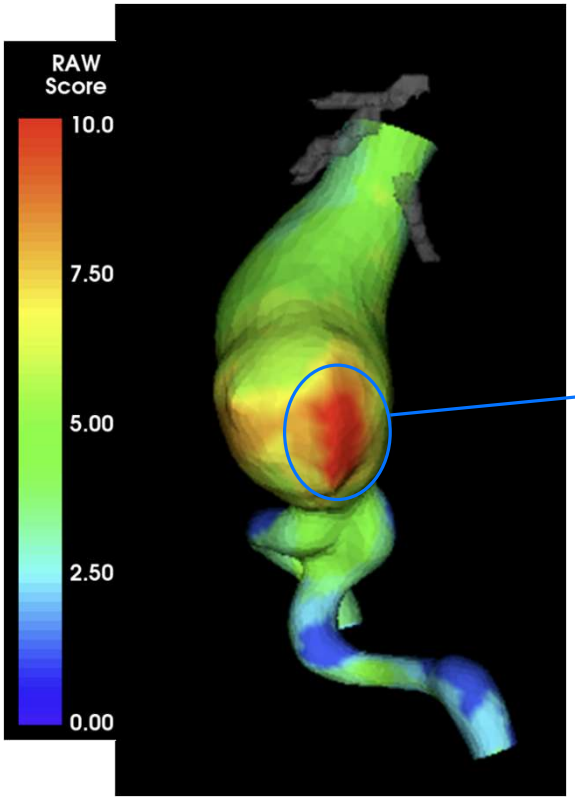
Front. Cardiovasc. Med., 05 January 2023 Sec. Cardiovascular Imaging,
Volume 9 - 2022 | https://doi.org/10.3389/fcvm.2022.1040053

AiORTA Plan



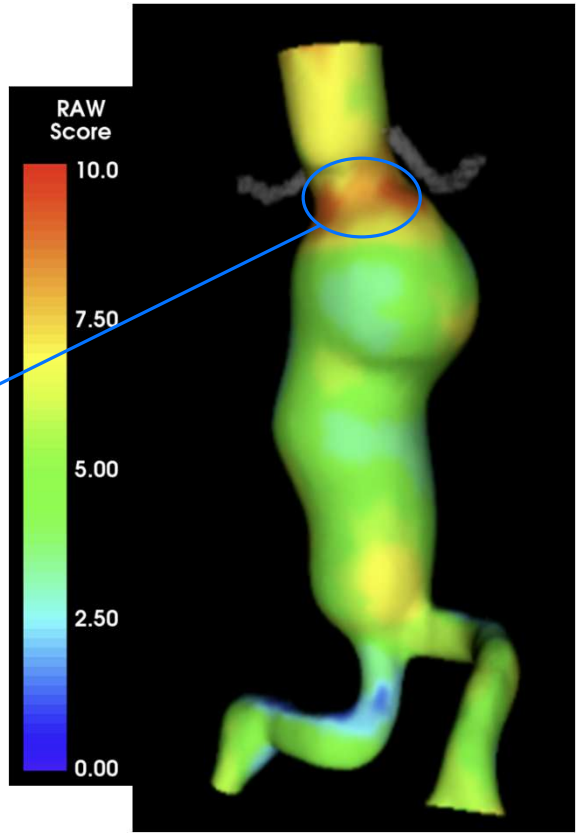
Fully automated
Segmentation:
deep neural network





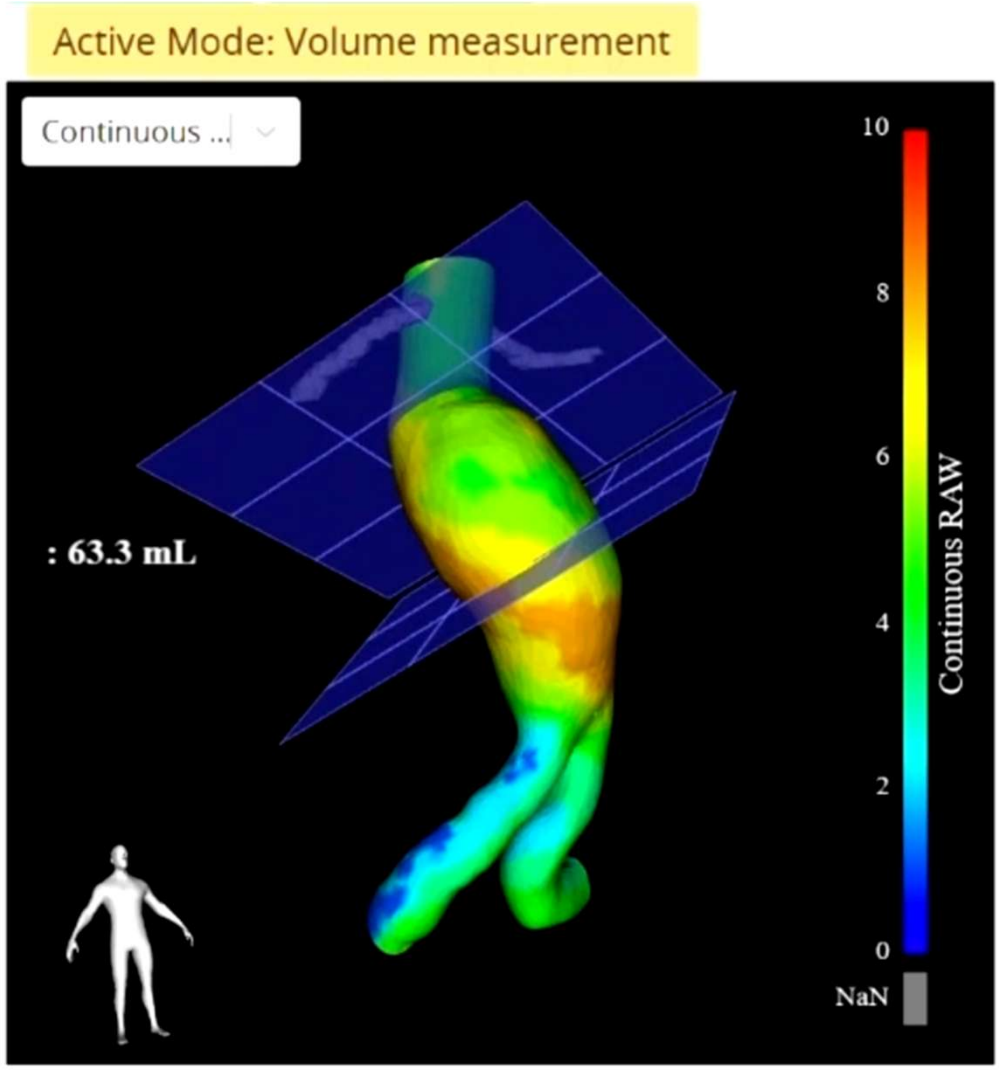
M, 50mm

Very high tissue weakness



In Addition to Weakness Maps…

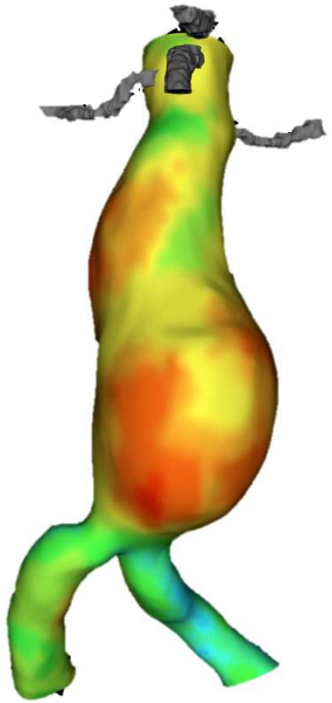
Volume Measurements Using AI Based Segmentation:



RAW Surface Area vs Volumetric Growth: Aortic ViGR (Volumetric Index for Growth)

Aortic Surveillance patients:

- AAAs age 18+ year old
- ECG-gated multiphase CTA
- Surveillance between 2016 and 2025
- 43 patients (5 Female – 12%)
- Average age 73 ± 8 years
- Average max diameter 46.1 ± 4.7 mm

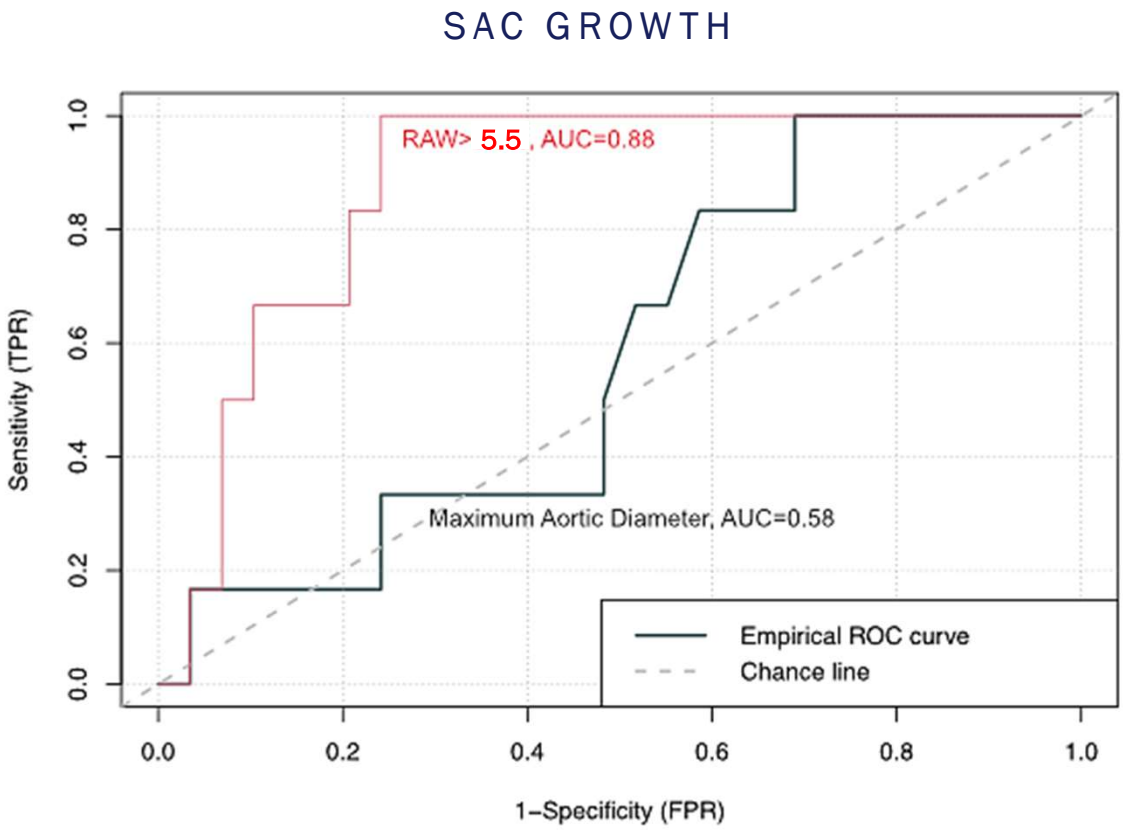


⚠ RESEARCH USE ONLY

Raw Surface Coverage

Classifies Volumetric Growth > 20 mL/yr

- Surface Coverage> 48% RAW>5.5 (AUC=0.88)
- Maximum aortic diameter (AUC=0.58)

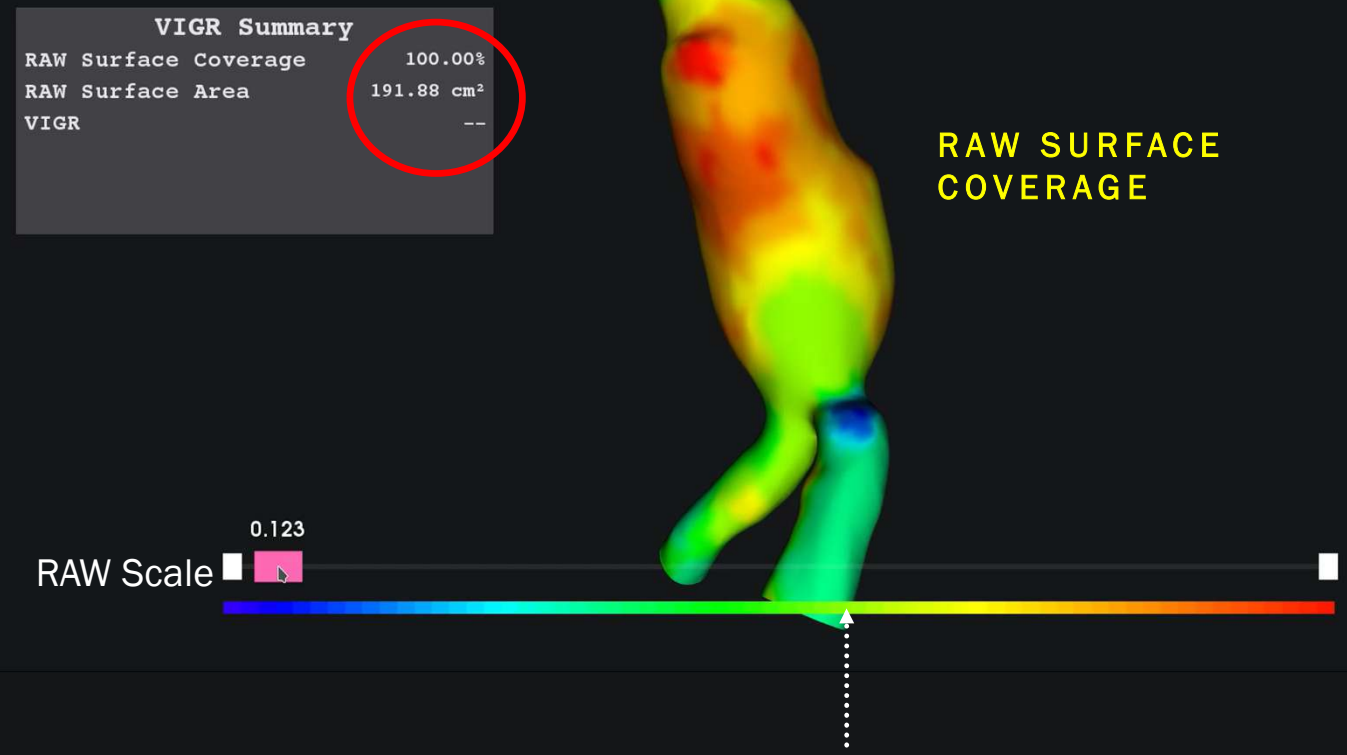


CASE 1

LOW Aortic ViGR (High RAW Distribution) = Weaker Tissue

RAPID GROWTH

Aortic ViGR:



RESEARCH USE ONLY

ViTAA is currently working on approval of RAW™ Maps with FDA feedback and guidance. It is not yet available for sale inside or outside the US.

CASE 1

LOW Aortic ViGR (High RAW Distribution) = Weaker Tissue

RAPID GROWTH

⚠ RESEARCH USE ONLY

12-MONTH FOLLOW-UP

GROWTH ANALYSIS

Change in Maximum Lumen Diameter	4.6 mm (12.6%)
Change in Maximum Aortic Diameter	**3.7 mm** (7.4%)
Change in Lumen Volume	14.7 mL (20.2%)
Change in Aortic Volume	**21.7 mL** (13.0%)
Change in Maximum ILT Thickness	-1.0 mm (-5.3%)
Change in ILT Volume	7.0 mL (7.4%)

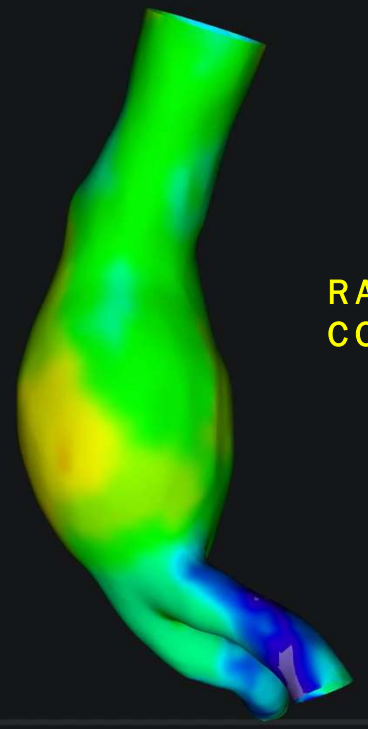
CASE 2

HIGH Aortic ViGR (LOW RAW Distribution) = Stronger Tissue

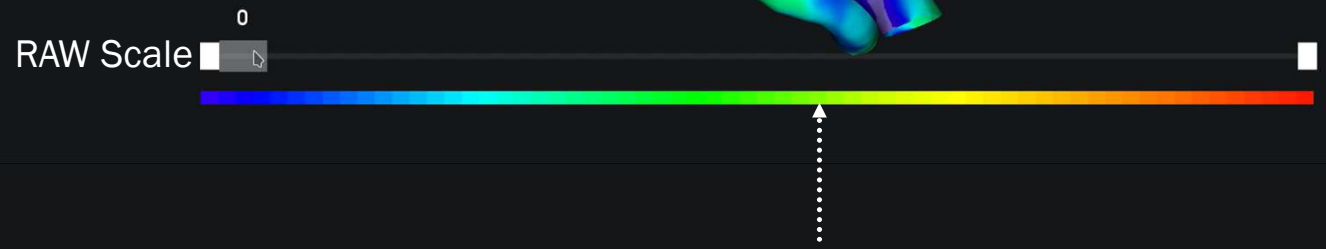
SLOW GROWTH

Aortic ViGR:

VIGR Summary	
RAW Surface Coverage	100.00%
RAW Surface Area	156.70 cm²
VIGR	--



RAW SURFACE COVERAGE



⚠ RESEARCH USE ONLY

CASE 2

HIGH Aortic ViGR (LOW RAW Distribution) = Stronger Tissue

SLOW GROWTH

12-MONTH FOLLOW-UP

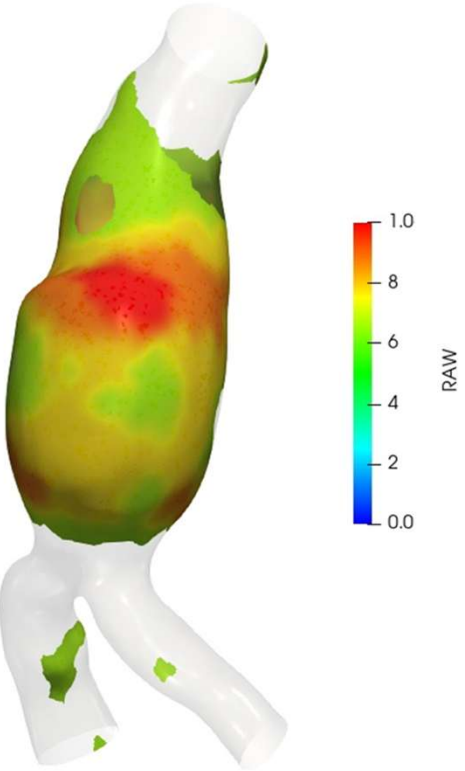
GROWTH ANALYSIS

Change in Maximum Lumen Diameter	2.8 mm (8.5%)
Change in Maximum Aortic Diameter	1.2 mm (2.5%)
Change in Lumen Volume	0.8 mL (1.7%)
Change in Aortic Volume	8.5 mL (7.0%)
Change in Maximum ILT Thickness	1.2 mm (5.1%)
Change in ILT Volume	7.7 mL (10.3%)

⚠ RESEARCH USE ONLY

CONCLUSIONS

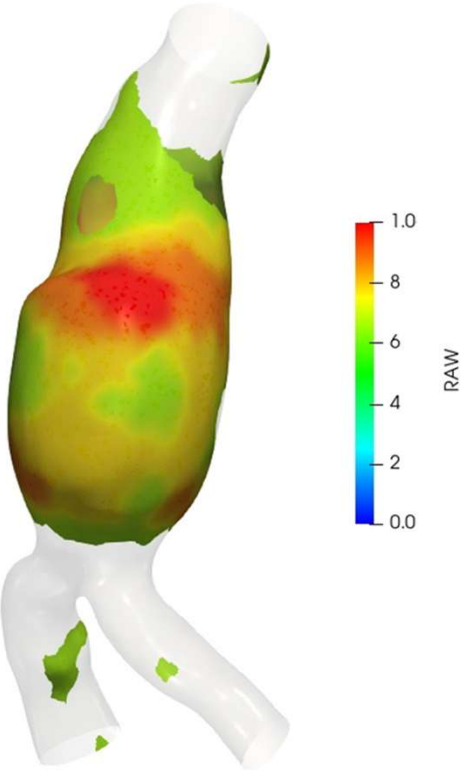
The percentage AAA surface area with elevated RAW predicts aneurysm behavior (rapid volumetric growth) a surrogate marker for AAA Risk



CONCLUSIONS

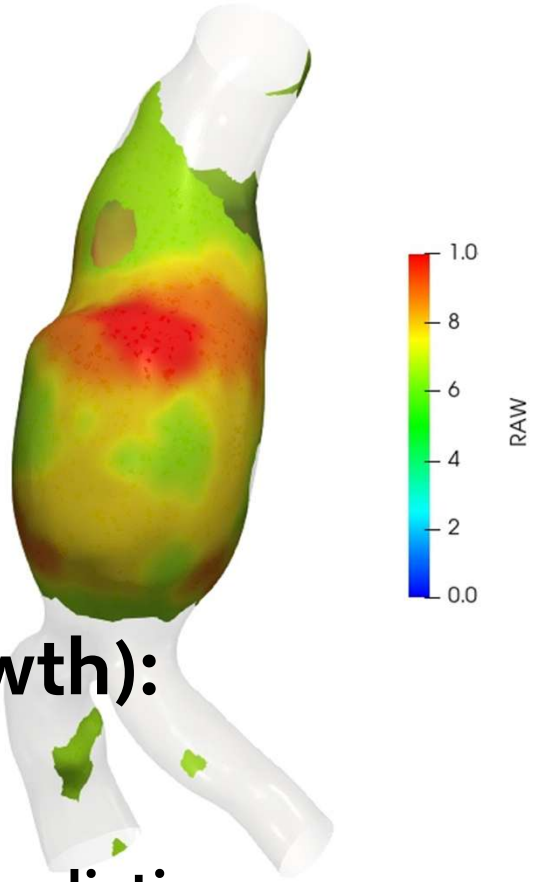
Combining RAW and AI-based Volume analysis allows for the use of a ViGR Score (High/Low) for Aneurysm Risk

Long term ViGR Study?



ViGR

(Volumetric index for GRowth):



A Novel Tissue-Based Tool for AAA Prediction