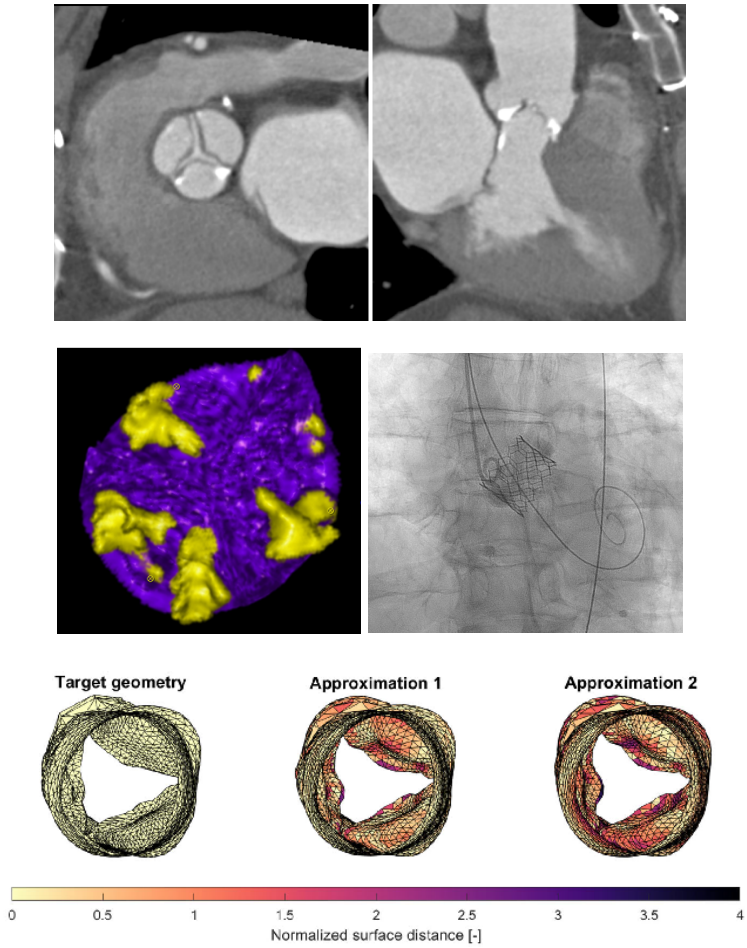
Diagnosis and treatment of Aortic valve stenosis

Background

Aortic valve stenosis (AS) is the most common valve disease in developed countries. Contrary to common belief, moderate AS has similar survival rates to severe AS at one and five years. Current guidelines focus mainly on severe AS, often overlooking moderate AS, especially in patients with unexplained symptoms. Traditional assessments like aortic valve area (AVA) and velocity measurements at the location of the valve at rest do not accurately predict valvular function, as most symptoms occur during exercise. A new index, the Stress Aortic Valve Index (SAVI), has been developed to better identify symptomatic patients with moderate AS. SAVI, which requires cardiac catheterization, measures the ratio of aortic to left ventricular pressure during peak stress.



We aim to focus on image-based predictions of physiological severity using CT, MRI, echocardiographic, and angiographic images, ideally predicting SAVI. Moreover, the success of treatment of the AS either with surgical valve replacement (SAVR) or Transcatheter Aortic valve replacement (TAVI) depends on proper sizing of the device and the presence of calcifications. Segmentation plays a crucial role in these processes. By utilizing these segmentations, we plan to perform computational fluid dynamic analyses, generate synthetic data, and conduct statistical shape modeling. This approach will enhance our understanding and prediction of valvular function, potentially leading to better patient outcomes.

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