TROUBLE WITH YOUR HEART? COME, LET'S CHECK IT!

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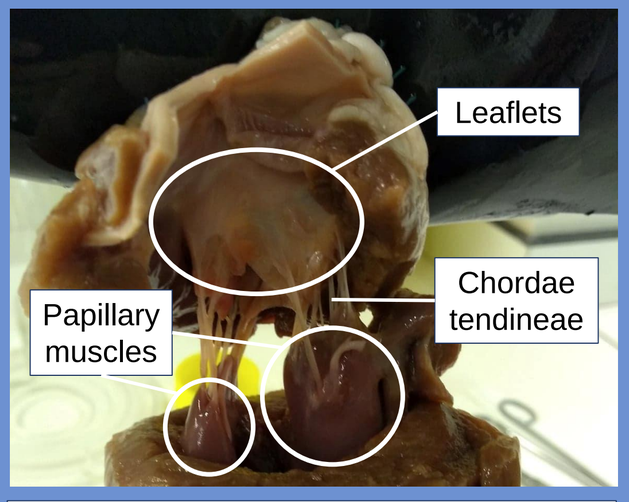
30 SECOND SUMMARY

Computational models provide insight on heart valve mechanics + Lack of computational frameworks that quickly generate mitral valve shapes = Creation of mathematical model describing shape of mitral valve → Study of different valve shapes and their impact on function + Aid clinicians in patient treatment



Complete structure of MV

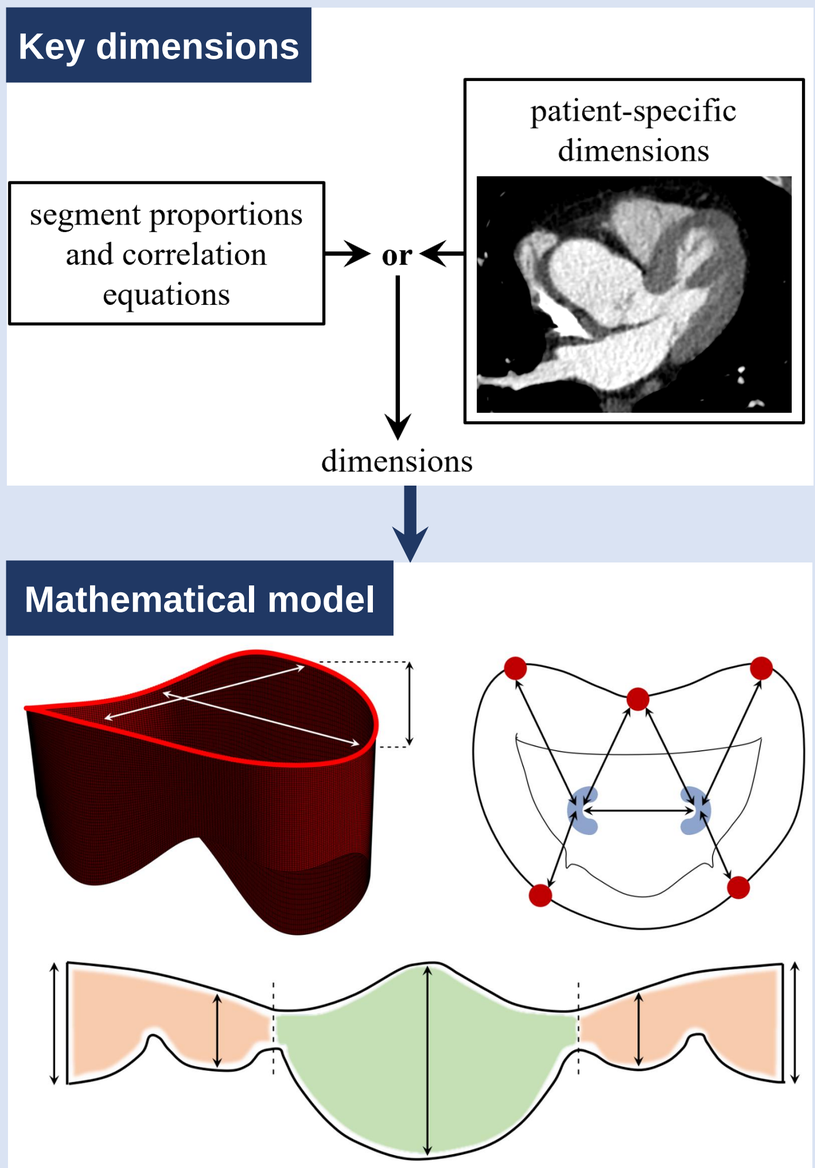
1. BACKGROUND AND AIMS

- **Mitral valve** (MV) function is the most complex amongst all heart valves, relying on its mechanical properties and structural integrity. A compromise in these leads to valve dysfunctions that can **endanger** a person's life
- The accuracy of computational models for heart valve studies relies on their geometry, and frameworks to generate mitral valve geometries are lacking
- Most mathematical models are based on **assumptions** and **differ** from realistic valves
- Here, we built a framework that generates computational MV models based on mathematical equations or on patient-specific dimensions

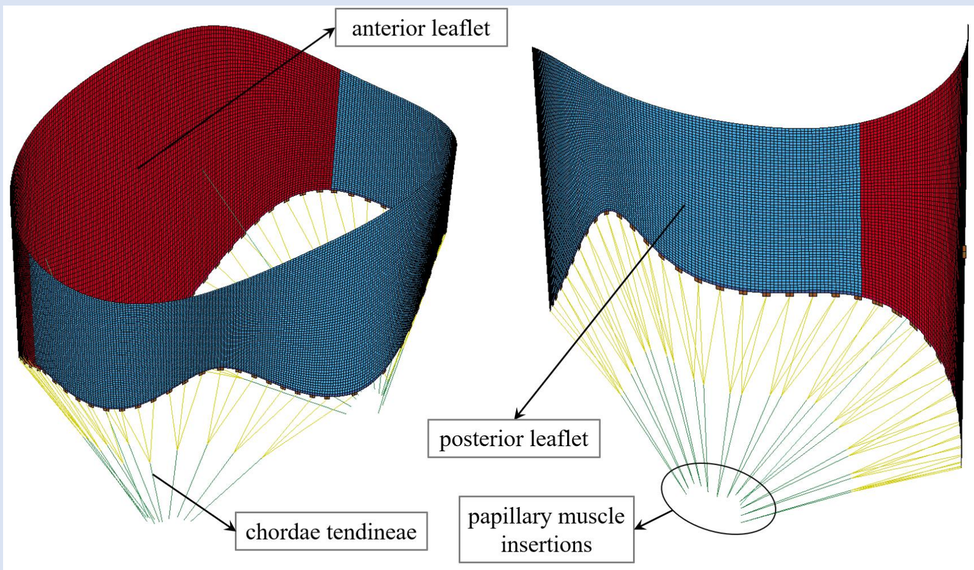
Check our publication

2. METHODOLOGY

❖ **Incorporate key dimensions in mathematical model**



❖ **Develop a complete MV model**



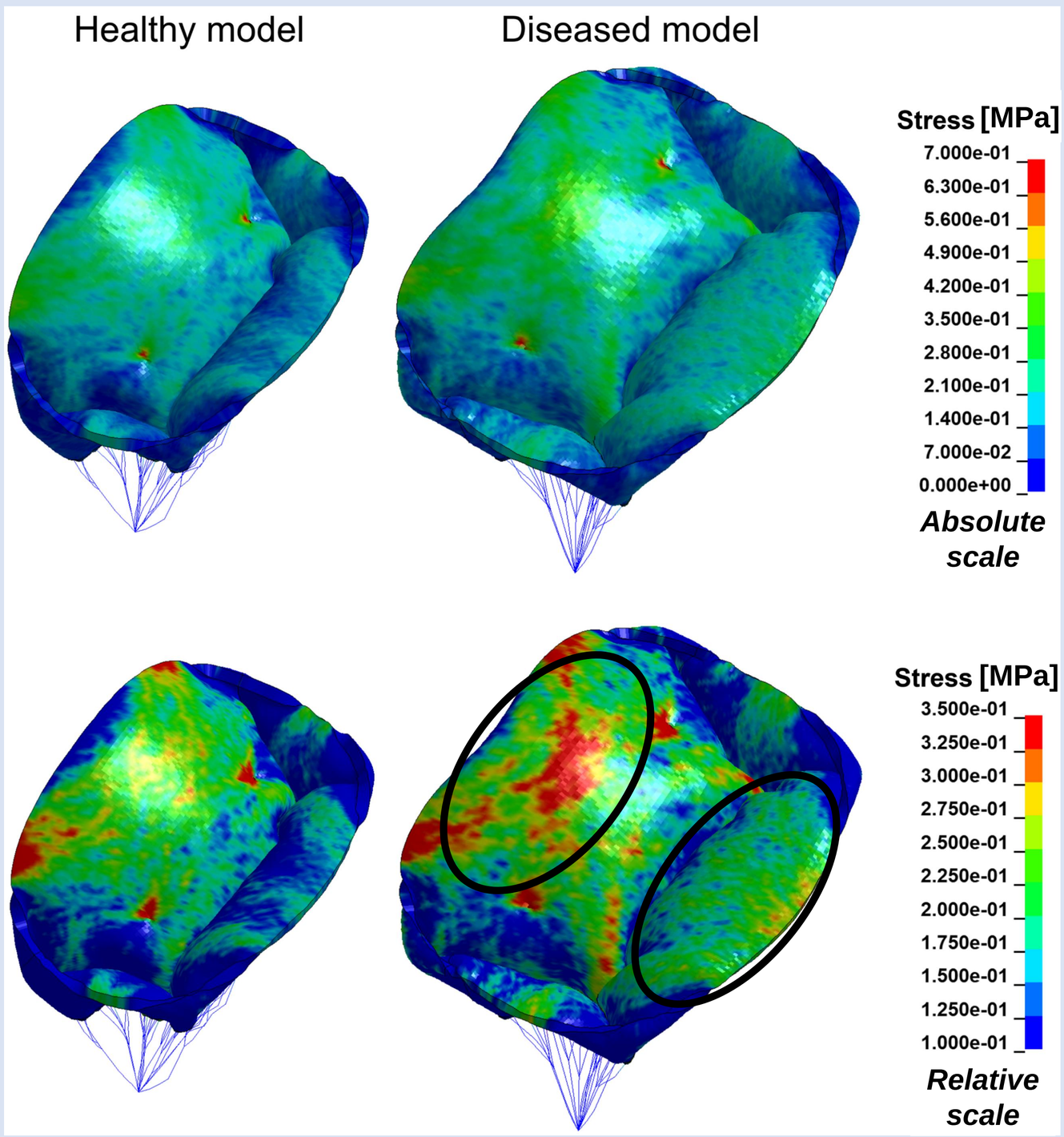
❖ **Create computational simulations to**

(1) Represent valve function OR

(2) Generate geometry to be used with different software

3. COMPUTATIONAL RESULTS

- ❖ Different valve **shape changes** are associated with different cases of function (healthy or diseased)
- ❖ **Diseased** valve configurations (e.g. dilation) are associated with greater valve tissue stress, exhibiting greater damaging to the tissue
- ❖ The figure illustrates stress distributions for healthy and diseased valve configurations; **Higher stress** values (in red) indicate **greater tissue damage**



4. POTENTIAL APPLICATIONS

- ✓ Our model can **quickly and automatically generate** a variety of clinical cases, useful to study customized MV shapes
- ✓ This framework can indicate the shape configurations associated with **unfavourable performance**, and has the potential to virtually evaluate repair procedures before the actual surgery