Establishment of a 3D-Model of the murine aortic arch

Glinzer A[1,2 *], Thon M[3 *], Pelisek J[1], Wildgruber M[2], Eckstein HH[1], Gee MW[3], Zernecke A[1,4]

[1] Department of Vascular Biology, Klinikum Rechts der Isar, Technische Universität München, [2] Department of Radiology, Klinikum Rechts der Isar, Technische Universität München,
[3] Mechanics and High Performance Computing Group, Technische Universität München, [4] Institute for Clinical Biochemistry and Pathobiochemistry, Universitätsklinikum Würzburg
[*] Contributed equally

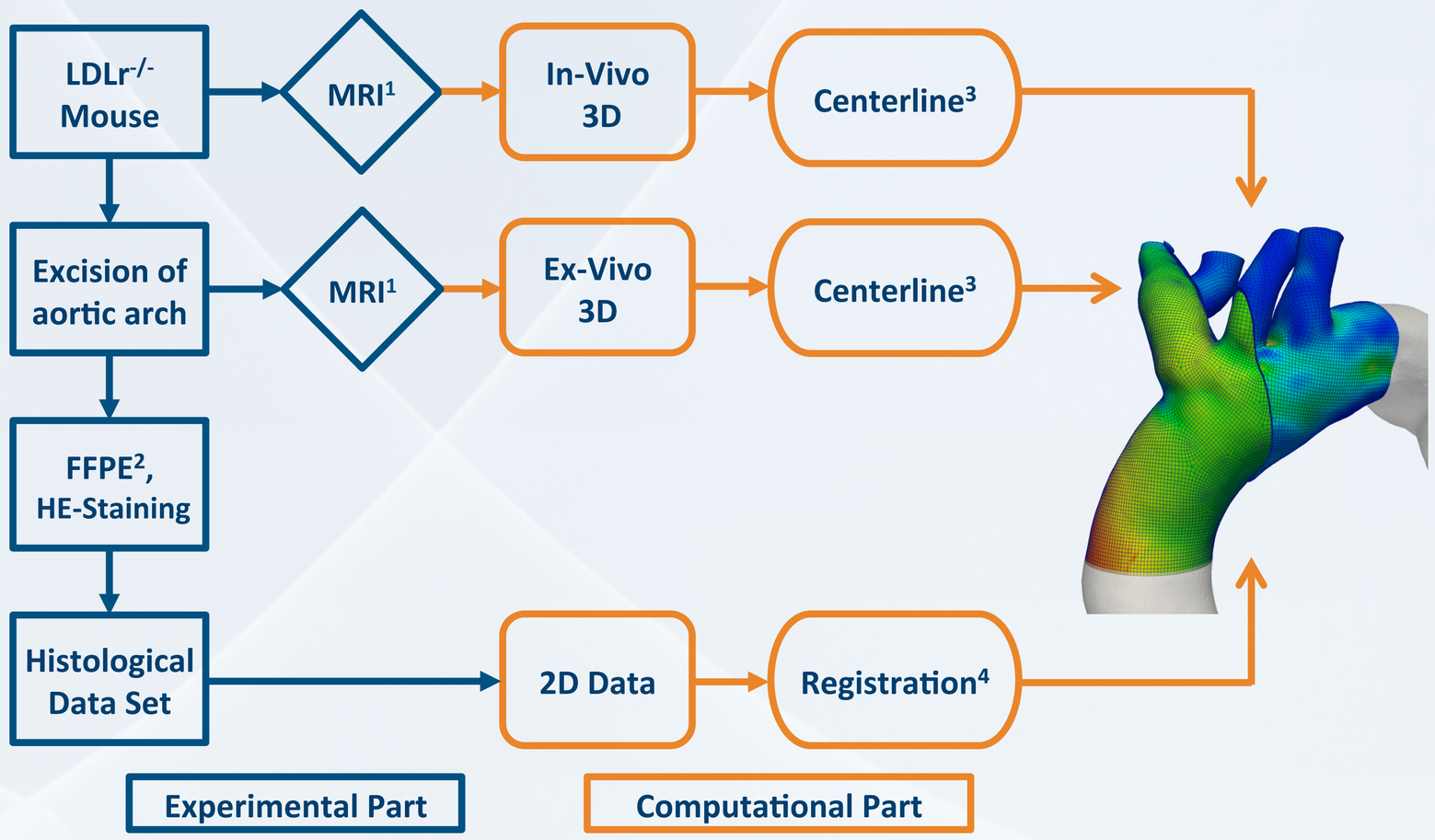
1 Background

Atherosclerosis plays a central role in the pathogenesis of cardiovascular diseases and is commonly found in the population of developed countries. It is characterized by an accumulation of inflammatory cells and lipids in the intima and media of the arterial wall resulting in arterial wall thickening and narrowing of the vessel lumen.
Atherosclerosis causes sequelae such as angina, heart attack and stroke. So far the processes of disease progression, especially mechanically relevant aspects that promote arterial wall thickening, are not fully understood.

2 Aim

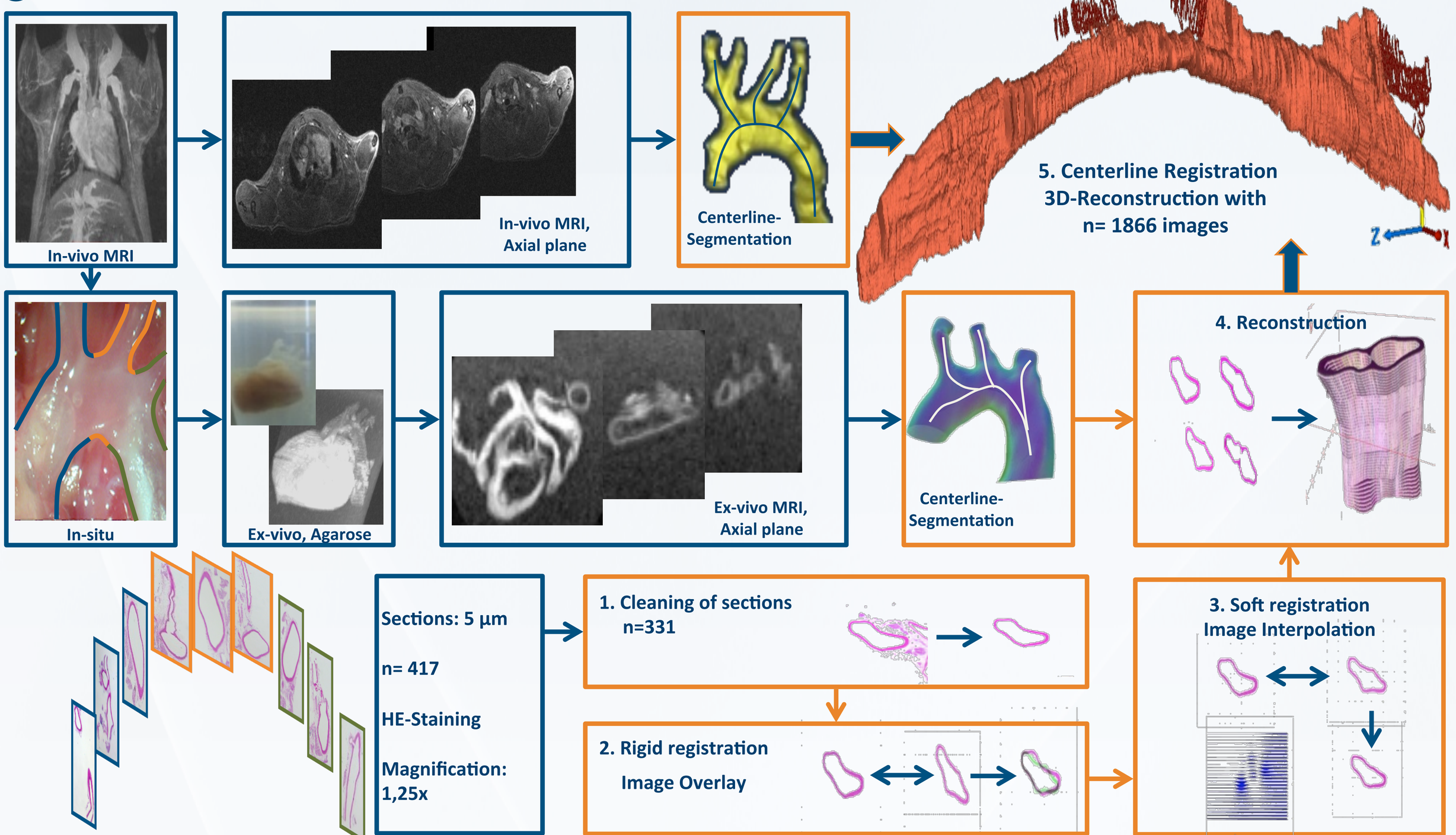
The aim of this study is to develop a computational 3D-model of the murine aortic arch using medical imaging combined with histological techniques and image processing.

3 Methods



[1]: 7 T MRI, Angiography, Magnevist®
[2]: Formalin fixed paraffin embedded
[3]: Vascular Modelling Tool Kit
[4]: Matlab

4 Results



5 Conclusion

We are establishing a method to reconstruct the geometry of the aortic arch. Through the combination of in-vivo and ex-vivo MRI data together with histological staining, a 3D-object of the murine aortic arch could be generated. This model will serve as the basis for subsequent mathematical modeling of factors that may determine atheroprogression.