MINES Saint-Étienne

ARMINES

Equipe CoMHet

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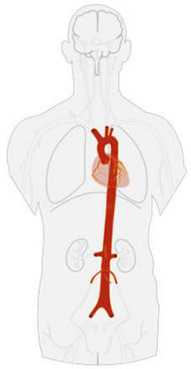
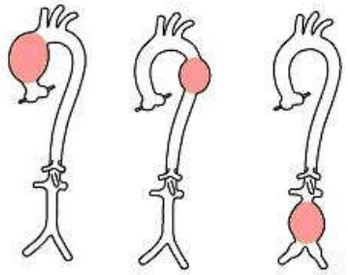
Characterization of deformation and rupture micro-mechanisms in aortic aneurysm wall

Context



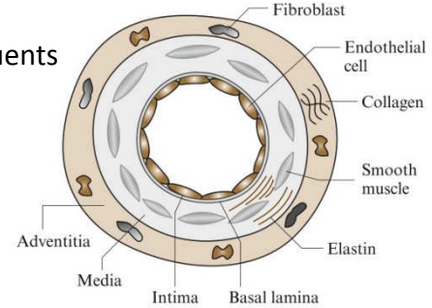
Rupture of aneurysm in human aortic wall



~ 35 000 aneurysm deaths/year in UE

Need to study:

- Separate role and interaction of primary structural micro-constituents
- Their evolving properties in response to mechanical loading



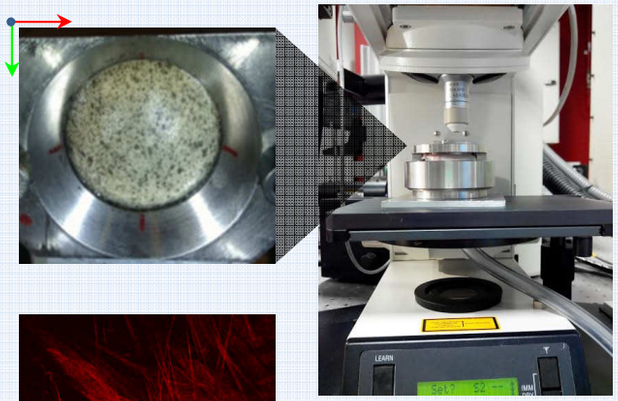
Aim: Investigation at micro-scale to find the determinants of rupture mechanism

Method

In vitro experiments

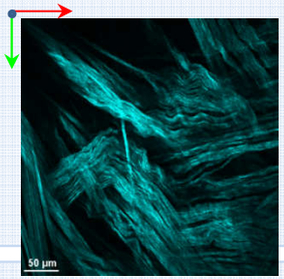
Experimental setup to combine mechanics and microstructural imaging:

- **Mechanical inflation device**
- **Multi-photon confocal microscope** (3D imaging of fibrous networks inside the tissue)

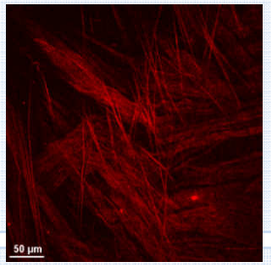


Target:

Obtain a database of 3D images to quantitatively analyze the microstructure under mechanical load bearing



SHG Channel



Auto-fluorescence Channel

Micro-scale characterization

Detailed **analysis of the 3D images** by providing specific physical quantities and evolution curves

Targets:

- Advanced segmentation strategy
- Method to measure displacement boundary conditions in the region
- Method to measure the evolution under increasing load