

## LMGC-BIOTIC and Sim&Cure are looking for a biomechanical master candidate...

### “Influence of the physical parameters of the tissue on the deployment of an endovascular prosthesis”

The BIOTIC team of the Mechanics and Civil Engineering Laboratory (LMGC, Université de Montpellier) focuses on the biomechanical analysis of human tissues (in particular, the soft tissues, and the cells that compose them). The approaches developed aim to account for interactions (between phases, fluid/structure, contact, etc.), transfers (thermal, chemical, mass, electrical, etc.) and multi-scale aspects.

Sim&Cure is a rising french company that was founded in 2014. The company develops the Sim&Size® product, a CE marked and FDA cleared medical device software. This software assists doctors in choosing the most suitable implant size for each patient in the neurovascular treatment of cerebral aneurysms.

The Sim&Cure company stands for:

- Simulation: software simulation deployment and high accuracy of sizing (see figure 1).
- Cure: the company produces high quality software devices that can help doctors in curing their patients.

Being a spinoff from the LMGc, Sim&Cure continues developing strong collaborations with the LMGc concerning the experimental validation of the numerical solutions that are developed in the field of biomechanics.

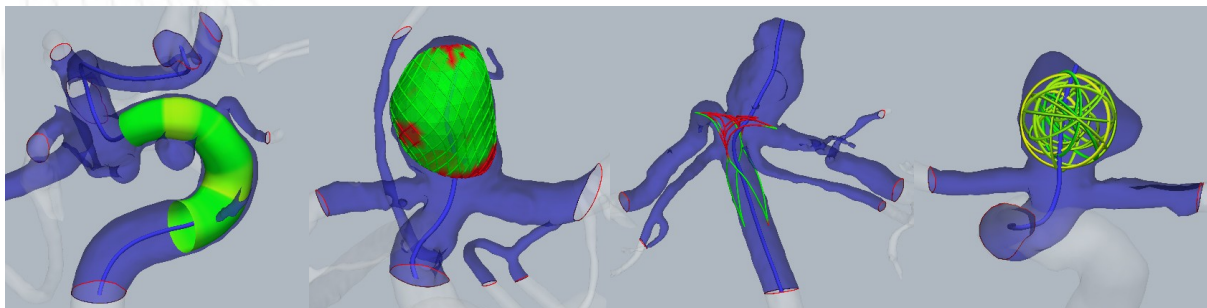


Figure 1: Illustration of the four types of implantable medical devices simulated by the Sim&Size® medical device software to help doctors in the therapeutic planning of the neurovascular treatment of cerebral aneurysms.

The vascular cavity occlusion (aneurysm) is a complicated endovascular procedure that can lead to peri-device leaks (PDL) in the case of unsuitable device sizing.

The main objective of this subject is to assess the influence of the physical parameters of the vascular structure on the outcome of prosthesis deployment. In particular, the results of this study should make possible to prioritize the phenomena to be modeled, among which: the elasticity of the arterial wall with and without initial strain, the elasticity of the medical device, the initial location of the deployment.

The prioritization of the physical parameters will be based on the stability of the prosthesis, the quality of the closure, and the computation times. This prioritization should make possible to propose a



simplification of the mechanical model. The study will be carried out on the LSdyna and sacFE finite element solvers concerning a perfect simulated geometry and also on 5 to 10 geometric cases. The establishment of such analysis requires high skills in numerical simulation, structural mechanics in the context of large strain and displacement. The knowledge of hyperelasticity theory would be interesting.

The master candidate will be hired by the LMGC and will closely collaborate with five collaborators from the LMGC and the Sim&Cure company.

Contact : Nathan COLLIN (n.collin@sim-and-cure.com), Bertrand WATTRISSE (bertrand.wattrisse@umontpellier.fr), Simon LE FLOC'H (simon.le-floch@umontpellier.fr)

