Karlsruher Institut für Technologie

Institut für Biomedizinische Technik

Master Arbeit

Study of the intra-cardiac electrogram signals using in-silico experiments to asses the impact of the atrial geometry

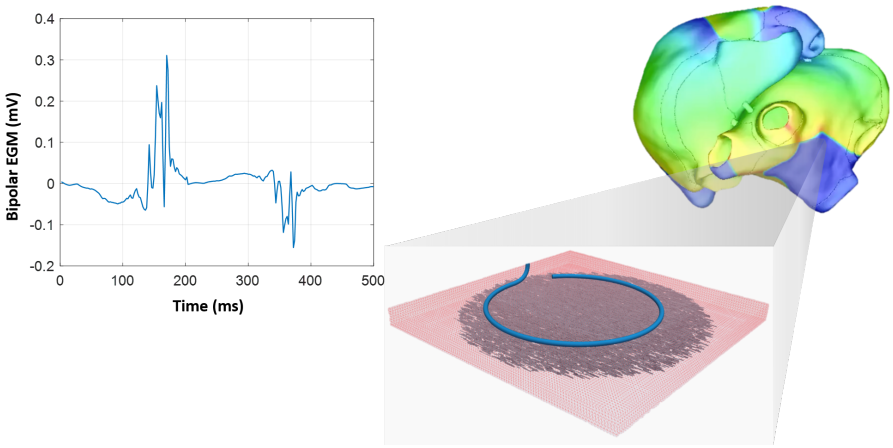
Motivation and Background

Computational modeling is a field that is continuously growing as well as in-silico experimentation. Currently, new medical devices, pharmacological products or therapy development reaching the market are quite expensive and require a huge amount of resources. Additionally, only 20% of the interventions that are successful in in-vivo experimentation are then successful in patients during the most expensive phase of the assessment in clinical trials.

More realistic frameworks involve more input parameters for the simulation. However, uncertainty plays a significant role in the cardiac simulation. Therefore, studying isolated tissue patches can give an insight of the tissue characteristics and mechanisms compared to a complete heart where it will be hard to distinguish these characteristic or mechanisms.

Fibrosis, for instance, modifies the cardiac substrate where the action potential propagates creating the perfect conditions to initiate and/or maintain an arrhythmia. It is still unclear how different degrees of fibrosis change the arrhythmia dynamics.

The aim of this project is to create a workflow to translate tissue patch characteristics to a complete atrial geometry in an in-silico experiment. This workflow will be used to test available medical catheters in both set ups and quantify the difference of the translation.



Project

The student will develop a workflow to translate the tissue patch model to an atrial geometry. In both setups the electrograms will be calculated using two different commercially available catheters and two degrees of fibrosis. Comparing both setups (tissue patch vs. atrial geometry) can give an insight on how in-silico experiments can be used in the development and test phase of a medical device.

Skills

- Good programming skills (Matlab/Python)
- Ability to work independently
- Commitment and self-organization skills
- Communication and work will be done in English

Start date

As soon as possible

Contact

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For more information feel free to send an email or just drop by our offices.