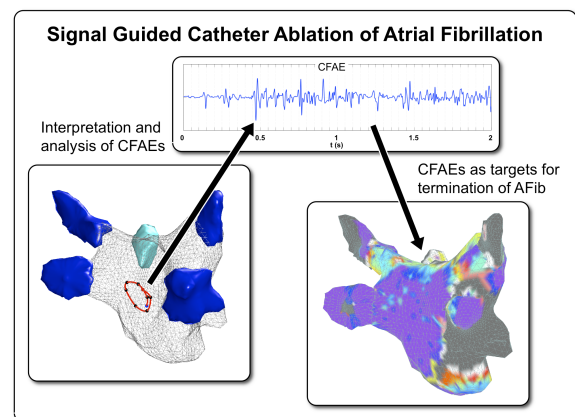


Intracardiac ECG Signal Processing / Mapping of endocardial activation patterns

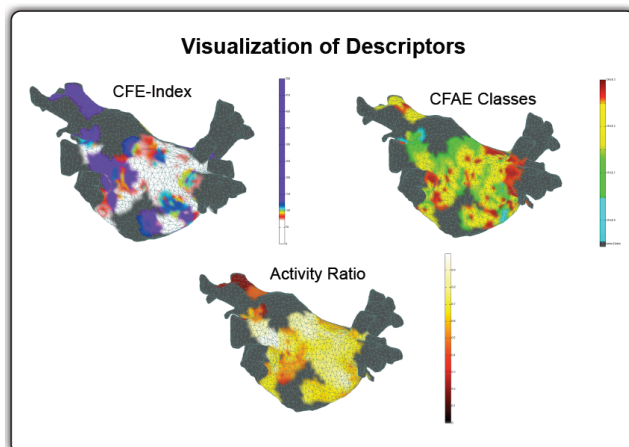
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Atrial Fibrillation (AFib) is the most common cardiac arrhythmia, showing an increasing prevalence with age. Hemodynamic impairment and thromboembolic events related to AFib result in significant morbidity and mortality.

Catheter ablation, notably the electric isolation of the pulmonary veins, has become a well-established curative therapeutic approach in drug-resistant atrial fibrillation. Despite the considerable clinical experience and accumulated evidence from experimental data, the exact mechanisms behind AFib are still not completely understood. Different concepts like rotational drivers, ectopic foci or dissociation of layers are discussed controversially - together with their respective curative ablation approaches.



Together with Städtisches Klinikum Karlsruhe, we are trying to understand endocardial activity during AFib. Electrograms measured intracardially during an electrophysiological examination are analyzed with methods of signal processing and multivariate statistics. A large set of descriptors



can be computed for each signal and used to classify several different types of fractionated electrograms. The spatio-temporal pattern of excitation is evaluated using simultaneous multichannel data from catheters recording in local high-density or in panoramic mode with up to 64 electrodes. Quantitative analysis helps to identify dominant mechanisms and their degree of stability. All information can be visualized on patient specific geometries and related to the atrial anatomy. This will support the physician in finding the best ablation strategy in treatment of AFib.

Recent Publications

- T. G. Oesterlein et al. Removing ventricular far-field signals in intracardiac electrograms during stable atrial tachycardia using the periodic component analysis, *Journal of Electrocardiology*, 48(2), pp. 171-180, 2015
- C. Schilling et al. Fuzzy decision tree to classify complex fractionated atrial electrograms, *BMT*, 2015
- F. M. Weber et al. Wave Direction and Conduction Velocity Analysis from Intracardiac Electrograms - A Single-Shot Technique. *IEEE TBME* (57), 2394-2401, 2010