**PROARRHYTHMIC SUBCELLULAR SIGNALING IN ATRIAL FIBRILLATION: ROLE OF CALCIUM DEPENDENT POTASSIUM CHANNELS**

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Atrial fibrillation (AF) is the most frequent arrhythmia that increases morbidity and mortality, with stroke and worsening heart failure being the most prominent complications. Current treatment approaches have only a moderate efficacy and substantial risks of proarrhythmia and toxicity and it is expected that a better understanding of the underlying mechanisms promoting induction and maintenance of AF may lead to the development of more effective and safer therapeutic approaches. Previous work from our laboratory and others has clearly shown that abnormal sarcoplasmic reticulum Ca2+ leak increases diastolic Ca2+ levels likely contributing to the induction of AF by promoting ectopic (triggered) activity. Here, I will briefly review the available data regarding the molecular mechanisms of AF-promoting Ca2+-dependent triggered activity. I will first consider the mechanistic insights that have been obtained from studies in human atrial samples from patients with AF, focusing on the potential role of delayed afterdepolarization-mediated ectopic (triggered activity) and the related underlying molecular mechanisms. Then I will present novel evidence for increased function of Ca2+-dependent small-conductance K+-currents (SK currents) in AF patients, providing evidence for increased channel subunit trafficking from early endosomes as the major mechanism of increased SK current function. Finally, I will discuss the information available about the putative role of increased SK currents in reentry-supporting APD shortening which promotes AF maintenance. I will conclude by identifying and discussing questions that I consider particularly important to address through future research in this area.