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Title  
Rotational Waves in Atrial Fibrillation: Role, Mechanisms and Mapping

Abstract  
Atrial fibrillation (AF) is the most common sustained arrhythmia with alarming increase in its prevalence. We take an integrative approach to discuss the manner in which nonlinear electrical waves self-organize in the form of rotors and drive the arrhythmia. Using cellular electrophysiology, numerical simulations as well as analytical mapping approaches we study the ionic mechanisms and dynamics of such patterns of excitation. Analysis of activation data in the frequency and phase domains reveals that local excitation frequencies during AF are hierarchically distributed throughout the atria with the highest frequency co-localizing with a sustained reentrant activity that drives the arrhythmia.