Life and death saddles in the heart

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ABSTRACT
Saddle points are responsible for threshold phenomena of many biological systems. In the heart, saddle points determine the normal excitability and conduction, but are also responsible for certain abnormal action potential behaviors associated with lethal arrhythmias. We investigate the dynamical mechanisms for the genesis of lethal extra heartbeats in heterogeneous cardiac tissue under two disordered conditions. For both conditions, the lethal events occur when the system is close to the saddle point, implying the pivotal role of the saddle point in cardiac arrhythmogenesis.

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