Temperature Regulates the Arrhythmogenic Activity of Pulmonary Vein Cardiomyocytes.

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摘要

Abstract

Temperature plays an important role in the electrophysiology of cardiomyocytes. Pulmonary veins (PVs) are known to initiate paroxysmal atrial fibrillation. The effects of temperature on the arrhythmogenic activity of rabbit single PV and atrial cardiomyocytes were assessed using the whole-cell clamp technique. PV cardiomyocytes had different beating rates at low (22–25°C), normal (38–39°C) and high (40–41°C) temperatures (0.9±0.1, 3.2±0.4, 6.4±0.6 Hz, respectively; $p<0.001$). There were different action potential durations and incidences of delayed afterdepolarization in PV cardiomyocytes with pacemaker activity (31, 59, 63%; $p<0.05$), PV cardiomyocytes without pacemaker activity (16, 47, 60%; $p<0.001$), and atrial myocytes (0, 0, 21%; $p<0.05$). However, oscillatory afterpotentials were only found in PV cardiomyocytes with pacemaker activity at normal (50%) or high (68%) temperatures, but not at low temperatures ($p<0.001$). Both PV and atrial cardiomyocytes had larger transient inward currents and inward rectified currents at high temperatures. Additionally, PV cardiomyocytes with and without pacemaker activity had larger pacemaker currents at higher temperatures. This study demonstrated that PV cardiomyocytes have an increase in arrhythmogenic activity at high temperatures because of enhanced automaticity, induced triggered activity, or shortening of action potential duration.