

4th Global Summit on Toxicology

August 24-26, 2015 Philadelphia, USA

Alcohol intoxication, arrhythmias and inward rectifiers

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Alcohol intoxication may induce electrocardiographic changes and arrhythmias, most frequently the atrial fibrillation (AF). In the pathogenesis of arrhythmias including AF, modifications and/or heterogeneity of inward rectifier potassium currents, namely I_{K1} and acetylcholine-sensitive current $I_{K(Ach)}$, are known to be involved. Recently, we have reported that ethanol at clinically relevant concentrations alters the rat ventricular I_{K1} in a dual way. We have also observed a significant inhibitory effect of acetaldehyde, the primary metabolite of ethanol, on this current. Considering missing data, we aimed to analyze ethanol-induced changes of inward rectifiers in the cardiac atria. Experiments were performed by the whole-cell patch clamp technique at room temperature in enzymatically isolated rat atrial myocytes. In contrast to the ventricular I_{K1} , ethanol in concentrations of 20 and 80 mM (~0.09 and 0.4%) showed only minor average changes of the atrial I_{K1} . In the case of $I_{K(Ach)}$, both components of this current, i.e. the constitutively active and the acetylcholine-induced $I_{K(Ach)}$, were affected by ethanol. The constitutively active $I_{K(Ach)}$ was significantly increased at all examined concentrations between 2 and 80 mM (e.g. at 20 mM by $114.6 \pm 28.3\%$). The acetylcholine-induced $I_{K(Ach)}$ was affected by 8 to 80 mM ethanol in a dual way with its prevailing activation (e.g. by $29.2 \pm 17.3\%$ at 20 mM). To conclude, the effect of ethanol on the atrial I_{K1} was minor compared to its effect on the ventricular I_{K1} . Changes of the atrial electrophysiology under alcohol intoxication are likely caused by other factors, the clinically relevant action of ethanol on $I_{K(Ach)}$ may contribute.

Biography

Marketa Bebarova has completed her MD studies at the age of 25 years and her PhD studies at the age of 29 years, both at Masaryk University (Czech Republic). Subsequently, she passed a Postdoctoral research stay at Cardiovascular Research Institute Maastricht, Maastricht University (Netherlands). Nowadays, she serves as an Associate Professor and as the Head of Laboratory of Cellular Electrophysiology at Department of Physiology, Faculty of Medicine, Masaryk University. She has published 20 papers in reputed journals. She is a nucleus member of the European Working Group (WG) on Cardiac Cellular Electrophysiology (WG of the European Society of Cardiology).

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