

Short-term administration of L-carnitine can be detrimental to the ischemic heart

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Background and Aims: The aim of present study was to investigate the effects of short-term administration of L-carnitine (LC) on ischemia/reperfusion (I/R) induced arrhythmias in isolated rat heart.

Methods: Isolated hearts of male Sprague-Dawley rats were mounted on a Langendorff apparatus and perfused with a modified Krebs–Henseleit (K/H) solution. The hearts were allocated randomly to one of following groups: (a) control; (b) the hearts which were perfused with 0.5, 2.5 and 5 mM of LC-enriched K/H solution for the whole period of I/R (Protocol A); (c) or during 10 min before or 10 min after ischemia (Protocol B). Regional ischemia (30 min) followed by reperfusion was induced by occlusion/ de-occlusion of LAD artery, respectively. The ECGs were analyzed to determine cardiac arrhythmias.

Results: Perfusion of LC in protocol A, produced significant ($p < 0.05$) reduction in the number of ventricular tachycardia (VT) (max 65%) during reperfusion. The incidence of reperfusion-induced ventricular fibrillation (VF) was also decreased from its control value of 63% to 17% in the hearts perfused with 5 mM of LC. However, preischemic administration of LC (Protocol B) by concentrations of 2.5 and 5 mM produced significant elevation in the total number of ventricular ectopic beats (VEBs) from 667 ± 116 in the control to 1227 ± 161 and 1289 ± 171 , respectively. In this protocol, the incidence of VF was also elevated from 18% (control) to 67% in 5 mM LC treated hearts, as reflected by a significant raise in the total time spent in VF.

Conclusions: The results showed that LC produced antiarrhythmic effects only when it was perfused for the whole period of the experiment. However, short-term preischemic administration of LC could be arrhythmogenic in ischemic heart. Maybe, incomplete metabolism of fatty acids produces toxic long chain fatty acid metabolites and also interrupts glucose oxidation in such condition.

Keywords: L-carnitine; Short-term administration, Arrhythmia; Ischemia; Reperfusion