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Pharmacological postconditioning with lactic acid and hydrogen rich saline alleviates myocardial reperfusion injury in rats

Guoming Zhang¹, Song Gao², Xiaoyan Li¹, Lulu Zhang², Hong Tan¹, Lin Xu¹, Yaoyu Chen³, Yongjian Geng², Yanliang Lin⁴, Benjamin Aertker², Yuanyuan Sun⁵

Affiliations

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Abstract

This study investigated whether pharmacological postconditioning with lactic acid and hydrogen rich saline can provide benefits similar to that of mechanical postconditioning. To our knowledge, this is the first therapeutic study to investigate the co-administration of lactic acid and hydrogen. SD rats were randomly divided into 6 groups: Sham, R/I, M-Post, Lac, Hyd, and Lac + Hyd. The left coronary artery was occluded for 45 min. Blood was withdrawn from the right atrium to measure pH. The rats were sacrificed at different time points to measure mitochondrial absorbance, infarct size, serum markers and apoptotic index. Rats in Lac + Hyd group had similar blood pH and ROS levels when compared to the M-Post group. Additionally, the infarct area was reduced to the same extent in Lac + Hyd and M-Post groups with a similar trends observed for serum markers of myocardial injury and apoptotic index. Although the level of P-ERK in Lac + Hyd group was lower, P-p38/JNK, TNF α , Caspase-8, mitochondrial absorbance and Cyt-c were all similar in Lac + Hyd and M-Post groups. The Lac and Hyd groups were able to partially mimic this protective role. These data suggested that pharmacological postconditioning with lactic acid and hydrogen rich saline nearly replicates the benefits of mechanical postconditioning.

Figures

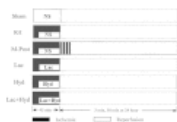


Figure 1. Timeline of the experimental protocols.

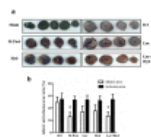


Figure 2. Analysis of ischemic and infarcted hearts.

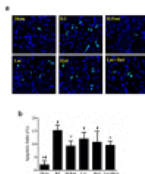


Figure 3. Detection of myocardial apoptosis. (a)...

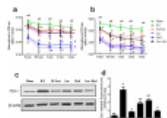


Figure 4. The measurement of mitochondrial membrane potential.

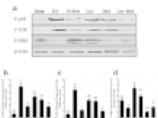


Figure 5. The phosphorylation expression of p38,...

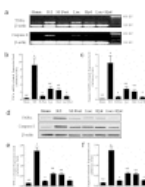


Figure 6. The expression of MAPK signaling pathway.

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