Protective effects of morphine preconditioning in delayed phase on myocardial ischemia-reperfusion injury in rabbits

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ABSTRACT. The aim of this study was to investigate the protective mechanisms of delayed-phase morphine preconditioning on myocardial ischemia-reperfusion injury. Thirty healthy male New Zealand white rabbits were randomly divided into three groups: a sham operation group (C), ischemia-reperfusion group (I/R), and delayed-phase morphine preconditioning group (M) (N = 10/group). Rabbits in the C group received thoracotomy for 160 min. Rabbits in the I/R group received left artery blockage for 40 min and reperfusion for 120 min. Rabbits in the M group received 1.0 mg/kg intravenous morphine 24 h prior to the identical treatment as the rabbits in the I/R group. In each group, the interleukin (IL)-10 and tumor necrosis factor (TNF)-α levels were detected at five time points: 20 min before the left coronary artery blockage (T1), 20 and 40 min after the left coronary artery blockage (T2 and T3, respectively), and 1 and 2 h after the myocardial reperfusion (T4 and T5, respectively). After reperfusion, the infarction size was
measured with Evans blue and 2,3,5-triphenyltetrazolium chloride (TTC) staining. Compared with the C group, serum IL-10 and TNF-α concentrations increased in the I/R and M groups; the difference was significant (P < 0.05). When compared with the I/R group, the IL-10 concentrations in the M group were significantly increased (P < 0.05), but the infarction size and TNF-α concentrations were significantly decreased (P < 0.05). These results suggested that delayed-phase morphine preconditioning might achieve myocardial protection through the regulation and balance of inflammatory cytokines.

**Key words:** Morphine; Preconditioning in delayed phase; Cytokines; Myocardial protection; Ischemia-reperfusion injury