Coronary endothelium plays a key role in exercise induced cardioprotection: a potential paracrine role of NO

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We recently showed that endothelial isoform of NOS (eNOS) plays a key role in exercise-induced cardioprotection during myocardial ischemia reperfusion (IR). Although this enzyme is expressed in both coronary endothelial cells and cardiac myocytes, only 20% of the total cardiac eNOS seems to localize in the cardiomyocytes. The aim of this study was to investigate the role of coronary endothelium in the eNOS exercise-induced cardioprotection.

Rats were assigned to sedentary (Sed) or exercised (Ex, 5 days/week for 5 weeks, 70% of maximal aerobic velocity) group. At the end of the exercise training period, hearts were mounted on an isolated hearts Langendorff apparatus and subjected to global ischemia (30 min) and reperfusion (120 minutes) in presence or not of a NOS inhibitor (L-NAME, 50μM). Treatment with L-NAME of isolated hearts during IR abolished exercise-induced cardioprotection, confirming previous results on the role of eNOS during IR. The contribution of the coronary endothelial cells was prevented by perfusing a bolus injection of Triton X-100 in the coronary system before IR. When endothelial cells are inactivated, the beneficial effects of exercise on hearts sensitivity to IR were totally abolished. Moreover cardiomyocytes isolated from sedentary and exercised hearts were subjected to 1 hour anoxia and 1 hour reoxygenation in presence or not of L-NAME (50μM). Interestingly, at the cardiomyocyte level, exercise-induced protection is not clear and L-NAME had no effect, suggesting that eNOS was not involved in such mechanism. In conclusion, the present results show that NO synthesis from coronary endothelial cells plays a major paracrine role in exercise induced cardioprotection.