



Effect of Swimming on Vascular Responses in male rats

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Abstract

The present study aimed to examine (1) whether there is any change in vascular responsiveness to alpha-agonist and KCl during exercise, and (2) whether the vascular endothelium plays a role in these changes. Adult male rats were subjected to a swimming schedule every day for 5-6 weeks. Studies were performed *in vitro* using thoracic aortae. Maximum contractile response to PE of endothelium-intact thoracic aortic rings obtained from swimming rats (1.2 ± 0.1 g, $n=8$) was lower than that of sedentary control rats (2.1 ± 0.2 g, $n=8$). When the endothelium was removed, however, the D-R curves of both groups of the rats were shifted to the left with an increase in maximum responses and no longer significantly different (max. tension, swim: 3.2 ± 0.3 g, $n=6$, control: 3.4 ± 0.4 g, $n=5$). Indomethacin (IDM) did not significantly alter the D-R curves. A similar effect to removal of endothelium was observed when methylene blue and IDM were both added. D-R curves to depolarizing concentrations of KCl (20, 40, 80 and 120mM) of endothelium-intact thoracic aortic rings were not different between those obtained from swimming and sedentary control rats. When the endothelium was removed, however, the D-R curves of both groups of animals were shifted to the left with increase in maximum responses. Moreover, the D-R curve of endothelium-denuded thoracic aortic rings of swimming rats showed increases in both sensitivity and maximum response greater than those of sedentary control rats. There were no differences in dilator responses to acetylcholine of endothelium-intact thoracic aortic rings, precontracted with PE or 80 mM KCl, between the rings obtained from swimming and sedentary control rats. These results suggest that there were changes in vascular responsiveness to alpha-agonist and KCl during exercise. The lower sensitivities to PE of endothelium-intact thoracic aortic rings obtained from swimming rats compared to those of sedentary control rats, and the restored of vascular responsiveness to depolarizing concentration of KCl of denuded rings of swimming rats, were due to an increase in spontaneous release of EDRF/NO, and not a consequence of an increase in prostaglandins or a decrease in the production of endothelial constrictors by vascular endothelium. EDRF/NO may play an important role in local vasodilatation.