Cerebral oxidative stress and angiotensin II signaling in chronic isoproterenol-infused rabbits

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Increased sympathetic nerve activity in the myocardium is a central feature of patients with heart failure, while cardiac remodeling is seen in isoproterenol (ISO) infused animals with severe myocardial hypertrophy accompanied by myocardial injury. Meanwhile, increased oxidative stress resulting from an increased cardiac generation of reactive oxygen species (ROS) is implicated in the progression of cardiac hypertrophy and heart failure. However, the role of ROS in -adrenoceptor stimulation-induced cerebral pathophysiology is not clearly understood. This study aimed to clarify the role of ROS in angiotensin II (Ang II) signaling in cerebral artery of ISO-infused rabbits.

Rabbits were infused with ISO intravenously for 7 days (10 mg/kg/day). Superoxide andhydrogen peroxide as well as superoxide dismutase (SOD) activity and NADH/NADPH oxidase were measured in cerebral artery, revealing the increased superoxide/hydrogen peroxide production and increased SOD activity in ISO-infused rabbits compared to control. NADH/NADPH oxidases were not different between control and ISO-infused rabbits. We also measured the changes of ROS intensity by Ang II and degree of DNA strand breaks in cerebral artery, revealing the augmentation of ROS production by Ang II and severe DNA strand breaks in ISO-infused rabbits compared to control. -Adrenoceptor stimulation provokes cerebral oxidative stress. ROS may participate in cerebral dysfunction, especially in respect to Ang II mediated vasoactivity during cardiac hypertrophy.