

ORIGINAL ARTICLE

Novel Role of the Renin–Angiotensin System in Preeclampsia Superimposed on Chronic Hypertension and the Effects of Exercise in a Mouse Model

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Abstract

Gestational hypertensive disorders, such as preeclampsia, affect 6% to 8% of all pregnancies in North America, and they are the leading cause of maternal mortality in industrialized countries, accounting for 16% of deaths. Women with hypertension have an increased risk (15% to 25%) of developing preeclampsia. Our aim was to investigate the mechanisms implicated in preeclampsia superimposed on chronic hypertension and in the protective effects of exercise in a mouse model. Female mice overexpressing human angiotensinogen and human renin were used as a model of preeclampsia superimposed on chronic hypertension. In the trained group, mothers were placed in cages with access to a wheel before mating, and they remained within these throughout gestation. Blood pressure was measured by telemetry. We found that angiotensin II type I receptor was increased, whereas the Mas receptor was decreased in the placenta and the aorta of pregnant sedentary transgenic mice. This would produce a decrease in angiotensin-(1–7) effects in favor of angiotensin II. Supporting the functional contribution of this modulation, we found that the prevention of most pathological features in trained transgenic mice was associated with a normalization of placental angiotensin II type 1 and Mas receptors and an increase in aortic Mas receptor. We also found reduced circulating and placental

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