

In Vivo Analysis of Angiotensin II-Induced Hypertension and Vascular Disease in Rats

Hamna J. Qureshi, Evan H. Phillips, and Craig J. Goergen
Weldon School of Biomedical Engineering, Purdue University

ABSTRACT

Murine models of abdominal aortic aneurysms (AAA) are commonly used to study the pathogenesis of this disease. Rats are often used in laboratory studies because of their size and because they are more physiologically similar to humans than mice are. In this study, we subcutaneously implanted 9-week-old apolipoprotein E-deficient (apoE KO) rats with angiotensin II-filled pumps to study the effects of this vasoconstricting hormone on aneurysm development. Deletion of the apoE gene in mice causes excess lipid accumulation in the blood vessels, thereby increasing the likelihood of atherosclerotic lesions in the aorta. However, atherosclerotic plaque buildup was not evident when the rats consumed either normal chow or high fat diets, and no dissecting aneurysms were identified via ultrasound. We observed an average of 32.5 ± 28.8 mmHg increase in systolic blood pressures as early as 4 days post-pump implantation and an increase of 54.2 ± 25.9 mmHg from baseline 6 weeks after angiotensin II infusion began. This study shows that apoE KO rats can be valuable models for the physiological development of hypertension but not for dissecting suprarenal aneurysms. Future studies will focus on studying the effects of angiotensin II on the hearts of these genetically modified animals.

KEYWORDS

Hypertension, abdominal aortic aneurysms, ultrasound, angiotensin II, apolipoprotein E