Differential responses to adenine-induced chronic kidney disease in WKY and SHR models

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Abstract

Introduction**:** This study delineates the distinct cardiovascular outcomes associated with CKD only versus CKD with concurrent hypertension. We induced CKD in Wistar Kyoto rats (WKYs), a model of lone CKD, and Spontaneously Hypertensive Rats (SHRs), a model of CKD with comorbid hypertension.

Methods: Both WKY and SHR were divided into control and adenine-treated subgroups. Adenine supplemented diet was administered for 8 weeks. At termination, under anaesthesia, a catheter was inserted into the carotid artery to measure central pressures, and echocardiography was performed to assess cardiac function. Pulsepenlab was used to determine aortic function. Blood samples were collected via cardiac puncture.

Results**:** The urea concentration was larger in SHR-treated rats compared to those in other groups ($P=0.028$). Central systolic blood pressure ($P<0.001$), pulse pressure ($P<0.02$) and mean arterial pressure ($P<0.001$) were larger in SHR and SHR-treated groups compared to the WKY and WKY-treated groups. The SHR-treated group had a larger pulse pressure compared to the WKY-treated group ($P=0.02$). Forward wave pressure ($P<0.002$), augmentation index ($P=0.006$) and augmented pressure ($P=0.004$) were increased in SHR-treated compared to WKY and WKY-treated groups. Left ventricular mass adjusted to body weight was higher in the SHR treated ($P=0.01$) compared to other groups. Right kidney mass adjusted for body weight was larger in the SHR-treated group than in the SHR ($P=0.0004$) and WKY control groups ($P=0.002$). The WKY-treated group also had heavier right sided kidneys than the WKY control group. Left kidney mass adjusted for body weight was larger in the SHR-treated group than in the WKY ($P=0.0002$) and the SHR control groups ($P=0.006$).

Conclusion**:** SHRs experience a greater susceptibility to adenine-induced kidney impairment than WKYs. Adenine-induced decreased kidney function causes more impaired aortic function, left ventricular mass and kidney weight in SHRs than in WKYs.