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The Role of Iron in Salt Sensitive Hypertension

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Summary

Background: Iron is associated with the pathogenesis of cardiovascular and renal diseases. Here, we investigated whether iron participates in the mechanism of salt sensitive hypertension and the effects of dietary iron restriction on salt sensitive hypertension.

Methods and Results: We used Dahl salt-sensitive rats and chronic kidney disease (CKD) rats as a salt sensitive hypertension model. CKD was induced by 5/6 nephrectomy in Sprague-Dawley rats. Dahl salt-sensitive rats were provided either a normal or high-salt diet. A further subset of Dahl salt-sensitive rats fed a high-salt with iron-restricted diet for 11 weeks. Dahl salt-sensitive rats given a high-salt diet developed hypertension, heart failure, and decreased a survival rate after 11 weeks diet. In contrast, iron restriction attenuated the development of hypertension and heart failure, thereby improved a survival rate. Dietary iron restriction suppressed cardiovascular hypertrophy, fibrosis, and inflammation in Dahl salt-sensitive rats given a high-salt diet. In addition, CKD rats exhibited hypertension and vascular remodeling. In contrast, iron restriction attenuated the development of hypertension and vascular remodeling. CKD rats also developed proteinuria, glomerulosclerosis, and tubulointerstitinal damage, whereas those changes were suppressed by iron restriction. Importantly, aortic expression of cellular iron import protein, transferrin receptor 1 was upregulated in both Dahl salt-sensitive rats fed a high-salt diet and CKD rats.

Conclusions: Taken together, these data suggest a causal role for iron in the pathogenesis of salt sensitive hypertension. Iron restriction could be an effective strategy for prevention of high salt-induced organ damage in salt-sensitive hypertensive patients.