Role of aldosterone in oxidative stress and organ injury

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Recent clinical studies have indicated the utility of mineralocorticoid receptor (MR) antagonists in cardiovascular and renal injuries. Chronic treatment with aldosterone/salt resulted in severe cardiac and renal injuries in rats. Further studies showed that the aldosterone-induced organ injuries were associated with increases in expression of NADPH oxidase components and reactive oxygen species (ROS) levels. Treatment with a selective MR antagonist, eplerenone, prevented elevations of ROS levels and ameliorated organ injuries. In vitro studies also showed that MR is highly expressed in cultured vascular smooth muscle cells, glomerular mesangial cells and fibroblasts. In these cells, aldosterone-induced cell injuries were associated with increases in NADPH oxidase activity and superoxide generation. Further, the aldosterone-dependent cell injuries were markedly attenuated by treatment with eplerenone. These accumulating data support the notion that the aldosterone/MR is involved in the pathogenesis of cardiovascular and renal injuries through NADPH oxidase-dependent ROS production.