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## The dietary phase 2 protein inducer sulforaphane can normalize the kidney epigenome and improve blood pressure in hypertensive rats.

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#### Abstract

**BACKGROUND:** Our previous studies have shown that broccoli sprouts high in the glucosinolate glucoraphanin decreases renal and vascular oxidative stress and inflammation as well as blood pressure in spontaneously hypertensive stroke-prone (SHRSP) rats. The objective of this study was to determine whether the metabolite of glucoraphanin, sulforaphane, was responsible for this improved blood pressure and whether this is associated with normalization of renal methylated DNA.

**METHODS:** Sulforaphane was given by gavage to SHRSP and Sprague Dawley (SD) rats over 4 months and blood pressure measured under anesthesia just before euthanasia. Renovascular morphology was determined by histology and methylated deoxycytosine levels analyzed using high-performance liquid chromatography.

**RESULTS:** Mean arterial pressure was 20% higher in vehicle-treated SHRSP when compared to SD. Sulforaphane administration to SHRSP improved blood pressure and lowered this difference to 11%. Vehicle-treated SHRSP had significantly increased wall:lumen ratios in renal arteries, increased numbers of vascular smooth muscle cells (VSMCs), increased renal protein nitration, and decreased (11%) renal DNA methylation compared to SD. Sulforaphane administration to SHRSP significantly lowered arterial wall:lumen ratio by 35%, reduced the number of VSMCs, reduced the level of protein nitration, and increased methylated deoxycytosine levels by 14%.

**CONCLUSIONS:** Sulforaphane administration rectified pathological abnormalities in SHRSP kidneys and significantly improved blood pressure. This was associated with normalization of global kidney DNA methylation suggesting that DNA methylation could be associated with hypertension.

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