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Longitudinal relationships between diet-dependent renal acid load and blood pressure development in healthy children.

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Diets high in sulfur-rich protein and low in fruits and vegetables affect human acid-base balance adversely. Corresponding subclinical forms of metabolic acidosis have been linked to hypertension in adults. We longitudinally examined relations of dietary acid load with blood pressure in 257 healthy prepuberty children with 3 or more parallel 3-day weighed dietary records, 24-h urine, and blood pressure measurements. Urinary net acid excretion and the potential renal acid load (PRAL), determined as the difference of major urinary nonbicarbonate anions and mineral cations, were used to predict dietary acid load. PRAL was also calculated from dietary data. In repeated-measures regression analyses, adjusted for body size and dietary fiber, an intraindividual increase of 10 mEq above the 'usual' net acid excretion or urine PRAL were each significantly related to a 0.6-0.7 mm Hg increased systolic blood pressure. Differences in urine PRAL among the children also significantly predicted between-person differences in systolic blood pressure. A higher individual net acid excretion or urine PRAL and intraindividual increase in urine PRAL were significantly related to higher diastolic blood pressure. Blood pressure associations were nonsignificant for dietary PRAL and urinary sodium. Thus, in healthy children, renal biomarker analyses reveal an association of proton load with higher blood pressure. Especially for systolic blood pressure, a more alkalizing nutrition may be beneficial for blood pressure development within a given individual. Experimental confirmation of a causal acid load-blood pressure link is required.