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Maternal dehydration contributes to the development of salt sensitivity of blood pressure (SSBP) in offspring, with its influence likely tied to an elevation in vasopressin secretion.

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Abstract

This study investigated whether maternal dehydration programs SSBP and abnormal glucose metabolism (AGM) traits in offspring, both highly predictive of diverse cardiovascular conditions. Physiological studies were conducted with rat offspring, classified into two groups: those born to rat mothers with a 35% drinking water restriction during pregnancy and lactation (referred to as "experimental offspring"), and those born to mothers with unrestricted water access ("control offspring"). In the control group, a four-week salt challenge involving 8% NaCl-containing chow, initiated at four weeks of age, did not significantly alter systolic blood pressure (SBP), regardless of sex. Conversely, the experimental group exhibited a marked SBP increase post-salt challenge, especially in males. Notably, glucose loading (200 mg/kg body weight) administered to both control and experimental offspring, exposed to a 32% sugar-containing drinking fluid regimen for 0-10 weeks, did not lead to abnormal blood sugar elevation. Further investigations unveiled that maternal water restriction's impact on the salt challenge-induced SBP response in male experimental offspring was counteracted by maternal conivaptan (non-selective vasopressin antagonist) treatment (22 ng/hour, sc.) during pregnancy. Additionally, these studies underscored a substantial rise in the percentage of vasopressin neurons displaying excitatory GABAergic postsynaptic potentials in the supraoptic nucleus of male experimental offspring post-salt challenge, a phenomenon absent in the control group. In summary, these findings suggest that maternal dehydration contributes to the development of SSBP trait in offspring. The programming and expression of this trait in male offspring appear linked to heightened vasopressin secretion, potentially regulated by excitatory GABAergic mechanisms.