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Investigation of High Salt Induction on Endothelial Function Using Metabolomic Analysis

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Summary

High salt intake is considered as a risk factor for cardiovascular diseases including erectile dysfunction thorough mineralocorticoid receptor (MR) activation, however, the mechanisms underlying high salt intake on erectile function remain unclear. We investigated whether high salt intake directly impair erectile function and whether MR inhibition protect erectile function from high salt intake.

Male Dahl salt-sensitive (Dahl-S) rats were distributed into 3 groups: normal salt (0.3% NaCl) diet (Control), high salt (8% NaCl) diet (HS), and high salt plus eplerenone (HS+EPL). In the HS+EPL group, rats received daily oral doses of EPL.

Erectile function using intracavernosal pressure (ICP) and mean arterial pressure (MAP) measurements after electrical stimulation of the cavernous nerve. Asymmetric dimethylarginine (ADMA) levels using ultra-performance liquid chromatography–tandem mass spectrometry (UPLC-MS/MS). Endothelial function was measured using isometric tension as previously reported.

In the HS group, the ICP/MAP ratio significantly was decreased. Serum ADMA was increased. The HS group exhibited significantly lower responses to ACh, as compared to those in the control group. However, EPL administration significantly improved each of these parameters.

Normal salt (0.3% NaCl) diet did not change the blood pressure in Dahl-S rats, whereas high salt (8% NaCl) diet increased the blood pressure. In this study, erectile function was impaired in high salt intake Dahl-S rats. The high salt diet also caused hypertension. On the other hands, EPL administration improved the erectile function in high salt intake Dahl-S rats. However, EPL did not change the blood pressure in high salt intake Dahl-S rats. Some reports also showed EPL administration did not change the blood pressure in high salt intake Dahl-S rats. In conclusion, high dietary salt intake impaired erectile function and enhanced MR expression in Dhal-S rats. Selective MR inhibitor improved erectile function without changing blood pressure. These results indicate that high salt intake caused ED though MR pathway beyond its effect on blood pressure.