

Discovery of Gastro-Intestinal Autonomic Afferent Pathway as Salty Sensor

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Summary

Previously, it has been shown that intraduodenal injection of hypertonic solution stimulated thermogenesis in rat, suggesting the existence of the NaCl sensor in the gastro-intestinal organs. Thus, we performed electro-physiological experiment whether gastro-intestinal injection of high NaCl solution affects afferent vagal nerve outflows supplying the stomach, intestine, or liver in anesthetized mice. In the present study, we firstly showed that intragastric injection of 1M NaCl solution activated afferents of vagal nerves in the stomach, and that intraduodenal or intraportal injection of 1M NaCl solution also stimulated celiac or hepatic afferents of vagal nerves, respectively. These results suggest that vagal afferent pathway responds to NaCl stimulation. In addition, intragastric injection of 1M NaCl solution suppressed efferent renal sympathetic nerve activity without changes of blood pressure and heart rate, and abdominal vagotomy did not affect NaCl-induced renal sympatho-inhibition. Thus, these lines of evidence suggest that NaCl-induced stimulation of gastrointestinal organs may affect vagal afferents and regulate efferent sympathetic outflows through the central nervous system. However, TRPV1 channel blocking of abdominal organs did not affect NaCl-induced vagal afferent excitation, indicating that signal pathways except of TRPV channel may be involved in the NaCl-induced afferent autonomic nerve regulation in the gastro-intestinal organs. To determine this mechanism, it will be needed to perform further studies in the future.