Bachelor of Philosophy Sample Thesis Prospectus

(Neuroscience)

Title: Early Gastric Emptying and Vasopressin Secretion in DOCA-Treated Rats Drinking Saline Solution

It has recently been implicated that control of fluid consumption is modulated in part by a visceral osmoreceptor in rats. The present study is being conducted to investigate how these receptors may be involved in early control of gastric emptying and vasopressin secretion in deoxycorticosterone (DOC)-treated rats drinking NaCl solutions of varying concentration.

Rats were injected subcutaneously daily with 2 mg DOC dissolved in 0.4 ml sesame oil, after which a single-bottle drinking test was conducted. The fluid administered during the drinking tests always was saline, which varied in concentration across treatment groups. Concentrations of 0.10 M, 0.15 M, 0.20 M, 0.25 M and 0.30 M NaCl were tested, and the duration of the drinking test decreased each day to promote rapid immediate drinking. By the final day of drinking, access was limited to 20 minutes. After a period of 7-10 days, when a substantial and stable salt drinking had been attained, a terminal experiment was conducted. DOC-treatment and saline access were conducted as in the previous days, with the exception that the test was stopped after a total of 2 minutes of pauses while drinking. At this point, the rats were sacrificed by decapitation, and trunk blood was collected in heparinized tubes. The blood was centrifuged and the plasma collected and assayed for sodium, protein, and vasopressin concentrations. The stomachs of the rats were removed, and the contents were weighed, dried, and then weighed again.

As expected, preliminary data analysis has shown that there is a difference in gastric emptying among the different concentrations of saline. All concentrations of fluid show a similar pattern of emptying, with an initial bolus of emptying followed by a period of slowed emptying. Then there is a third phase of emptying, in which emptying once again increases in magnitude. It is this third phase that varies among different concentrations, with the more concentrated solutions emptying at a slower rate than the less concentrated solutions. Further data analysis must be done to determine the effects of drinking saline on vasopressin secretion.

This research is the beginning of a greater body of work to be done on this general subject. Previous work indicating the presence of visceral osmoreceptor in rats showed that intragastric saline loads in water-deprived rats stimulated thirst and vasopressin secretion before there was a change in plasma sodium concentration (Strickler et al., 2001). The work presented here is novel in that similar parameters are being examined in euhydrated rats that are drinking substantial amounts of saline, as opposed to having it artificially administered. In addition, this work is among the first to examine how DOC-treatments affect gastric emptying in rats drinking saline. Further experiments should examine gastric emptying and vasopressin secretion in rats after salt consumption caused by other treatments, such as adrenalectomy and water deprivation.