

Ghrelin and appetite regulation in the spinifex hopping mouse

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Ghrelin is a hormone released from the gut that stimulates food intake, and is important in the control of energy balance. The water-deprived Spinifex hopping mouse, *Notomys alexis*, exhibits a natural cycle of fasting, followed by sustained food intake that is greater than animals with access to water. Food intake is increased to generate metabolic water in order to maintain fluid homeostasis during water deprivation (WD). We hypothesised that an important driver of the increased appetite is ghrelin. Five groups (n = 5) of hopping mice were subjected to WD with unlimited food availability over a time course of 29 days. Food intake and body weight were determined each day and compared to a control group with access to water. Plasma and tissue samples were collected at five time points (days 0, 2, 5, 10 and 29), and the level of plasma ghrelin and brain ghrelin receptor (GHSR1a) mRNA were determined by ELISA and real time-PCR, respectively. Plasma ghrelin concentration mirrored the decreased food intake during the first five days of WD, rising significantly above control (Day 0) at day 10 ($p < 0.05$) and then decreasing markedly in the second phase of WD. Brain GHSR1a mRNA expression peaked at day 2 of WD when plasma ghrelin levels were lowest, then decreased to control levels for the remainder of the experiment. The data suggest ghrelin is important in stimulating the increase in food intake in hopping mice during the first phase of WD. However, ghrelin signalling appears to be down-regulated in the sustained appetite drive of the second phase of WD, suggesting that other signalling systems are involved in appetite regulation during this phase.