Palatable food regulates the activity of magnocellular oxytocin neurons in the supraoptic nucleus of the hypothalamus

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Introduction & Hypothesis

Alongside oxytocin's classical roles in maternal behaviour, this peptide is now considered to be key in the control of food intake. In rats, there is evidence that SON oxytocin neurons are activated by the consumption of bland food when hungry1. After food consumption, the peripheral hormone cholecystokinin signals satiety to anorexigenic neurons of the hypothalamic arcuate nucleus. These neurons release α-melanocyte stimulating hormone which in turn regulates oxytocin neurons in the supraoptic nucleus (SON) of the hypothalamus2.

Aims: Use oxytocin- and c-Fos-like immunoreactivity alongside in vivo electrophysiology to study SON oxytocin neuron activity in response to in vivo gavage of a palatable food.

Hypothesis: SON oxytocin neurons are activated in response to the direct delivery of palatable food into the stomach.

Methods

Male Sprague Dawley rats fasted overnight & terminally anaesthetised

Gavage of sweetened condensed milk (SCM) OR sham gavage

Blood sampling

Electrophysiological recording in the SON before, during and after SCM gavage

Scm gavage results in increased c-Fos-like immunoreactivity and a sustained increase in the firing rate of SON oxytocin neurons. This increase in SON neuron activity is not due to a change in osmolarity. Instead, SON oxytocin neurons may be regulated by satiety-related peripheral signals released in response to food in the stomach, providing further evidence for oxytocin's role in the control of food intake.

Results

(1) Increased c-Fos expression in SON oxytocin neurons after SCM gavage

(2) Increase in firing of SON oxytocin neurons with SCM gavage

(3) Blood glucose increases with SCM gavage but plasma osmolarity does not

Conclusion

SCM gavage results in increased c-Fos-like immunoreactivity and a sustained increase in the firing rate of SON oxytocin neurons. This increase in SON neuron activity is not due to a change in osmolarity. Instead, SON oxytocin neurons may be regulated by satiety-related peripheral signals released in response to food in the stomach, providing further evidence for oxytocin's role in the control of food intake.


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