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Daily variation in neurohypophysial function in mother and pups during lactation in the rat

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A daily variation in the circulating concentrations of oxytocin and vasopressin has been demonstrated in the rat (Windle & Forsling, 1993), accompanied by changes in pituitary and hypothalamic content. The changes in vasopressin have been shown to vary with reproductive status (Forsling & Peysner, 1988), but no studies have been performed during lactation, neither is it known if such rhythms have been established in the pups. A study has therefore been performed on the daily rhythms in the hormone content of the neurohypophysial system and release of oxytocin and vasopressin in mother and pups during lactation.

Observations were performed on 10 lactating rats and 14 pups. Trunk blood was obtained on humane decapitation at either 08.00 h or 20.00 h and the hypothalamus and pituitary removed. Vasopressin and oxytocin were determined by radio-immunoassay of plasma and extracts of the whole hypothalamus and pituitary.

As found in normally cycling female rats, there was a significant increase in the circulating concentrations of both vasopressin and oxytocin over the hours of daylight, values increasing from 1.8 ± 0.08 to 4.0 ± 0.08 pmol l⁻¹ and 3.2 ± 0.24 to 9.3 ± 0.3 pmol l⁻¹, respectively (means \pm S.E.M., $P < 0.05$, Student's unpaired t test). The hypothalamic hormone content similarly showed a significant increase during the day, while the pituitary content fell, oxytocin content falling from 1200 ± 80 to 834 ± 98 nmol per gland. Similar rhythms of neurohypophysial function were seen in the pups. Plasma vasopressin concentrations increased from 0.8 ± 0.06 to 1.1 ± 0.03 pmol l⁻¹, while the pituitary content fell from 382 ± 18 to 268 ± 40 nmol per gland. Plasma oxytocin concentrations were 1.6 ± 0.1 pmol l⁻¹ at 08.00 h, increasing to 2.6 ± 0.12 pmol l⁻¹ at 20.00 h and the pituitary content at the two times was 336 ± 18 and 192 ± 16 nmol per gland, respectively. As in the adult the vasopressin content of the hypothalamus increased between 08.00 and 20.00 h. Oxytocin content however showed no significant change.

Thus normal adult rhythms of neurohypophysial function are unchanged in the mother during lactation and are established in the pups.

Forsling ML & Peysner K (1988). *J Endocrinol* **117**, 397–402.

Windle RJ & Forsling ML (1993). *J Endocrinol* **136**, 305–311.

All procedures accord with current UK legislation.