

Oxytocin system activity in the nucleus accumbens shell drives maternal aggression and is altered by local CRF infusion

Subjects and husbandry

- Mothers: lactating Sprague-Dawley rats (230g – 250g, Charles River); Intruders: virgin female Sprague-Dawley rats (200g – 220g, Charles River)
- Standard laboratory conditions (12/12 h light/dark cycle, lights on at 7:00, 22 °C, 55 % humidity) with water and food *ad libitum*

Stereotaxic surgery

On lactation day 2 (LD2) animals were bilaterally implanted with guide cannulas (Exp. 1; 23G; 12mm length; stainless steel) 2 mm above the Nucleus accumbens shell (NAcSh, AP 1mm; L 3mm; D 5.3mm; angle 17.5°) under isoflurane anesthesia.

On LD2, rats were unilaterally implanted with a microdialysis probe (Exp. 2; molecular cut-off: 18 kDa; Hemophan, Gambro Dialysatoren, Hechingen, Germany) targeting the NAc (AP 1mm; L 3mm; D 7.3mm; angle 17.5°).

Maternal defense test

Maternal aggression was monitored following drug infusion in the MDT by measuring the number of aggressive behaviors within 10 min. To define an “aggression score” and enhance the accuracy of behavioral phenotyping (Guillox et al., 2011), z-score was calculated as follows:

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$$z - aggression = \frac{\left(\frac{x-\mu}{\sigma}\right)attack + \left(\frac{x-\mu}{\sigma}\right)keep\ down + \left(\frac{x-\mu}{\sigma}\right)aggr.\ grooming + \left(\frac{x-\mu}{\sigma}\right)lateral\ threat + \left(\frac{x-\mu}{\sigma}\right)aggr.\ sniffing + \left(\frac{x-\mu}{\sigma}\right)off.\ upright}{number\ of\ parameters}$$

X: individual value

μ : mean of control group

σ : standard deviation control group

Maternal care observation

Maternal care (MC) was monitored for 10s every 2nd minute in 30-min blocks, following an established protocol (Bosch and Neumann, 2008). In Exp. 1, MC was monitored under basal conditions as well as after the maternal defense test (MDT, a psychosocial stressor).

The occurrence of the following nursing parameters was scored: arched back nursing (ABN), blanket nursing posture, other nursing posture (together, these parameters account for “total nursing”). Other maternal as well as non-maternal behaviors (e.g., self-grooming) were monitored.

Retrodialysis and oxytocin measurement

On LD 4, the inflow adapter of the microdialysis probe was connected via PE-20 tubing to a syringe mounted onto a microinfusion pump; the outflow adapter was attached to a 1.5 ml collection tube. Ringer’s solution was flushed to collect basal samples (-60, -30), then the syringes were switched to those containing CRF or Ucn3 to allow drug infusion. After 30 min, the syringes were switched back to vehicle. Samples were collected in 30-min intervals and immediately frozen on dry-ice. Oxytocin content was measured with radioimmunoassay by an external company (RIAgnosis).