Oxytocin and Social Bonding as Treatments in a Rodent Model of Post-Traumatic Stress Disorder

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1. Introduction

- In preclinical studies, stress disorders (PTSD) are often caused by the experience of an extreme stressful event. Symptoms manifest within 6 months and include re-experiencing of the traumatic event.
- Oxytocin (OXT) is an amino-acid peptide that has been linked to social bonding and stress reduction in rats and humans.
- Prior studies have shown that peripheral administration of OXT reduces anxiety-related behaviors in rats.
- OXT and/or social bonding may be beneficial in reducing the probability of developing PTSD.
- We hypothesize that peripheral OXT administration immediately after trauma and continuous social bonding interventions are treatments that may prevent the development of PTSD symptoms.

2. Methods

- Injections and pumps were prepared at a concentration of 40 μg/μl saline.
- Single and co-housed animals were exposed to shock.
- Oxytocin SC injections: 0.2 mg/kg in saline. Oxytocin SC pumps: 7-Day & 14-Day osmotic pumps.
- Behavioral tests were conducted to assess anxiety levels.

3. A. Effect of Oxytocin

3. A.1. Introduction

- Oxytocin and social bonding may have a therapeutic effect on anxiety levels during re-exposure to a stressful context.
- The effect of OXT is somewhat controversial.


- Behavioral tests were conducted to assess anxiety levels.
- The co-housed shock group is compared to the co-housed sham group and the single housed shock group.

3. A.3. Results

- The co-housed shock group is compared to the co-housed sham group and the single housed shock group.
- The co-housed shock group spent significantly more time in the center of the open field than the co-housed sham group.
- The shocked rats spent significantly less time in the shock compartment than the shocked sham rats.
- The co-housed shock group displays a trend of lower anxiety in the open field and in the elevated plus maze.

3. B. Effect of Oxytocin

3. B.1. Situational Reminders

- A single OXT injection after shock did not interfere with the consolidation of the traumatic memory at SR1 (data not shown).
- However, subsequent consolidations were prevented in the multiple-injection group (dark blue).
- These subsequent consolidations were prevented in the multiple-injection group (dark blue).

3. B.2. General Anxiety Tests

- General anxiety tests were conducted to assess anxiety levels.
- The co-housed shock group displays a trend of lower anxiety in the open field and in the elevated plus maze.
- The shocked rats spent significantly less time in the shock compartment than the shocked sham rats.

4. Conclusions

- Social bonding may prevent short-term anxiety and the development of certain forms of long-term anxiety.
- Social bonding is mediated by multiple systems, in addition to OXT.
- OXT and/or social bonding and support may also be beneficial in reducing context-associated fear.
- Chronic administration of OXT during contextual reminders can prevent the development of long-term anxiety by reducing context-associated fear.
- Chronic, but not acute OXT is effective at reducing avoidance to the shock compartment.
- Findings in the OXT-pump group suggest that OXT affects the consolidation of sensorially salient memories differently than that of neutral memories, or that the trauma-related memory is unable to be reconsolidated during re-exposures if the OXT is administered before or during the re-exposures.

5. References

- Corral-Frias NS, LaHood R, Vogelsang K, French ED, Fellous JM.
- Ring, Robert H., et al. "Anxiolytic-like activity of oxytocin in male mice: behavioral and autonomic evidence, chronic, but not acute oxytocin is effective at reducing avoidance to the shock compartment."
- Future directions include examination of the effects of sensorially salient memories on the consolidation of non-emotional memories, and the combination of social bonding and exogenous OXT as a potential treatment for PTSD intervention.

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