

Commentary

A Potential Role for Oxytocin in the Intergenerational Transmission of Secure Attachment

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Neuropsychopharmacology (2009) 34, 2621–2622; doi:10.1038/npp.2009.136; published online 2 September 2009

If a significant amount of psychopathology stems from insecure attachment during infancy and childhood (Berant *et al*, 2008), then much of this illness is perpetuated by the intergenerational transmission of attachment styles (van Ijzendoorn *et al*, 1995). One fundamental challenge for psychiatry is to break this cycle, and doing so will require knowledge of the biological and psychosocial mechanisms that fuel it.

In this issue, Strathearn and colleagues present evidence that the neuropeptide oxytocin may be an important component of this mechanism. Oxytocin mediates mother–infant attachment in rats and sheep, as well as adult female pair bond formation in prairie voles (Insel and Young, 2001); hence it is reasonable to hypothesize that it might also mediate attachment between human mothers and their children. Recently, researchers have begun investigating the role of oxytocin in human behavior through the use of intranasal oxytocin sprays that seem to enable neuropeptides to cross the blood–brain barrier (Born *et al*, 2002). These studies have demonstrated several remarkable behavioral effects of oxytocin in human subjects, including increased gazing to the eye region of faces, improved face expression recognition, enhanced encoding of positive social memories, decreased behavioral and neuroendocrine responses to social stress, increased positive communication between couples, and increased levels of trust and generosity in economic games (Ebstein *et al*, 2009; Heinrichs and Domes, 2008). Most of these studies have been conducted with male subjects, however, and human maternal behavior has not yet been targeted with this approach.

In this issue, Strathearn and colleagues investigate the influence of the oxytocin system on attachment with an

alternative and innovative approach that emphasizes ecological validity. During pregnancy, women were assessed for attachment styles and categorized as either Type A (insecure, dismissive attachment) or Type B (securely attached) mothers. Approximately 7 months after giving birth, the mothers' plasma oxytocin response to an interaction with their infant was measured, and Type B mothers were found to have a greater oxytocin response than Type A mothers. Approximately 11 months after delivery, both types of mothers were imaged with fMRI, as they viewed pictures of both their own and other infants displaying happy, sad, or neutral facial expressions. Type B mothers, who had earlier exhibited the stronger oxytocin response to interactions with their infants, showed a stronger ventral striatum response to their infant's happy and sad faces than did Type A mothers. Moreover, there was a significant positive correlation between a mother's oxytocin response when interacting with her infant and her ventral striatum response when later viewing her infant's face in the MRI scanner. The ventral striatum is a putative reward region at the cross-roads of the mesolimbic dopamine and oxytocin systems (Skuse and Gallagher, 2009), and both dopamine and oxytocin are known to facilitate pair bonding in female prairie voles (Young *et al*, 2005). Although oxytocin was not measured during the scanning session, it is possible that the higher oxytocin levels characteristic of Type B mothers render stimuli associated with their own child more rewarding than is the case for Type A mothers, and this, in turn, could very well influence the mothers' responsiveness to her infant and hence the quality of attachment that develops.

A necessary caveat to these notable findings is that the authors measured oxytocin in plasma, but plasma oxytocin may not always be an accurate reflection of oxytocin levels in the brain (Landgraf and Neumann, 2004). An important next step would be to determine whether intranasal administration of oxytocin to Type A mothers before imaging augments their ventral striatum response to viewing pictures of their own infants. Nevertheless, this

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Received 31 July 2009; accepted 31 July 2009

paper by Strathearn and colleagues is an important first step toward a better understanding of the biological basis of individual variation in mothering among women, a behavior sure to have consequences for the physical and mental development of the next generation.

DISCLOSURE

The author declares no conflict of interest.

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See related article by Strathearn *et al* on page 2655.