

# Maternal love: How a mother's brain responds to her infant

February 28 2008

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The distinctive ability of mothers to identify the cries of their offspring is widely evident in nature, where it is critical to the survival of these offspring. In humans, we are aware that the distinctive ability of mothers to recognize and respond to the smiles and cries of their babies plays an important role in the psychological, cognitive, and social development of these babies.

We have had a very limited understanding of how the maternal brain accomplishes these amazing feats, but a new study published in the February 15th issue of *Biological Psychiatry* now provides some new insight.

Noriuchi, Kikuchi, et al. used functional magnetic resonance imaging (fMRI), a tool that enables scientists to study the function of brain circuits in people, to examine patterns of maternal brain activation. The authors asked healthy mothers to view video clips, which showed either their own infant (approximate age of 16 months) or an unknown infant in two emotional conditions – either happy or upset/crying.

Dr. Madoka Noriuchi, senior author on the paper explains their findings: “We found that a limited number of mother’s brain areas were specifically related to maternal love, and the specific pattern of mother’s response was observed for her infant’s attachment behaviors evoking mother’s care-taking behaviors for vigilant protectiveness.”

In other words, they discovered that particular circuits in the brain,

involving several regions in the cerebral cortex and limbic system, are distinctively activated when mothers distinguish the smiles and cries of their own infants from those of other infants. The authors also found that a mother responds more strongly to the crying than the smiling of her own infant, which, according to the authors, seems “to be biologically meaningful in terms of adaptation to specific demands associated with successful infant care.”

John H. Krystal, M.D., Editor of *Biological Psychiatry* and affiliated with both Yale University School of Medicine and the VA Connecticut Healthcare System, discusses the importance of this study: “This type of knowledge provides the beginnings of a scientific understanding of human maternal behavior. This knowledge could be helpful some day in developing treatments for the many problems and diseases that may adversely affect the mother-infant relationship.”

The article is “The Functional Neuroanatomy of Maternal Love: Mother's Response to Infant's Attachment Behaviors” by Madoka Noriuchi, Yoshiaki Kikuchi and Atsushi Senoo. The authors are from the Laboratory of Cognitive Neuroscience, Department of Frontier Health Science, Division of Human Health Science, Graduate School of Tokyo Metropolitan University, Tokyo, Japan. The article appears in *Biological Psychiatry*, Volume 63, Issue 4 (February 15, 2008), published by Elsevier.

Source: Elsevier

Citation: Maternal love: How a mother's brain responds to her infant (2008, February 28)  
retrieved 19 April 2024 from  
<https://medicalxpress.com/news/2008-02-maternal-mother-brain-infant.html>

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