

AREA THREE: MECHANISMS BY WHICH ALTRUISTIC LOVE AFFECTS HEALTH

The chain of events leading from negative emotional responses to external events to impact on disease has been well investigated. There has been less research into applying the same model to studying the effects of positive emotional responses on health. The same approaches and standards that have been used in the stress literature can be applied to the study of the chain of events leading from altruistic love to beneficial effects on health. It is possible that the mechanism by which altruistic love affects health occurs through blocking or attenuating the stress response, or through activating positive neurotransmitter pathways in the brain.

Research Area Consultant

Esther M. Sternberg, M.D. is our IRUL research area consultant in this area. She was trained at McGill University and practiced medicine in Montreal. She then returned to a research career and teaching at Washington University School of Medicine in St. Louis. Her recent book, *The Balance Within: The Science Connecting Health and Emotions* (2000, paperback 2001), has been universally well-received as one of the best books on emotions and health.

Esther M. Sternberg, M.D.
Professor
American University
Washington, D.C.

1. The Physiology of Love: Empathic Responding to Emotional Reactions

Stephanie D. Preston's highly original and exciting project studies empathy from a perception-action perspective. That is, it postulates that empathy is a biological process that involves a set of specialized nerve cells in the brain that allow one to mimic motor actions, emotions, and social behaviors. These nerve cells, called mirror neurons, have been well studied in the context of perception-motor response – i.e., the phenomenon that allows a person to watch and mimic the actions of others, much as in the child's game "Simon Says." This study proposes that a similar process, utilizing the same sorts of neurons, may underlie the biological process of empathy.

The grant proposes to use a story-telling situation, combined with neuro-imaging, psychological instruments, and objective physiological measures, to compare subjects selected from different professions with high empathic components (firemen, ministers, and doctors) with others, and with a group of brain-damaged patients.

Stephanie D. Preston, Ph.D.
University of Iowa Hospitals and Clinics
200 Hawkins Drive
2 RCP – Neurology Department
Iowa City, IA 52242
Tel. 319-384-5934

Email: stephanie-d-preston@uiowa.edu

2. Towards an Understanding of the Neurobiology of Parental Love

This project, conducted by James F. Leckman, M.D., proposes to compare some aspects of the neurobiology of parental love with the processes involved in obsessive behaviors. It uses a very powerful naturalistic situation to study these interactions – i.e., an infant's cry and the visual stimulus of seeing the infant. This project addresses parental love behaviors and their neural and neuroendocrine underpinnings, and postulates that these may be biologically set to focus and perpetuate a connection between the parent and child. The study will use neuro-imaging (fMRI), psychological instruments, and physiological hormone measures (oxytocin and cortisol) known to be activated in association with such behaviors. The project is likely to yield important information regarding the neurobiology of pathways of love, and those elements of love that resemble the more extreme behaviors that can be seen in obsessive compulsive disorder (OCD). The theory that extreme behaviors seen in OCD may in part stem from dysregulated biological pathways that evolutionarily evolved to cement parent-infant relationships is novel and exciting; if validated, it will serve to change our thinking about both the state of love and OCD. It could in fact contribute to a paradigm shift in the field by relating some aspects of parental love and empathy with some obsessive behaviors. When parental love and empathy are appropriately applied in measured amounts and contexts, they are necessary and adaptive for both parent and offspring; when inappropriate or excessive, they may constitute disease.

James F. Leckman, M.D.

Director of Research

Neison Harris Professor of Child Psychiatry, Pediatrics and Psychology

Yale University Child Study Center

230 South Frontage Road

PO Box 207900

New Haven, CT 06520-7900

Tel. 203-785-7971

Email: james.leckman@yale.edu

3. Is There a Neurobiology of Love?

This project, proposed by Dr. Sue Carter, Psychiatric Institute, Chicago, is an extremely well designed animal study in a model that has shown that the hormones oxytocin and vasopression play an important role in affiliative behavior and development of social bonds between parent and offspring. While it is difficult to devise ways to study empathy and love in animals, this project provides an extremely well controlled approach to understanding the precise relationships between different brain hormones and social bonding. This model will definitely shed light on the role of oxytocin in these behaviors. Most importantly, the project will examine the health benefits of loving interactions, which have been observed in epidemiological studies in humans, but are difficult to address in a systematic way in human studies. Preliminary data indicate that female

animals exposed to pups show a lower level of the stress hormone cortisol. Oxytocin, one of the other hormones that will be studied, oxytocin, may mediate these anti-stress effects. The experimental approach is novel in that it measures a mother's hormonal and behavioral responses to a naturalistic setting – i.e., exposure to a pup, to determine the health effects on the mother. This project also considers the extent to which generalized love for humanity has a hormonal basis.

C. Sue Carter, Ph.D.
Professor of Psychiatry and Co-Director
The Brain-Body Center
Department of Psychiatry
The Psychiatric Institute (MC 912)
1601 West Taylor Street
Chicago, IL 60612
Tel. 312-355-1593
Email: scarter@psych.uic.edu