Anguish of Romantic Rejection May Be Linked to Stimulation of Areas of Brain Related to Motivation, Reward and Addiction

ScienceDaily (Aug. 28, 2010) — Breaking up really is hard to do, and a recent study conducted at Stony Brook University found evidence that it may be partly due to the areas of the brain that are active during this difficult time.

The team of researchers, which included Arthur Aron, Ph.D., professor of social and health psychology in the Department of Psychology at Stony Brook University, and former graduate students Greg Strong and Debra Mashek looked at subjects who had a recent break-up and found that the pain and anguish they were experiencing may be linked to activation of parts of the brain associated with motivation, reward and addiction cravings. The study was published in the July issue of the *Journal of Neurophysiology*.

"This brain imaging study of individuals who were still 'in love' with their rejecter supplies further evidence that the passion of 'romantic love' is a goal-oriented motivation state rather than a specific emotion" the researchers concluded, noting that brain imaging showed some similarities between romantic rejection and cocaine craving. "The findings are consistent with the hypothesis that romantic love is a specific form of addiction."

The study also helps to explain "why feelings and behaviors related to romantic rejection are difficult to control" and why extreme behaviors associated with romantic rejection such as stalking, homicide, suicide, and clinical depression occur in cultures all over the world, the researchers wrote.

"Romantic rejection is a major cause of suicides and depression. We have known very little about it. Understanding the neural systems involved is extremely important both for advancing our basic knowledge of intense romantic love in general and of response to rejection in particular," said Dr. Aron. "The specific findings are significant because they tell us that the basic patterns seen in previous studies of happy love share key elements with love under these circumstances; they also tell us that what is unique to romantic rejection includes elements that are very much like craving for cocaine."

The study was headed by Helen Fisher, a research professor and member of the Center for Human Evolutionary Studies at Rutgers, The State University of New Jersey, in New Brunswick, N.J., and co-author Lucy L. Brown of the Einstein College of Medicine of Yeshiva University, the Bronx, N.Y. The researchers used functional magnetic resonance imaging (fMRI) to record brain activity in 15 college-age, heterosexual men and women who had recently been rejected by their partners. All reported that they were still intensely "in love" with that former partner, spent the majority of their waking hours thinking of the person who rejected them, and yearned for the

person to return. Participants were shown a photograph of their former partner, then completed a simple math exercise to distract them from their romantic thoughts. They then viewed a photograph of a familiar "neutral" person.

The researchers found that viewing photographs of their former partners stimulated several key areas of the participants' brains to a greater degree than when they looked at photos of neutral persons. The areas are:

* the ventral tegmental area in the mid-brain, which controls motivation and reward and is known to be involved in feelings of romantic love, * the nucleus accumbens and orbitofrontal/prefrontal cortex, which are associated with craving and addiction, specifically the dopaminergic reward system evident in cocaine addiction, and * the insular cortex and the anterior cingulate, which are associated with physical pain and distress.

"It shows that intense romantic love seems to function much like an addiction," Dr. Aron said. "But that does not tell us one way or the other whether the desire to be in love in general is an addiction." Dr. Aron noted that some of what has been learned over the years in this area may be useful in helping people attempting to recover from drug addiction.

The study also provided some evidence that "time heals all wounds." Researchers found that as time passed, an area of the brain associated with attachment -- the right ventral putamen/pallidum area -- showed less activity when the participants viewed photographs of their former partners.