

## **Negative Health Consequences of Social Isolation**

### **Introduction**

The present proposal will use an animal model to investigate the negative health consequences of social isolation, and the beneficial effects of social support and environmental stimulation. The experiments described here are part of a larger ongoing research program in my laboratory in the Department of Psychology. Several studies, including those from my own laboratory, have indicated that negative social experiences have detrimental health consequences. Our previous research has demonstrated that the prairie vole is a useful model for studying the role of the social environment in mediating behavior, physical health, and the brain. Long-term social isolation in prairie voles results in behaviors relevant to both depression and anxiety along with cardiovascular dysfunction associated with heart disease. Further, prairie voles exposed to social isolation display altered regulation of the heart, blood vessel dysfunction, and hormonal disturbances, which are directly relevant to the health of the cardiovascular system. However, the mechanisms within the brain that mediate these health consequences are not well understood, and likely involve changes in the pathways of communication among brain regions that regulate emotion, behavior, and responses to stress.

The current project, therefore, will provide important insight regarding the role of the brain in regulating behavioral, physiological, and stress-coping consequences of social isolation and the potential beneficial effects of social support. This project will extend previous findings from our laboratory by investigating specifically the changes in the brain that mediate negative health consequences of social isolation using the prairie vole model. The present findings will increase our understanding of how the social context influences both behavior and biological processes by focusing on neural activity in key brain regions that play a role in emotion, stress, and social behavior, including the hypothalamus, amygdala, nucleus accumbens, and raphe nuclei. This research program will provide a foundation for developing improved treatments for individuals who are subjected to negative social experiences (such as those who are socially isolated, separated from friends and family, or experiencing loneliness). The results from this project will have a significant impact on society by improving our understanding of the health outcomes of social bonding and facilitating the development of new treatments.

### **Description of the Project**

Social bonds are very important to the human experience. Social isolation or the lack of positive social interactions in humans can have both emotional and physiological effects, such as producing depression, anxiety, cardiovascular problems, and an inability to cope with stress. To better understand these relationships, this study will focus on a valid and reliable rodent model, the prairie vole, to more directly study the negative health consequences of social isolation and the beneficial effects of social support. This unique rodent species is very useful for studying the interactions of social experiences, stress, and health. Prairie voles exhibit several social behaviors similar to those of humans, including an active engagement in the social environment, forming long-term social bonds with family members and opposite-sex partners, and living in family groups. The current project will use the prairie vole model to investigate the negative health effects of social isolation and beneficial effects of social support, and more specifically the role that the brain plays in mediating the health consequences of social experiences.

### **Specific Aims of the Project**

***Specific Aim 1: To investigate the negative health consequences of social isolation in male and female prairie voles, versus social support with a partner of the opposite sex.***

Hypothesis 1A: Social isolation for 10 days in male and female prairie voles will lead to depressive behaviors, poor stress-coping ability in response to mild stressors, and altered cardiovascular and hormonal responses to stress.

Hypothesis 1B: Social support (pairing) for 10 days in male and female prairie will be protective against the development of altered behaviors, stress-coping ability, and cardiovascular and hormonal responses to stress.

***Specific Aim 2: To investigate the role of stress-responsive brain areas in mediating the behavioral and physiological responses to social isolation in male and female prairie voles.***

Hypothesis 2A: Social isolation for 10 days in male and female prairie voles will lead to altered neural activity in brain areas that regulate emotion, stress, and social behavior.

Hypothesis 2B: Social support (pairing) for 10 days in male and female prairie will be protective against altered neural activity in brain areas that regulate emotion, stress, and social behavior.