

Project 4: Early Stress & Alcoholism: Neurobiological Analysis

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Alcohol abuse and alcoholism are major burdens for our society. While the development of excessive drinking patterns is influenced by many factors, stress in general, and stress during childhood in particular, are believed to be important etiological elements in this process. Indeed, chronic stress has been shown to alter neurotransmission in many brain systems linked to drug taking and alter the rewarding properties of a variety of abused drugs, including alcohol. Little is known, however about how the neurobiological response to stress might alter the way a subject responds to alcohol.

Strikingly, many of the brain regions, including the orbital and medial prefrontal cortex, the amygdala and the hippocampus, that have been shown to modulate the response to stress, are also part of the brain reward circuitry, which is central in the development of excessive drinking. This commonality of neural circuitry suggests that these regions may play a role in mediating the effects of stress on alcohol consumption. In addition, serotonin-containing neurons of the dorsal raphe nucleus, which innervates all of the areas listed above, along with the hypothalamus, is a key modulator of the stress response, and is able to modify the response to drugs as well. This project, first funding in 2003, is designed to continue to study the interaction of childhood stress and ethanol by employing a well-studied model of childhood stress in rhesus monkeys, nursery-rearing. By comparing young adult nursery-reared monkeys to normal mother-reared controls from the same colony, we are studying: 1) drinking behavior, 2) neuroendocrine status, 3) the serotonin transporter and receptors, and Corticotropin releasing factor receptors.

Relevance to Public Health: Adults, who in childhood experience traumatic events like separation from their parents, are at increased risk for alcohol abuse and alcoholism. The causes for this increased risk are unknown. The proposed studies are designed to directly address the mechanisms by which childhood stress leads to adult alcoholism by studying the drinking behavior and brain structure and function of animals that experienced material separation. This information from this project can have important influences on how traumatized children may be protected from later substance abuse.