



Frontiers in alcohol addiction science and medicine

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ABOUT THE LECTURE

As a lead researcher at the Pearson Center for Alcohol and Addiction, Marisa Roberto demonstrated her lab's cutting-edge approach to understanding the neurological mechanisms behind alcohol use disorder. She described the interplay between the brain's stress system and the neuroimmune environment, and how they both drive and respond to excessive drinking behavior. Roberto also revealed an ambitious bench-to-bedside model that takes fundamental cellular discoveries and translates them into potential new therapies for alcohol addiction.

TOP TAKEAWAY POINTS

1. **Addiction is the leading cause of preventable death worldwide**, with alcohol use disorder as a major contributor. Alcohol misuse is often coupled with other mental illnesses (e.g., depression and anxiety) and may accelerate the development of neurodegenerative disease. However, historically **alcohol use disorder** has received relatively little research funding, and the stigma associated with the condition prevents many from seeking treatment.
2. **Affecting 6-8% of the population, alcohol use disorder is understood to be a neurological condition** in which individuals develop a need to drink to feel "normal." When experiencing anxiety and/or depression, those susceptible to alcohol use disorder may experience compulsive behavior in relation to alcohol consumption, including a loss of control in limiting intake and the **emergence of alcohol dependence**.
3. An area of the brain called the **amygdala**, known for its involvement in fear and stress responses, appears to play an important role in the neurological changes during alcohol use disorder. Roberto's lab has focused on a population of neurons in this area of the brain that release a neurotransmitter called **GABA**. Across multiple species, the team discovered that **alcohol increases GABA signaling between neurons, leading to greater stress responses**.
4. **Various stress-regulating peptides and neurochemicals** act on the pathways that control GABA release. In collaboration with other multi-disciplinary scientists at Scripps Research, Roberto is investigating potential medicines to modify these pathways and restore the balance in stress activation. Several promising preclinical and clinical studies have shown that, **by normalizing GABA transmission, many aspects of alcohol use disorder can be alleviated**.
5. **The brain's immune system is now recognized to be a critical bridge** between alcohol intake and stress responses. Chronic alcohol exposure activates certain immune cells in the amygdala, which produce inflammatory chemicals and contribute to the excessive GABA release. As part of the neuroimmune consortium INIA (Integrative Neuroscience Initiative on Alcoholism), the Roberto lab is testing novel anti-inflammatory compounds that could be translated into clinical treatments for patients with alcohol use disorder.

