Researchers pinpoint when cocaine-addicted individuals are most vulnerable to relapse

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A pile of cocaine hydrochloride. Credit: DEA Drug Enforcement Agency, public domain

New research from the Icahn School of Medicine at Mount Sinai using electroencephalography, or EEG, indicates that adults addicted to cocaine may be increasingly vulnerable to relapse from day two to one month of abstinence and most vulnerable between one and six months. The findings, published online today in *JAMA Psychiatry*, suggest that the most intense periods of craving for illicit substances often coincide with patients' release from addiction treatment programs and facilities.

It is not known why individuals with substance use disorders relapse even after remaining abstinent from illicit substances for long periods of time. However, it is clear that cue-induced craving—craving elicited by the exposure to cues previously associated with drug use—plays a major role in relapse. Until now, studies have used self-reported measures to assess cue-induced craving. This is the first study that uses EEG to quantify cue-induced craving in humans with cocaine use disorder, showing a similar trajectory of craving demonstrated in previous studies using animal models. In this study and in contrast to the EEG measures, self-reported craving showed a gradual decline with increasing abstinence duration, underscoring a potential disconnect between the physiological response to drug-related cues in addicted individuals and their perception of this response.

"Our results are important because they identify an objectively ascertained period of high vulnerability to relapse," says Muhammad Parvaz, PhD, Assistant Professor of Psychiatry and Neuroscience, Icahn School of Medicine at Mount Sinai, and the study's lead author. "Unfortunately, this period of vulnerability coincides with the window of discharge from most treatment programs, perhaps increasing a person's propensity to relapse."

Over five and a half years, the research team collected data from EEG recordings in 76 adults addicted to cocaine with varying durations of abstinence (two days, one week, one month, six months, and one year). EEG was recorded while participants looked at different types of pictures, including pictures that depicted cocaine and individuals preparing, using, and simulating use of cocaine. After EEG, participants also self-rated their level of craving for each cocaine-related picture.

"Results of this study are alarming in that they suggest that many people struggling with drug addiction are being released from treatment programs at the time they need the most support," said Rita Goldstein, PhD, Professor of Psychiatry and Neuroscience at the Icahn School of Medicine and Principal Investigator of the study. "Our results could help guide the implementation of alternative,

individually tailored and optimally timed intervention,
prevention, and treatment strategies."

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