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Editorial

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Genetic Globalization of Addiction

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Introduction

Addiction is a brain disorder characterized by compulsive engagement in rewarding stimuli despite adverse consequences. Despite the involvement of a number of psychosocial factors, a biological process—one that is induced by repeated exposure to an addictive stimulus is the core pathology that drives the development and maintenance of an addiction, according to the "brain disease model" of addiction. However, some scholars who study addiction argue that the brain disease model is incomplete and misleading.

Now commonly called substance use disorder, addiction is a mental health condition where a person's progressive and chronic use of drugs or alcohol leads to issues with personal relationships, the ability to work, and one's physical health.

The brain disease model posits that addiction is a disorder of the brain's reward system which arises through transcriptional and epigenetic mechanisms and develops over time from chronically high levels of exposure to an addictive stimulus. DeltaFosB (ΔFosB), a gene transcription factor, is a critical component and common factor in the development of virtually all forms of behavioral and drug addictions. Two decades of research into ΔFosB's role in addiction have demonstrated that addiction arises, and the associated compulsive behavior intensifies or attenuates, along with the overexpression of ΔFosB in the D1-type medium spiny neurons of the nucleus accumbens. Due to the causal relationship between ΔFosB expression and addictions, it is used preclinically as an addiction biomarker. ΔFosB expression in these neurons directly and positively regulates drug self-administration and reward sensitization through positive reinforcement, while decreasing sensitivity to aversion.

Addiction exacts an "astoundingly high financial and human toll" on individuals and society as a whole. In the United States, the total economic cost to society is greater than that of all types of diabetes and all cancers combined. These costs arise from the direct adverse effects of drugs and associated healthcare costs long-term complications, the loss of productivity and associated welfare costs, fatal and non-fatal accidents, suicides, homicides, and incarceration, among others. Classic hallmarks of addiction include impaired control over substances or behavior, preoccupation with substance or behavior, and continued use despite consequences. Habits and patterns associated with addiction are typically characterized by immediate gratification (short-term reward), coupled with delayed deleterious effects.

Neuropsychology

Cognitive control and stimulus control, which is associated with operant and classical conditioning, represent opposite processes that compete over the control of an individual's elicited behaviors. Cognitive control, and particularly inhibitory control over behavior, is impaired in both addiction and attention deficit hyperactivity disorder. Stimulus-driven behavioral responses that are associated with a particular rewarding stimulus tend to dominate one's behavior in an addiction.

The developing brain goes through many stages. In the embryos of vertebrates, the predecessor to the brain and spinal cord is the neural tube. As the foetus develops, the grooves and folds in the neural tube deepen, giving rise to different layers of the brain. The human brain is split up into three major layers: the hindbrain, the midbrain, and the forebrain.

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