

## Editorial Note on Addiction

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Addiction is a biopsychosocial disorder characterized by repeated use of drugs, or repetitive engagement in a behavior such as gambling, despite harm to self and others. According to the "brain disease model of addiction," while a number of psychosocial factors contribute to the development and maintenance of addiction, a biological process that is induced by repeated exposure to an addictive stimulus is the core pathology that drives the development and maintenance of an addiction.

Many scholars who study addiction argue that the brain disease model is incomplete and misleading. 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 (e.g., eating food, the use of cocaine, engagement in sexual activity, participation in high-thrill cultural activities such as gambling, etc.).

DeltaFosB ( $\Delta$ FosB), 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  $\Delta$ FosB's role in addiction have demonstrated that addiction arises, and the associated compulsive behavior intensifies or attenuates, along with the overexpression of  $\Delta$ FosB in the D1-type medium spiny neurons of the nucleus accumbens. Due to the causal relationship between  $\Delta$ FosB expression and addictions, it is used preclinically as an addiction biomarker.  $\Delta$ FosB 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 (e.g., emergency medical services and outpatient and inpatient care), long-term complications (e.g., lung cancer from smoking tobacco products, liver cirrhosis and dementia from chronic alcohol consumption, and meth mouth from methamphetamine use), the loss of productivity and associated welfare costs, fatal and non-fatal accidents (e.g., traffic collisions), 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 (long-term costs). Examples of drug and behavioral addictions include alcoholism, marijuana addiction, amphetamine addiction, cocaine addiction, nicotine addiction, opioid addiction, food addiction, chocolate addiction, video game addiction, gambling addiction, and sexual addiction. The only behavioral addiction recognized by the DSM-5 and the ICD-10 is gambling addiction. With the introduction of the ICD-11 gaming addiction was appended. The term addiction is misused frequently to refer to other compulsive behaviors or disorders, particularly dependence, in news media. An important distinction between drug addiction and dependence is that drug dependence is a disorder in which cessation of drug use results in an unpleasant state of withdrawal, which can lead to further drug use. Addiction is the compulsive use of a substance or performance of a behavior that is independent of withdrawal. Addiction can occur in the absence of dependence, and dependence can occur in the absence of addiction, although the two often occur together.

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