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# Addiction

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A subject collection from *Cold Spring Harbor Perspectives in Medicine*

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## **Addiction**

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*Front cover artwork:* The background is an immunohistochemical stain of cells expressing  $\beta$ -galactosidase (in red) under the control of a  $\kappa$ B promoter and colocalized with green fluorescent protein under control of dopamine D2 receptor (in blue) containing medium spiny neurons (MSNs) in the nucleus accumbens (NAc) shell. In the foreground are 3D reconstructions of Lucifer yellow–filled NAc MSNs artistically rendered by Daniel Christoffel and Scott Russo, Mount Sinai School of Medicine.

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## Preface

THE TITLE OF THIS BOOK IS *ADDICTION*. But what, precisely, does it mean for someone to suffer from addiction? For such a commonly used word, there is little consensus on the definition of addiction. The term was coined by Shakespeare and first appeared in line 92 of the play *Henry V* (written in 1599): “Since his addiction was to courses vain.” Shakespeare derived the term from the Latin word *addictionem*, which translates as “devotion,” but Shakespeare used addiction to convey an inclination or penchant. The modern use of addiction traces to the first decade of the 20th century where it was used to describe dependence on morphine.

In the early 20th century addiction was typically defined by the development of physical dependence, a drug-specific collection of negative symptoms that emerge following the abrupt cessation of chronic drug use that collectively characterize withdrawal. Although this is certainly a notable aspect of opiate and alcohol addiction, other drugs of abuse are associated with milder withdrawal syndromes. This was acknowledged in the second edition of the *Diagnostic and Statistical Manual of Mental Disorders* (DSM II, 1968), which noted that “withdrawal symptoms are not the only evidence of dependence; while always present when opium derivatives are withdrawn, they may be entirely absent when cocaine or marijuana are withdrawn.” The initial focus on physical aspects of withdrawal as the primary characteristic of addiction contributed to an underappreciation of the impact of cocaine and marijuana use. This changed in the 1970s and 1980s when drug traffickers engineered increasingly potent marijuana and introduced inexpensive cocaine that could be smoked (i.e., crack), leading to dramatic escalation of the abuse of these drugs throughout the world.

Curiously, the most recent edition of the DSM (IV, 1994) avoided the use of the term addiction entirely in favor of “abuse” and “dependence.” At any rate, dependence (read addiction) was characterized by three main factors: difficulty regulating drug intake and maintaining abstinence, devoting substantial time to the procurement and use of drugs and recovery following drug use, and continued use of drugs despite negative consequences. It is interesting that drug craving was not listed as a diagnostic criterion of addiction in the DSM IV even though it was acknowledged that craving “is likely to be experienced by most (if not all) individuals with Substance Dependence.” Today, many researchers define craving as a universal hallmark of addiction, which is reflected in several of the chapters in this volume.

Despite the fact that the psychiatric definition of addiction was becoming more precise in the late 20th century, the general perception of addiction was more in line with the first edition of the DSM (1952), which stated “drug addiction is usually symptomatic of a personality disorder.” Unfortunately, the general public oftentimes views addiction as a moral rather than a medical problem. This issue was addressed directly in an important editorial written by former National Institute on Drug Abuse director Alan Leshner entitled “Addiction Is a Brain Disease, and It Matters” (1997, *Science* 278: 45–47). Dr. Leshner framed addiction as a chronic, relapsing illness that requires treatment approaches like other chronic diseases, such as diabetes and hypertension. Moreover, because addiction is a brain disease, effective treatments can be identified through a more complete understanding of the changes in the brain produced by abused substances.

No single book can comprehensively survey a field as dynamic and diverse as the neurobiology of addiction. Rather, our goal was to highlight a cross section of innovative contemporary addiction research. Although we are pleased with the results, practical concerns limited the scope to the five most widely abused classes of drugs. This in no way diminishes the fascinating work focusing on



Preface

other drugs of abuse (e.g., benzodiazepines, hallucinogens) and impulse-control disorders (e.g., gambling, overeating).

We are extremely grateful to the truly outstanding collection of scientists who contributed chapters to this volume. At Cold Spring Harbor Laboratory Press, we acknowledge Executive Editor Richard Sever for initiating the project, the incredibly patient Project Manager Barbara Acosta, who oversaw the project from its inception, and master production editor Diane Schubach. Finally, we dedicate this book to Colin Pierce, Conor Kenny, Ronan Kenny, and Amelia Kenny, all of whom probably wish their fathers were a little less addicted to their work.

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