Foreword: The Neuroethics of Drug Addiction

T.W. Robbins, PhD, FRS
University of Cambridge, Cambridge, UK

Discussions of neuroethical issues associated with drug addiction, as exemplified in this timely and scholarly volume, are of enormous contemporary social importance. In this discourse we must consider the extent to which such issues are unique to the case of addiction, and which are not. The very status of drug-addicted individuals probably falls under the former, given the special stigma afforded to them. Mental illness often suffers from undue stigmatization which, as we are all only too aware, may dilute opportunities for resource allocation in health care and for research funding in academic medicine. The folk stigma associated with addiction is that of enfeebled willpower in exercising restraint in the absence of dementia or otherwise impaired mental faculties. This enfeebling of inhibitory control contrasts with the stigma often associated with disorders of motivation such as chronic fatigue syndrome, where the latent suspicion is often that of laziness and malingering rather than the exercising of volitional control over such behaviors as craving and drug taking. The stigma around addiction stems from a reluctance of drug abusers to seek treatment that is attributed to apathy or motivational inertia, and their apparent lack of social responsibility that renders them a burden on their own families and society.

The role and perceptions of lost volitional control in drug abuse are hardly weakened by modern neuroimaging studies that reveal significant apparent underfunctioning of regions of the prefrontal cortex traditionally associated with top–down behavioral control and decision making. These regions include the anterior cingulate cortex, the ventrolateral prefrontal cortex and the orbitofrontal cortex. One important scientific issue is how much of this impaired neural function derives from chronic exposure to drugs of abuse and how much is already present prior to drug abuse, and may thus also contribute to the propensity to addiction. Of course, both of these may be true, even in the same individual. Which of these states of affairs holds may also depend on the primary drug of abuse. A critical question, also debated in neuroethical
analyses of studies of illegal behavior, is whether this behavior can be blamed on the individual, or on the individual’s predispositions arising from altered brain structure. In the eyes of some commentators, such a mind–brain dualism may serve to excuse drug abusers from their illegal or socially inappropriate behavior. An alternative view deriving from modern neuroscience, however, would emphasize that it is perhaps more productive to consider an integrated concept of the volitional self in terms of underlying brain mechanisms.

In this foreword to *Addiction Neuroethics*, I would like to argue further that it is irrelevant to the issue of responsibility whether drugs cause changes in brain function (which further fuel the drive to addiction) or whether there is also a neurobehavioral endophenotype (addictive personality) predisposing to drug abuse (although this is in itself an interesting and relevant scientific question). Notions of responsibility and intentionality, which are central to legal arguments concerning guilt, and which may be suspended in judgments on persons with psychosis or dementia, may still apply to the behavior of drug addicts. The fact that their volitional control may be impaired by permanent brain damage or transient brain dysfunction, or ultimately by genes conferring this impaired brain function, enhances their risky behavior, and may promote compulsive responding, but does not fully determine it. However, it should be realized that exerting volitional control is difficult for these individuals, and that they may need additional help, medical or otherwise, in order to achieve this goal. Both the medical and other models of behavior underlying addictions are discussed in chapters of this compilation. Moreover, the use of structural or functional brain imaging, or ligand-based positron emission tomography (PET) may help to explain the behavior exhibited by addicts and guide forms of treatment, but it cannot be used to excuse it.

Advances in neuroscience and cognate disciplines such as experimental psychology have greatly enhanced the understanding of the neural and psychological mechanisms underlying drug addiction. Thus, we now know the molecular basis of action of virtually all drugs of abuse, as well as their initial sites of action in the brain and how they affect associated neural networks. Addiction can now usefully be conceptualized as a form of aberrant learning, by specific brain regions, with considerable implications for treatment. We know much about the harms to the brain and viscera produced by chronic drug abuse, whether of illegal drugs such as amphetamine, cocaine and alcohol, or legal drugs such as alcohol and nicotine. These advances have made drug addiction an excellent test case for the identification and discussion of ethical issues, as this book clearly illustrates.

We also learn from chapters in this volume that the other main ethical dilemmas posed by addiction derive from its treatment. Modern
neuroscience has revealed a potential panoply of treatments of addiction, of varying degrees of plausibility. Some of these, such as psychosurgery (e.g. lesion of the anterior cingulate or nucleus accumbens) are often motivated by misinterpretations of the published basic scientific evidence, and have the same dubious neuroscientific (and thus neuroethical) status as psychosurgery practiced in the twentieth century for such conditions as schizophrenia and depression. Although cingulotomy turned out perhaps most successfully in cases of obsessive–compulsive disorder (OCD), there is insufficient evidence to believe that it could also work effectively in addiction, and in any case, even the small success found in OCD has not led to its widespread acceptance. The modern neurosurgical approach to the treatment of neurological and neuropsychiatric disorder has been that of deep brain stimulation (DBS), as discussed in Chapter 5. While this has been associated with some outstanding successes, for example in the treatment of Parkinson’s disease, depression and OCD, the application of DBS to addiction is not obvious, partly because we are still identifying the relevant neural circuitry, and partly because we are not entirely certain of its neural and neurochemical effects. Clearly, the same types of general consideration also apply to the use of DBS in addiction as in other mental disorders.

Drugs and various forms of cognitive behavioral therapy have been the mainstays of treatment for addiction, sometimes together. A general practitioner with whom I was being interviewed for BBC Radio asserted that it was blatantly wrong to treat drug addiction with drugs, though I see no logical or ethical problems arising from this. Indeed, this is often necessary, as in the case of treatment of withdrawal from opiate addiction by substitutes such as methadone or buprenorphine. The treatment of heroin addiction by supervised administration of heroin or of amphetamine addiction similarly with amphetamine is perhaps more controversial, to the point of suggestions that it is unethical. Presumably, the dubious moral features of this approach lie in the argument that this form of intended harm reduction is not treating addiction, but rather encouraging it. The cost benefits of such treatment regimens, however, have to be considered in pragmatic terms of the strategies they offer to manage behaviors such as addictions, and reduce crime and thereby the almost certain imprisonment.

In general, there is now a considerable effort to research potential drug treatments for addiction designed to reduce drug intake, craving, relapse and other aspects of addictive behavior. Out of this research initiative has arisen the possibility of employing vaccines against specific drugs of abuse—an innovation prompting previously unrealized neuroethical issues in terms of their use. Foremost among these is the potential coercive use of such treatments for children or fetuses at risk of drug abuse, of prisoners with drug abuse problems, or even of employees at
the workplace. I suspect that the resolution of these dilemmas may hinge on the likely efficacy of such treatments. I would be skeptical that a vaccine against cocaine is likely to reduce drug seeking of other compounds in a determined abuser, but time will tell. At present, despite some excitement around the notion of vaccines, it seems unlikely that society would condone mass inoculation of children with antidrug vaccines. The associated risks are simply not worth taking.

As we accumulate more genomic and epidemiological information about addiction, it seems more likely, however, that our propensities to abuse different drugs may be predicted to some extent, as will the possibility of deleterious consequences of abuse such as the induction of psychosis by cannabis. However, it would seem unlikely that we would expose children to risks associated with PET scanning for dopamine D₂ receptors, for example. Some similar issues arise for drug addiction as for other aspects of genetic counseling in the context of disease. Unless the long-term effects are fully assessed, the most likely outcome of such enhanced knowledge would be to enhance education about risks associated with drug use, rather than resort to prophylactic treatments or major interventions.

Overall, I look forward to seeing how the science–society divide for addiction is bridged as we advance through the next decade. The emerging science of neuroethics has a great deal of responsibility to shoulder as new issues are sure to arise from increasingly sophisticated neuroscientific investigations of drug addiction.
Contributors

Richard Ashcroft  School of Law at Queen Mary, University of London, London, UK

James Bell  National Addiction Centre, Institute of Psychiatry, King’s College London, London, UK

Daniel Z. Buchman  University of British Columbia, Vancouver, British Columbia, Canada

Nancy D. Campbell  Rensselaer Polytechnic Institute, New York, USA

Benjamin Capps  National University of Singapore, Singapore

Adrian Carter  University of Queensland, Herston, Queensland, Australia

Florence de Groot  Deakin University, Geelong, Victoria, Australia

Jhodie R. Duncan  Florey Neuroscience Institutes, University of Melbourne, Parkville, Victoria, Australia

Craig L. Fry  University of Melbourne and Murdoch Childrens Research Institute, Parkville, Victoria, Australia

Coral E. Gartner  University of Queensland, Herston, Queensland, Australia

Wayne D. Hall  University of Queensland, Herston, Queensland, Australia

Elaine Hyshka  University of Alberta, Edmonton, Alberta, Canada

Judy Illes  University of British Columbia, Vancouver, British Columbia, Canada

Edgar Kaiser  Kaiser Foundation, Vancouver, British Columbia, Canada

Michael Krausz  University of British Columbia, Vancouver, British Columbia, Canada

Andrew J. Lawrence  Florey Neuroscience Institutes, University of Melbourne, Parkville, Victoria, Australia

Joan Leach  University of Queensland, St Lucia, Queensland, Australia

Neil Levy  Florey Neuroscience Institutes, Carlton South, Victoria, Australia

Anne Ligford-Hughes  Imperial College London, London, UK

Rebecca Mathews  University of Queensland, Herston, Queensland, Australia

Peter Miller  Deakin University, Geelong, Victoria, Australia
Contributors

Stephen J. Morse  University of Pennsylvania Law School and Psychiatry Department, Philadelphia, USA

Marcus Munafò  University of Bristol, Bristol, UK

Liam Nestor  Imperial College London, London, UK

David Nutt  Imperial College London, London, UK

Brad Partridge  University of Queensland, Herston, Queensland, Australia

Kylie D. Reed  National Addiction Centre, Institute of Psychiatry, King’s College London, London, UK

Trevor W. Robbins  University of Cambridge, Cambridge, UK

Julie M. Robillard  University of British Columbia, Vancouver, British Columbia, Canada

Robin Room  University of Melbourne and Turning Point Alcohol & Drug Centre, Fitzroy, Victoria, Australia

John Strang  National Addiction Centre, Institute of Psychiatry, King’s College London, London, UK

T. Cameron Wild  University of Alberta, Edmonton, Alberta, Canada

John Witton  National Addiction Centre, Institute of Psychiatry, King’s College London, London, UK

Jody Wolfe  University of Alberta, Edmonton, Alberta, Canada
INTRODUCTION

Brain disorders and mental illnesses impose an enormous personal burden upon sufferers and their families, and a substantial economic burden on society. These conditions include psychiatric disorders such as addiction, depression and anxiety, neurodegenerative disorders such as Alzheimer’s and Parkinson’s diseases, and acquired neurological trauma or damage such as stroke. The treatment and rehabilitation of those affected by brain and mind disorders command a significant proportion of health-care expenditure (Begg et al., 2007; EMCDDA, 2006; Ezzati, Lopez, Rogers, & Murray, 2004; McKeeganey, Neale, Lloyd, & Hay, 2007). In developed countries such as Australia, Canada and the USA, they account for over a quarter of the total burden of disease (Begg et al., 2007; Ezzati et al., 2004; Murray & Lopez, 1996). This figure is expected to grow as populations age and per capita tax bases decrease (Independent Working Group on Brain and Mind Disorders, 2003).

Neuroscience promises to significantly improve treatments and prevention strategies for many disorders of the brain, and even to provide cures where none have previously existed (Insel, 2009). This hope turns on interventions arising from the continuous stream of discoveries about the neurobiological bases of human behavior, and the genetic,
neurochemical and electrophysiological mechanisms of major mental and neurological disorders. Proponents of neuroscience research argue that these advances hold not only technological promise for treating mental illness, but an epistemic promise that will bring forth a radical shift in the understanding of the nature and cause of mental illness and the suffering that accompanies it. The chapters in this volume examine the validity of these promises and discuss challenges that they present in the field of addiction.

Overall, this body of work falls within the domain of neuroethics (Illes, 2006), initially defined as “the field of philosophy that discusses the rights and wrongs of the treatment or enhancement of the human brain” (Safire, 2002). Neuroethics has broadened in its now 10-year life to include a wide range of elements of social science, public health, history of science and medicine, and science communication, among others. In this volume we examine the neuroethical challenges raised by neuroscience research of addiction, its potential applications in the treatment and prevention of addiction, and the formulation of social policies toward drug use. We have called this emerging area addiction neuroethics.

WHY ADDICTION NEUROETHICS?

Addiction and the use of addictive drugs raise important ethical questions:

- Are people who use drugs morally responsible for their behavior?
- How should society respond to people who use drugs in ways that harm themselves and others?
- Is it ethically justified to prohibit the use of some drugs in order to prevent addiction or reduce the social and economic burdens that they cause?
- Is it morally justifiable to legally coerce addicted individuals into treatment?
- Should programs be implemented to screen young people vulnerable to developing an addiction? Should systems be implemented to prevent them from becoming addicted?
- Under what circumstances is it justified to test individuals for drug use?
- Should neuroscientists accept research funding from commercial interests whose main aim is to maximize consumption of products that can lead to considerable harm?
- Is it acceptable for health-care professionals to prescribe and keep people on addictive drugs that are otherwise illegal, and if so, under what circumstances?
- And more.
The answers that academics, health-care providers and society overall give to these questions depend critically on how people understand drug use and addictive behavior. These are the sorts of questions that Addiction Neuroethics attempts to answer. Compared with other areas in neuroethics, such as neuroimaging for mental health or disordered states of consciousness, addiction neuroethics has received relatively little attention (for exceptions, see Academy of Medical Sciences, 2008; Ashcroft, Campbell, & Capps, 2007; Carter, Capps, & Hall, 2009; WHO, 2004). Yet, there are important reasons why addiction neuroethics is urgently needed.

First, drug use and addiction are major problems facing most societies and one of the largest causes of preventable disease burden worldwide. It is estimated that drug abuse and addiction account for over 10% of the overall burden of disease in Europe and other developed countries such as Australia, Canada and the USA (Begg et al., 2007; Rehm, Room, van den Brink, & Kraus, 2005). In the USA alone, illicit drug abuse and addiction cost society US $180.9 billion per year (ONDCP, 2004); in addition, alcoholism costs US $180 billion (NIAAA, 2000) and tobacco addiction around US $167 billion (Adhikari, Kahende, Malarcher, Pechacek, & Tong, 2008). Given the significant harm caused by drug addiction and abuse, there is a critical need to investigate the associated ethics issues in detail to ensure that advances in the treatment of addiction are translated into clinical practice in ways that minimize harms and maximize benefits. If neuroscience research on addiction is to be translated into effective public health policies, it is critical to understand the ethical, philosophical and social contexts within which neuroscience research is conducted, understood and applied.

Alongside the pressing need to reduce drug-related harm are the salient social factors that make addiction a particularly poignant case study for neuroethical analysis. Neuroscience is believed by some scholars to challenge assumptions about autonomy and willful control over behavior. The impact that addiction has on an individual’s autonomous decision making is a central question in debates about addiction, and is therefore a perfect test bed for examining the impact of neuroscience findings on understandings of agency. It also has important consequences for attribution of responsibility, another area that is often discussed in relation to addiction.

For much of the previous two centuries, addiction has been seen as an excuse for using drugs. This skeptical view is also expressed by some social scientists who argue that addiction is an attribution that enables drug users to avoid responsibility for the social consequences of their drug use (Dalrymple, 2006; Heyman, 2009; Satel & Lilienfeld, 2007). Some scholars, in fact, argue that addiction is not a disease and does not exist (Davies, 1997; Szasz, 1975). This view of addiction is often described as the moral model of addiction.