

# Should the Reorganization of Addiction-Related Research Across All the National Institutes of Health Be Structural?—The Devil Is Truly in the Details

Bankole A. Johnson, Robert O. Messing, Michael E. Charness, John C. Crabbe, Mark S. Goldman, R. Adron Harris, Henry R. Kranzler, Mack C. Mitchell Jr, Sara Jo Nixon, Edward P. Riley, Marc A. Schuckit, Kenneth J. Sher, and Jennifer D. Thomas

The recent proposal to dissolve the National Institute on Alcohol Abuse and Alcoholism and National Institute on Drug Abuse and create a new institute for substance use, abuse, and addiction will require significant effort by the staff of both institutes, the Advisory Councils, and outside experts to overcome complex challenges that could threaten its success. Although integration of the grants portfolios can be achieved, harmonization of goals and policies related to legal use of alcohol versus illegal consumption of drugs will present serious challenges. Consolidating the infrastructure of the 2 existing institutes would entail avoiding encroachment on grant funding. A new institute for substance use, abuse, and addiction would require an enormous amount of cooperation from other institutes as the portfolios of research on alcohol, tobacco, and other drug abuse should logically be transferred to the new institute. In the near term, a structural reorganization would be less efficient and more costly than the individual institutes are currently. Increasing efficiency and reducing costs over time will necessitate careful strategic planning. Success in this difficult task would be made easier and less costly by first implementing carefully placed building blocks of increasing functional reorganization. The newly created institute should increase opportunities for specialization within disorders of addiction, attract new leadership, and build a novel strategic plan that will energize scientists and staff and incorporate ideas of stakeholders to advance the public good in preventing and treating alcohol, tobacco, and all addictions. Attention must be paid to the devil in the details.

**Key Word:** National Institutes of Health.

FOR DECADES, THERE has been considerable debate about whether the current organization of separate institutes focusing on alcohol and other drugs of abuse, namely the National Institute on Alcohol Abuse and Alcoholism (NIAAA) and the National Institute on Drug Abuse (NIDA), is the best mechanism to support scientific research in these areas (Lewin and Associates, 1988; National Research Council Committee on the Organizational Structure

of the National Institutes of Health, 2003). This debate provided the impetus for the formation of the Substance Use, Abuse, and Addiction (SUAA) Working Group on April 28, 2009, by the Scientific Management Review Board (SMRB) and subsequently the release of their deliberations on September 15, 2010. On that date, the full SMRB recommended a structural reorganization that would dissolve NIAAA and NIDA and create a new institute for substance use, abuse,

*From the Department of Psychiatry and Neurobehavioral Sciences (BAJ), University of Virginia, Charlottesville, Virginia; Ernest Gallo Clinic and Research Center, Department of Neurology (ROM), University of California San Francisco, San Francisco, California; VA Boston Healthcare System, Department of Neurology (MEC), Harvard Medical School, Boston University School of Medicine, Boston, Massachusetts; Portland Alcohol Research Center, Department of Behavioral Neuroscience (JCC), Oregon Health & Science University and VA Medical Center, Portland, Oregon; Alcohol and Substance Use Research Institute, Department of Psychology (MSG), University of South Florida, Tampa, Florida; Section of Neurobiology (RAH), School of Biological Sciences, Waggoner Center for Alcohol and Addiction Research, University of Texas at Austin, Austin, Texas; Department of Psychiatry (HRK), Treatment Research Center, University of Pennsylvania, Philadelphia, Pennsylvania; Department of Internal Medicine (MCM), Johns Hopkins University School of Medicine, Johns Hopkins Bayview Medical Center, Baltimore, Maryland; Division of Addiction Research, Department of Psychiatry (SJN), University of Florida, Gainesville, Florida; Department of Psychology (EPR, JDT), Center for Behavioral Teratology, San Diego State University, San Diego, California; Department of Psychiatry (MAS), University of California, San Diego, La Jolla, California; Department of Psychological Sciences (KJS), University of Missouri-Columbia, and Midwest Alcoholism Research Center, Columbia, Missouri.*

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*Reprint requests: Bankole A. Johnson, DSc, MD, Department of Psychiatry and Neurobehavioral Sciences, University of Virginia, PO Box 800623, Charlottesville, VA 22908-0623. Tel.: 434-924-5457; Fax: 434-244-7565; E-mail: bankolejohnson@virginia.edu*

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and addiction, mostly based on the potential opportunities that such a union might bring. Logically, such an institute would include scientists and projects related to the study of all addictive substances, including tobacco, which is currently conducted at other institutes. This recommendation was adopted by the National Institutes of Health (NIH) Director, Dr. Francis Collins, on November 18, 2010 (Collins, 2010). Maximizing these opportunities will, however, require much more critical thinking, extensive consultations, and focused strategic planning to mitigate a series of complex challenges that would threaten the success of this enterprise. Indeed, the devil will truly be in the details, and we are only at the beginning of a process to understand the reality of how a new institute can be born. We examine 7 critical themes related to this potential structural merger and provide ideas for strategies that will be needed to optimize this approach.

### ORGANIZATIONAL STRUCTURE

Proceeding along the path of a structural reorganization needs to deliver on the promise that such a union would bring about scientific opportunities and public health benefits that could otherwise not have been achieved. Now is the time for more analytic thinking and a strategic approach that threads an accurate path to progress and incorporates most of the important needs of both institutes. Increased synergies of focus, operations, programs, procedures, scientific approaches, and collaborations on a level that hitherto has not been achieved are essential to surpass the status quo, enhance the public good, and advance the prevention and treatment of alcohol, drug, and behavioral addictions.

For a new structural reorganization to succeed, all operations of both abolished institutes would need to be integrated seamlessly and relevant activities at other institutes would need to be incorporated; this includes both infrastructure and personnel. Not merging the infrastructure of both institutes would create silos of people and resources within a much larger organization through which differences would be difficult or nearly impossible to resolve, and collaborations less likely to occur, thereby negating important advantages of a union. A poorly integrated institute would be ungovernable as a united whole and unable to address a clear set of missions, objectives, and priorities.

To succeed, a new single and larger institute for alcohol and drug use, abuse, and addiction would also require an enormous amount of cooperation from other institutes because the portfolios of research in the areas of alcohol, tobacco, and other drug abuse should logically be transferred to the new institute. The larger an administrative structure is, the more complex it would be to administer, and the greater would be the need for sophisticated administrative structures and skills. Thus, in the near term, a structural reorganization would be less efficient and more costly than the individual institutes are currently. Only with careful strategic planning would it be possible to increase efficiency and reduce costs over time.

NIAAA and NIDA do not have overlapping infrastructures. Indeed, the intramural laboratories of the institutes are located in different parts of Maryland (at least 30 miles apart)—Rockville and Bethesda for NIAAA and Baltimore for NIDA. To organize them efficiently into 1 operation would require the focus and expansion of one of these sites. Presently, the United States federal government faces a challenging financial climate and likely a flat NIH budget or even a loss. Even if the long-term costs were reduced, additional funds would be required in the short term to avoid compromising the ongoing research of all the institutes involved. It is unclear that additional funds would be appropriated to fund a consolidated infrastructure of the 2 institutes. Are there plans within the NIH to use Office of the Director resources to achieve an efficient structural integration, with the promise of a greater scientific and public health yield in the future? Surely, the funds cannot come solely from the existing institutes, as this would disrupt grant funding and be counterproductive to scientific progress. If the Secretary of Health and Human Services approves a structural reorganization, then additional funds will be needed from the Office of the Director or the Common Fund.

An efficient structural reorganization will require the development of a financial plan to streamline staff and existing operations. Hence, this financial planning must start soon. The new institute for substance use, abuse, and addiction will have to draw on programs with funding from other NIH institutes that have alcohol and drug addiction-related portfolios, such as the National Institute of Mental Health (NIMH), National Institute of Diabetes and Digestive and Kidney Diseases (NIDDK), National Institute of Child Health and Human Development (NICHD), National Cancer Institute (NCI), and National Heart, Lung, and Blood Institute (NHLBI). These other institutes from which programs are drawn would, naturally, need to contract in size to remain efficient. Indeed, this new institute for alcohol and drug use, abuse, and addiction could potentially become one of the largest groupings within NIH, with antecedent costs.

An important recipe for a proposed structural reorganization to succeed would be to extend the functional union based on the foundation of the established history of successful collaborative ventures between NIAAA and NIDA. For example, in Fiscal Year 2008, NIAAA and NIDA cofunded 13 grants, including collaborative studies on the genetics of alcoholism and the National Epidemiologic Survey on Alcohol and Related Conditions, and have collaborated on NIDA's Clinical Trials Network (SUAA Working Group, 2010). Further collaborations to ensure appropriate scientific prioritization should therefore be encouraged and would not require any new money being invested by NIH or the federal government. Demonstrated success of this type of functional reorganization should be required before a more complete and costly structural reorganization is allowed to take place. Over time, those areas of overlap and synergy would be identified to eliminate redundancy and optimize collaboration.

According to the plan recently outlined by Dr. Collins, the newly created Substance Use, Abuse, and Addiction Task Force will provide its recommendations about which programs should be moved to the proposed new institute by the summer of 2011. Thereafter, a transition team will be formed to develop the structure of the new institute and a search will be conducted for a director, with the goal of launching the new entity by October 2012. If the move toward a structural reorganization is to be considered as a process that will be unveiled slowly and progressively, with gradual integration of 2 disparate cultures, an alternate approach would be to begin by intensifying and strengthening present functional collaborations through an NIAAA-NIDA Joint Task Force.

There is certainly no crisis—the sine qua non for a structural change to an institute or institutes within NIH. Indeed, the SUAA Working Group report (SUAA Working Group, 2010) states, "...the SUAA Working Group unanimously agreed that there are no existing organizational impediments significantly hindering NIH's conduct of SUAA research" (p. 12). Yet, the debate about the potential reorganization to fuse the objectives of NIAAA and NIDA seems to have created a mood of crisis that has led to polarized opinions. A gradual and progressive plan for integration could provide time for careful thought and planning and defuse this sense of crisis.

A reasonable approach would begin with the NIH Director determining a specific percentage of resources from each institute to be committed for collaborative research agendas modeled on the same governance and operational structures that are currently used by the Neuroscience Blueprint and the Basic Behavioral Research Operations Network. This arrangement would provide an increasingly integrated functional reorganization. In this way, a clearer road map can be developed that provides for a process of due diligence and critical information gathering to understand the practical needs and challenges of developing an informed organizational approach. Predetermined milestones can then be used to evaluate progress and adjust course as needed to ensure a viable plan that fuses the optimal functions of NIAAA and NIDA as well as incorporating other relevant research.

## ADVANCES IN THE NEUROSCIENCES

A central argument for the creation of a new institute has been that the neurobiological mechanisms that underlie addictive disorders are the same. There is considerable evidence that substances of abuse express their addictive potential, in part, through similar brain circuits, most notably the cortico-mesolimbic dopamine circuit (Johnson, 2010a). Nevertheless, despite decades of research, the approach of direct antagonism of cortico-mesolimbic dopamine receptors has not, as yet, yielded any efficacious medicines to treat alcohol or drug addiction. It would therefore be an oversimplification to state that the cortico-mesolimbic circuit is the only important neuronal circuit that governs alcohol- and drug-seeking behavior. The addiction field has no "theory of everything" (Ellis, 1986). If it were so, we could simply build a national institute on dopa-

mine addiction. Indeed, for some substances such as inhalants, the involvement of the cortico-mesolimbic dopamine circuit in their rewarding effects has been difficult to prove (Onaivi, 2007). Furthermore, there is growing evidence that other small molecules and neurohormonal circuits are also important, particularly for several of the neuroadaptations that maintain addiction (Koob, 2010; Koob and Le Moal, 2005). The spectrum of these adaptations differs in part depending on the drug used, which creates opportunity for medications development that targets specific drugs while potentially avoiding fundamental mechanisms that control normal reward and motivation. In fact, pharmacological differences between alcohol and other drugs might actually hold the key to the success of medications development for these different disorders. The new institute should therefore strive to build a broad addiction research portfolio that exploits not only common but also drug-specific mechanisms in addiction.

Although research has yielded a few approved medications, we can do better. The close collaboration between NIAAA, the Food and Drug Administration, and other regulatory bodies such as the European Medicines Agency (European Medicines Agency [EMA]—Committee for Medicinal Products for Human Use [CHMP], 2009)—is leading to the consideration of clinically relevant, non-abstinence-related endpoints (including harm reduction), which would provide a more attractive model for the development of commercially viable compounds. While NIDA has had success with medications for the treatment of opiate dependence, it has been unable to develop an approvable medication for stimulant dependence to date. In part, the NIDA model has been to test multiple medications, sometimes at the same time, and to abandon leads that do not appear to produce a robust signal. In contrast, the NIAAA model has been to tease apart scientific and clinical knowledge on a narrower group of compounds to understand not only why a medication might work but also why it might not. Perhaps, if NIAAA medications development can be criticized for spending too much effort on a small group of medications, NIDA's medication development group might be justifiably criticized for abandoning promising medications too soon and not allowing the research in a particular area to ripen. A new institute for substance use, abuse, and addiction should establish a different culture of medications development testing, more along the systematic approach of NIAAA. In turn, the new institute could benefit from the established procedural pipelines of both NIAAA and NIDA for rapid Phase 2 testing of candidate medications.

The new institute needs to be a National Institute on Addictive Disorders and Health (NIADH) that also promotes health and behavioral changes that nurture resilience. Importantly, such an institute should use advances in the neurosciences to understand the complexity of divergent mechanistic pathways to addiction, and deploy these selectively to enrich and enhance the development of novel bio-behavioral approaches to the prevention and treatment of alcohol and drug addiction.

**Table 1.** Ranking of Overall Harm of Alcohol, Tobacco, and Drugs—A Multicriteria Decision Analysis<sup>a</sup>

	Combined <sup>b</sup>	To users	To others
Alcohol	72	57	86
Heroin	55	73	40
Crack cocaine	54	80	33
Methamphetamine	33	69	<5
Cocaine	27	43	17
Tobacco	26	38	19
Amphetamine	23	43	<10
Cannabis	20	25	17

<sup>a</sup>The data are from the findings of Nutt and colleagues (2010).

<sup>b</sup>Combined overall harm to users and to others—physical, psychological, and social.

**Table 2.** Past-Year Liability for Various Types of Substance Dependence, Based on 200 Million United States Adults ≥18 Years of Age (2001–2002)<sup>a</sup>

	Prevalence (%) of past-year use	Number of individuals with past-year use	Percentage of past-year users with past-year dependence	Number of individuals with past-year dependence
Alcohol	65.44	130,880,000	5.82	7,617,216
Tobacco	27.66	55,320,000	46.13	25,519,116
Sedatives	1.24	2,480,000	5.42	134,416
Tranquilizers	0.93	1,860,000	5.04	93,744
Painkillers	1.81	3,620,000	6.3	228,060
Stimulants	0.49	980,000	14.34	140,532
Marijuana	4.07	8,140,000	7.96	647,944
Cocaine/crack	0.56	1,120,000	23.91	267,792
Hallucinogens	0.57	1,140,000	2.67	30,438
Solvents/inhalants	0.11	220,000	1.04	2,288
Heroin	0.03	60,000	26.96	16,176

<sup>a</sup>The data are from Wave I of the National Epidemiologic Survey on Alcohol and Related Conditions (2001–2002; Grant et al., 2011).

### ALCOHOL IS NOT SOME OTHER DRUG IN TERMS OF HARM TO USERS AND OTHERS

A recent article published in *The Lancet* (Nutt et al., 2010) noted that in the United Kingdom, the overall harm to both the individual and others was greatest for alcohol (Table 1). Alcohol is the addictive substance that is most commonly used by the U.S. population, with a prevalence of about 65.4% (Table 2; Grant et al., 2011). Addiction to alcohol is, however, far less common, as a proportion of its use, than addiction to many other drugs of abuse. Nicotine is, by far, the more addictive substance. Nonetheless, Rehm et al. (2009), in another recent publication in *The Lancet*, found that the total economic cost of alcohol abuse in the United States in 1998 was nearly \$235 billion (adjusted to 2007 international dollars). The harm to society attributed to alcohol consumption often results from alcohol use disorders that include the inappropriate use of alcohol in situations such as before driving or by underage drinkers, rather than addiction to alcohol. A 2010 fact sheet from the Centers for Disease Control and Prevention reports that during 2000 to

2004, the annual health-related economic losses in the United States due to cigarette smoking were estimated at \$193 billion (\$96 billion in direct medical costs plus \$97 billion in lost productivity). Data from the Office of National Drug Control Policy in 2002 showed that the total economic impact in the United States of all illicit drugs combined was about \$200 billion, but 60% of that amount was related to incarceration. Hence, the new institute should focus on (i) alcohol use disorders, including alcoholism, (ii) nicotine addiction, and (iii) illicit drug addictions as a group, in that order.

Within a new institute for substance use, abuse, and addiction, if funding allocations followed the relative public health need, the research portfolio for alcohol-related studies would dwarf that of other drugs of abuse excluding tobacco. To ensure that the commensurate amount of funding follows the public health impact of alcohol use and misuse, the new institute should have a fixed grant allocation mandate for alcohol studies in much the same way that NIDA presently has a specified allocation of funds for HIV research. This is not to negate the negative health impact of other abused drugs but to ensure that policy and funding are directed toward the greatest public health need. Importantly, with the potential for an ever-increasing portfolio of drugs or behaviors that might be classified as “addictive,” there needs to be a clear strategy as to how resources are to be allocated. Indeed, we should resist the temptation to unbalance the public health needs of the new institute for substance use, abuse, and addiction by disproportionate funding for “sexy” or “in vogue” behavioral addictions.

An important component of a new institute should be health promotion. In this respect, alcohol is unique, as there is a balance to be struck in the level of consumption of alcohol between its potential health benefits in moderation (Grunzerath et al., 2004) and the harm of excessive alcohol consumption (Johnson and Marzani-Nissen, 2010). From a strict perspective of health promotion and disease prevention, there are no known general health benefits of any other drugs of abuse. Even though there is a place for the therapeutic use of some abused drugs to treat medical conditions—for instance, opiates to control pain or medical marijuana to prevent nausea and emesis in patients with cancer (Cotter, 2009)—this is best conceptualized as treatment to alleviate the symptoms of disease rather than health promotion per se. This uniqueness of the alcohol abuse prevention portfolio needs to be recognized and advanced, and a policy of a “war on alcohol” like that advanced previously for drugs would be impractical and would not serve the public need. In this regard, the goals of the 2 existing institutes are different. NIAAA must search for ways to allow the legal consumption of alcoholic beverages by adults in situations and in amounts that are not harmful while finding ways to prevent the inappropriate use of alcoholic beverages and to understand the mechanisms through which alcohol causes addiction. In contrast, NIDA mostly studies the properties of addictive drugs that do not have any legal use (other than prescription use

for some) and seeks ways to prevent any illicit use of these substances.

One potentially problematic plan that has been proposed for a new institute for substance use, abuse, and addiction would be that the study of fetal alcohol spectrum disorders (FASDs) would be transferred to the sole purview of NICHD. Similarly, the study of teratogenicity due to other drugs of abuse, or perhaps the study of all anomalies resulting from any cause, would also be transferred to NICHD. There are at least 2 important concerns with this suggestion. First, in terms of incidence, FASDs are among the most common preventable birth defects (May et al., 2009), and their prevalence is greater than that of anomalies produced by all other abused drugs combined. Second, FASD does not occur in a vacuum. FASD is endemic in families with strong drinking histories, and it is common to see several affected children within a family. It is just as important for prevention and treatment to restore caregivers to good health as it is to protect future offspring. That is, the approach to FASD does not rest solely with child development and interventions to improve outcomes, but also with strategies to prevent FASDs in the first place. Indeed, it would be important for a new institute to retain within its aegis all components of programs that should make sense to be incorporated as a whole. Similarly, the portfolio on alcoholic liver disease should stay with the new institute as both continued drinking despite progressive liver impairment and relapse to drinking posttransplantation require the treatment of the alcohol-dependent state and an understanding of the addiction process. Furthermore, alcoholic liver damage may accentuate addiction to alcohol because recent evidence suggests that the disruption of cytokine signaling that occurs in alcoholic liver disease affects brain function and may promote both alcohol self-administration and inflammatory brain damage.

In much the same way, the programs of the new institute would be the poorer if all tobacco research became the sole purview of NCI or NHLBI because the prevention and treatment of tobacco addiction would be subsumed by the study of its general health consequences. Indeed, data in Table 2 indicate that tobacco is, by far, the most addictive of all the drugs, followed by heroin and crack cocaine (percentage of past-year users with past-year dependence; Grant et al., 2011). It would certainly be unreasonable to expect scientists within NICHD, NIDDK, NCI, and NHLBI to be experts on addiction, and for many, such specialist training would be lacking. Hence, multifaceted consideration needs to be given as to how to mitigate the potential negative health impact, in terms of opportunities lost, occasioned by the deletion of critical programs that would stand better as a whole in the new institute, before they are jettisoned to other NIH institutes.

## COMORBIDITY

Comorbid alcohol and drug addiction is at the interface between these diseases. Interestingly, of the 60% of those with alcohol dependence and a comorbid disorder, only 13% have drug use disorders (Table 3; Grant et al., 2004). In contrast,

**Table 3.** Comorbidity of Alcohol Dependence with Other Disorders<sup>a</sup>

Disorder(s)	Comorbidity (%)
Drug use disorders	13
Mood (especially major depression) disorders	17
Anxiety disorders	19
Personality (especially antisocial) disorders	29
Nicotine dependence	34
Total comorbidity	60

<sup>a</sup>The data are from Wave I of the National Epidemiologic Survey on Alcohol and Related Conditions (2001–2002; Grant et al., 2004).

according to these still unpublished data from the National Epidemiologic Survey on Alcohol and Related Conditions, fully 34% of alcohol-dependent individuals are also addicted to nicotine. Logically, a new institute for substance use, abuse, and addiction must include research on the prevention and treatment of use, abuse, and addiction to both alcohol and tobacco. This would require the relocation of all the scientists, projects, and funds related to tobacco research from other institutes because it would be critical to ensure that the prevention and treatment of nicotine dependence are studied along with its health consequences. In fact, the essence of the clinical diagnosis of all addiction disorders is maladaptive behavior (loss of control and compulsive drug seeking and self-administration) despite negative consequences to self and others. Thus, in terms of the public health need, the logic of a new institute that did not encompass all the components of both alcohol and tobacco research would be quite weak, as their combination is the most prevalent comorbid addictive disorder.

Because research into comorbid disorders has been relatively sparse compared with work on alcohol or particular substances of abuse, a new institute must grapple to understand the complexities of comorbidity and avoid an oversimplified approach. Indeed, the example provided in the SUAA Working Group report about common mechanisms of action providing therapeutic strategies underscores this point. While it is true, as the report states, that cannabinoids and alcohol activate similar reward pathways and that cannabinoid receptors may be associated with the reinforcing effects of alcohol (SUAA Working Group, 2010), it has not been proven that targeting cannabinoid signaling is an efficacious strategy for treating alcohol dependence (Johnson, 2010b). Hence, there is a need to look beyond superficially obvious relationships to develop a deeper scientific understanding and a more effective treatment approach.

Both alcohol and other abused drugs have comorbid associations with major mental illnesses, particularly affective disorders (Regier et al., 1990). The treatment of comorbid alcohol or drug abuse and mental illnesses has, however, received rather sparse attention from both NIAAA and NIDA. Nonetheless, it was shown recently that a combination of medications rather than a single-agent approach might be optimal treatment for those with alcohol dependence and comorbid depression (Pettinati et al., 2010). Clearly,

comorbid alcohol and drug addiction with mental illness is an important issue that requires collaborative research between the new institute and NIMH. This, and the array of “behavioral addictions,” raises an interesting question—should part of NIMH’s portfolio be incorporated within the new institute for substance use, abuse, and addiction?

### TRAINING

Although addiction specialists are trained to look after patients who may misuse alcohol and other drugs, most of those who treat the end-organ consequences of alcohol and other drug abuse are not addiction specialists. The culture for scientific meetings both in the United States and globally is to have separate meetings for alcohol and drug addiction researchers. In the United States, this constitutes primarily the Research Society on Alcoholism (RSA) and the College on Problems of Drug Dependence (CPDD). There are some good reasons to attempt to blend these 2 scientific communities, such as cross-training, understanding and treating comorbidity, and developing joint treatment initiatives for addiction specialists. Nevertheless, at least in the case of alcohol-related disorders, their separate existence partially reflects the fact that nonaddiction experts such as specialists in liver, cancer, and degenerative disorders are frequently in attendance. Recognition of this high specialist mixture has been reflected in further subdivision of alcohol meetings into those that stress the biological aspects of the disease, such as the International Society for Biomedical Research on Alcoholism. Perhaps the primary reason for this trend is that although end-organ damage occurs with many drugs of abuse, its study is best defined and most widely executed with respect to alcohol-related research. Also, because end-organ specialists in alcohol-related research tend to work within a distinct subspecialty of medicine such as hepatology, they may not cross over easily into a combined drug addiction forum because they lack access to the necessary case mix. Attempting to coalesce these disparate scientific communities on a global scale, given the cultural differences, is unlikely to be fruitful in the near term and may require a new generation of scientists and clinicians. For the present, trainees should be allowed to learn from the diversity of both the RSA and CPDD environments and scientific communities and, hopefully, blend this into their research, or clinical practice, or both. This dual opportunity would afford trainees a larger perspective from which to choose their subspecialty. Focused training in these individual specialties, with attention to both synergies and differences, would best advance progress in the respective fields of alcohol and other drug addiction and dispel the notion that one size fits all.

Because NIAAA, NIDA, and the nicotine addiction research community have followed separate paths in the past, training the next generation of scientists and care providers in the addictions and related disorders will present an enormous challenge. This next generation should be trained in a multidisciplinary fashion—not just as neuroscientists studying the

effects of various drugs on the brain. They should learn about how the brain interacts with the rest of the body—for example, in terms of energy metabolism, nutrients, the provision of precursors for neurotransmitters, pharmacokinetics, genetics, genomics, epigenetics, and metabolomics—as well as the short- and long-term effects of alcohol, nicotine, and illicit drugs on the brain and other body organs.

The training of pre- and postdoctoral fellows depends heavily upon NIH research and training grants. Many NIAAA training grants include the training of scientists in research on alcohol-induced liver damage, FASD, cancer, and lung disease. This important aspect of alcohol’s health effects would be lost if the medical and psychosocial consequences of addiction were not included in the portfolio of the new institute. As well, if the focus is unduly restricted to only the “addictive” aspects of the science, the breadth of training will be compromised.

### OPPORTUNITIES FOR GROWTH AND DEVELOPMENT

An important aspect of an extensive deliberative process would be the creation of a vehicle to understand and explore unmet public health needs for the growth and development of addiction-related science.

An integral part of the successes of both NIAAA and NIDA has rested in the domain of collaborative scientific and treatment ventures. Hence, there will be an opportunity for collaborations between the new institute for substance use, abuse, and addiction and other ventures across the NIH campus. Indeed, there is a pressing need for an addiction “road map” that cuts across all the NIH institutes, given that diseases associated with alcohol and drug addiction rank among the highest causes of preventable morbidity and mortality in the United States and globally. This road map should have a clearly stated mission and goal such as the development of efficacious treatment for alcohol and other drug use disorders and their consequences.

An opportunity that should not be missed is joint public health prevention programs in alcohol and drug addiction. Importantly, children need to receive education about alcohol and other drugs simultaneously, as should other vulnerable sociodemographic groups such as pregnant mothers and the elderly. Appropriate training should be provided to primary care physicians to ensure the early identification of high-risk individuals on the basis of family history, comorbidity, age of exposure, and other behavioral, biological, or genetic correlates. Because alcohol use disorders have the greatest potential for harm overall, funding for research in this area would be the major component of a new institute for substance use, abuse, and addiction to serve best the public good.

Opportunities to prepare the staff of NIAAA and NIDA for an era of more and increasingly intensive collaborations also should be taken. Developing flexible approaches that integrate systems should be used to break down silos and

create an atmosphere of positive challenge. The opportunity created by the deliberations related to the optimum organizational structure of NIAAA and NIDA should be used to create a forum for dialogue. Both groups need to learn to speak a novel scientific and cultural language that promotes commonality of interest. Such a dialogue, fostered by the institute directors through a biannual process of consultations and working parties, and the Task Force, should be used to chart and monitor progress, thereby creating an ecological barometer to measure change.

Scientists should use the opportunity created by these deliberations to reflect on their own approaches, build relationships with both institutes, and commit to a greater understanding of dependence on both alcohol and other drugs. Furthermore, what has been learned about the neuroscience of alcohol and drug addiction should be considered for application to behavioral addictions, which appear to be an emerging field for health promotion.

### NEW LEADERSHIP

New leadership is needed to invigorate and set a clear path for a new institute for substance use, abuse, and addiction. The new leader should have a well-formed and grassroots understanding of the stakeholders, communities, and focus groups for both alcohol and drug addiction and should command their mutual respect. Such a leader, credible to both the alcohol and drug addiction communities, will need to develop a framework to implement the organizational change and move beyond the hitherto polarizing debate. An esprit de corps among staff needs to be developed through focused working groups and collaborative activities and should be energized to develop the broader mission and objectives of the organization. Finally, new leadership is needed to bridge the gulf between academia and industry to harness the power of biotechnologies and new biobehavioral approaches developed by the new institute. An open search for the leader of the new institute should commence as soon as a clearer understanding of the actual promise of and roadblocks facing a new institute is articulated.

### CONCLUSIONS

In sum, the decades-old debate about the optimum organizational structure of NIAAA and NIDA has reached a crescendo with the recent deliberations of the SUAA Working Group and the SMRB. Despite the lack of a crisis, the *sine qua non* impetus for a structural reorganization of 2 institutes, this path proposed by the SMRB and adopted by the NIH Director is based upon the hope of new scientific and public health advances. For a new institute for substance use, abuse, and addiction to succeed, a multitude of potential challenges need to be negotiated effectively. Notably, new funds will be needed, even in the current difficult national economic climate, to coalesce and streamline the infrastructure of both NIAAA and NIDA. Additional funds will be needed to

incorporate addiction-related disorders, most notably tobacco-related disorders, currently conducted by other institutes. Regard needs to be paid to the fact that although there are some commonalities in our scientific understanding of how the rewarding effects of alcohol and other drugs are expressed neurobiologically, important distinctions also exist. Rather than creating a monolithic and thematically driven institute based on a narrow conceptualization of the addiction circuitry, the new institute should undertake the painstaking and diligent scientific work to understand how diverse and complex mechanisms manifest in the expression of the abuse of alcohol and various substances.

Because the success of the future institute relies on the successful collaboration of scientists whose principal aims and goals may differ, would it not be reasonable to propose that a more functional reorganization should logically precede a structural integration of the 2 institutes? Owing to the differences in the constitution of professional pools and organizations for alcohol- and drug-related research, with alcohol groups including a greater proportion of nonaddiction specialists, bridges will have to be developed over time across the scientific and clinical gulf. Careful thought is needed to determine the programmatic components of the new institute. Fragmentation or segregation of ongoing programs such as those involving FASDs, alcoholic liver disease, or prevention and treatment does not serve the public good and must be avoided. A similar need exists to develop an appropriate approach toward tobacco research. Comorbid alcohol and drug addiction is at the interface of a collaborative scientific enterprise and, in the future, should receive appropriate funding and opportunities for development. Because of the strong interrelationship between alcohol and tobacco use, abuse, and addiction, a new institute would not be well grounded if it did not incorporate both. This would require the relocation of scientists, projects, and related funds to the new institute. It is intriguing to consider whether parts of NIMH should also be included within this new institute to address the prevention and treatment of comorbid substance use disorder and mental illness, as well as some behavioral addictive disorders. Indeed, for the new institute to succeed, an enormous amount of collaboration would be needed among other NIH institutes to transfer components of their portfolios related to alcohol and drug addiction research. The diversity of the training that can be obtained in alcohol and other drug abuse-related disorders should be harnessed to generate new ideas and increase opportunities for subspecialization.

These deliberations have identified a real opportunity to improve the public health, increase collaboration among staff members at NIAAA and NIDA, and broaden the thinking and vision of scientists to promote the public good. New leadership that is credible and respected by both the alcohol and drug addiction communities is needed to drive the new institute for substance use, abuse, and addiction, inspire new vistas, build more intensive collaborations, and motivate staff to do what they have always done best—serve the public good. Otherwise, the path toward a structural reorganization for a

new institute that meets some of the promise proposed for it, even with careful and strategic planning, could become a famished road (Okri, 1992) that simply consumes people and resources with no tangible gains. Success in this difficult task would be made easier and less costly by first implementing carefully placed building blocks of increasing functional reorganization. Indeed, for the structural reorganization of a new institute for substance use, abuse, and addiction to succeed, attention needs to be paid to the devil in the details.

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### DISCLOSURES

B.A. Johnson has served as a consultant to Johnson & Johnson (Ortho-McNeil Janssen Scientific Affairs, LLC), Transcept Pharmaceuticals, Inc., D&A Pharma, Organon, ADial Corporation, Psychological Education Publishing Company (PEPCo LLC), and Eli Lilly and Company. He also has served on the Extramural Advisory Board for NIAAA (2004–present), the National Advisory Council for NIDA (2004–2007), the Medications Development Subcommittee of NIDA's Advisory Council on Drug Abuse (2004–2007), and the Medications Development Scientific Advisory Board for NIDA (2005–2009). In addition, he has been the recipient of research grant support from both NIAAA and NIDA. R.O. Messing has served on the Board of Scientific Counselors for NIAAA (2002–2008) and on the Medical Advisory Council of ABMRF, The Foundation for Alcohol Research (2006–2009), and has been the recipient of research grant support from NIAAA. M.E. Charness is on the Scientific Advisory Board of Allon Therapeutics. H.R. Kranzler has been a paid consultant for Alkermes, Inc., Glaxo-SmithKline, and Gilead. He has received research support from Merck. He also reports associations with Eli Lilly and Company, Janssen, Schering Plough, Lundbeck, Alkermes, Inc., GlaxoSmithKline, Abbott, and Johnson & Johnson, as these companies provide support to the ACNP Alcohol Clinical Trials Initiative (ACTIVE) and Dr. Kranzler receives support from ACTIVE. M.C. Mitchell is the President of ABMRF, The Foundation for Alcohol Research, and is a consultant for Alkermes, Inc. and Orexigen. K.J. Sher has served as a consultant to the Joint Defense Group, a group of law firms representing various major brewers on a then-pending class action lawsuit (2006–2007). He also has served on the Psychosocial Advisory Council for the Alcoholic Beverage Medical Research Foundation (1992–1998; 2001–2007), the Extramural Advisory Board for NIAAA (1991–1992; 2004–2007; 2009–present), the National Advisory Council on Alcohol Abuse and Alcoholism (2003–2007), and various ad hoc task forces and working groups for NIAAA. In addition, he has been the recipient of

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### REFERENCES

- Collins FS (2010) Statement of NIH Director Francis S. Collins, M.D., Ph.D., on recommendation to create a single Institute for substance use, abuse, and addiction research. <http://www.nih.gov/news/health/nov2010/od-18.htm>. NIH News. Accessed November 18, 2010.
- Cotter J (2009) Efficacy of crude marijuana and synthetic delta-9-tetrahydrocannabinol as treatment for chemotherapy-induced nausea and vomiting: a systematic literature review. *Oncol Nurs Forum* 36:345–352.
- Ellis J (1986) The superstring: theory of everything, or of nothing? *Nature* 323:595–598.
- European Medicines Agency (EMA)—Committee for Medicinal Products for Human Use (CHMP) (2009) Guideline on the Development of Medicinal Products for the Treatment of Alcohol Dependence. European Medicines Agency, London, UK.
- Grant BF, Dawson DA, Moss HB (2011) Disaggregating the burden of substance dependence in the United States. *Alcohol Clin Exp Res* 35:387–388.
- Grant BF, Stinson FS, Dawson DA, Chou SP, Dufour MC, Compton W, Pickering RP, Kaplan K (2004) Prevalence and co-occurrence of substance use disorders and independent mood and anxiety disorders: results from the National Epidemiologic Survey on Alcohol and Related Conditions. *Arch Gen Psychiatry* 61:807–816.
- Gunzerath L, Faden V, Zakhari S, Warren K (2004) National Institute on Alcohol Abuse and Alcoholism report on moderate drinking. *Alcohol Clin Exp Res* 28:829–847.
- Johnson BA (2010a) Opportunities, challenges, and successes in the development of medicines for the treatment of addiction, in *Addiction Medicine: Science and Practice* (Johnson BA ed), pp 1525–1537. Springer Science + Business Media, New York, NY.
- Johnson BA (2010b) Medication treatment of different types of alcoholism. *Am J Psychiatry* 167:630–639.
- Johnson BA, Marzani-Nissen G (2010) Alcohol: clinical aspects, in *Addiction Medicine: Science and Practice* (Johnson BA ed), pp 381–395. Springer Science + Business Media, New York, NY.
- Koob GF (2010) Animal models of drug dependence: motivational perspective, in *Addiction Medicine: Science and Practice* (Johnson BA ed), pp 333–357. Springer Science + Business Media, New York, NY.
- Koob GF, Le Moal M (2005) Plasticity of reward neurocircuitry and the 'dark side' of drug addiction. *Nat Neurosci* 8:1442–1444.
- Lewin and Associates (1988) Examination of the Advisability and Feasibility of Restructuring Federal Alcoholism, Drug Abuse and Mental Health Activities. National Academy of Sciences, Washington, DC.
- May PA, Gossage JP, Kalberg WO, Robinson LK, Buckley D, Manning M, Hoyme HE (2009) Prevalence and epidemiologic characteristics of FASD from various research methods with an emphasis on recent in-school studies. *Dev Disabil Res Rev* 15:176–192.
- National Research Council Committee on the Organizational Structure of the National Institutes of Health (2003) Enhancing the Vitality of the National Institutes of Health: Organizational Change to Meet New Challenges. National Academies Press, Washington, DC.
- Nutt DJ, King LA, Phillips LD, the Independent Scientific Committee on Drugs (2010) Drug harms in the UK: a multicriteria decision analysis. *Lancet* 376:1558–1565.
- Okri B (1992) *The Famished Road*. Nan A. Talese/Doubleday, New York, NY.
- Onaivi ES (2007) An endocannabinoid hypothesis of drug reward. *Cannabinoids* 2:22–26.
- Pettinati HM, Oslin DW, Kampman KM, Dundon WD, Xie H, Gallis TL, Dackis CA, O'Brien CP (2010) A double-blind, placebo-controlled trial

- combining sertraline and naltrexone for treating co-occurring depression and alcohol dependence. *Am J Psychiatry* 167:668–675.
- Regier DA, Farmer ME, Rae DS, Locke BZ, Keith SJ, Judd LL, Goodwin FK (1990) Comorbidity of mental disorders with alcohol and other drug abuse. Results from the Epidemiologic Catchment Area (ECA) Study. *JAMA* 264:2511–2518.
- Rehm J, Mathers C, Popova S, Thavorncharoensap M, Teerawattananon Y, Patra J (2009) Global burden of disease and injury and economic cost attributable to alcohol use and alcohol-use disorders. *Lancet* 373:2223–2233.
- SUAA Working Group (2010) Substance Use, Abuse, and Addiction (SUAA) Working Group Report. Available at: [http://smrb.od.nih.gov/Sept2010\\_SUAA\\_Working\\_Group.pdf](http://smrb.od.nih.gov/Sept2010_SUAA_Working_Group.pdf). Accessed February 25, 2011.