BENJAMIN B. WAGNER
United States Attorney
RICHARD BENDER
SAMUEL WONG
GREGORY T. BRODERICK
Assistant United States Attorneys
501 I Street, Suite 10-100
Sacramento, CA 95814
Telephone: (916) 554-2700
Facsimile: (916) 554-2900

IN THE UNITED STATES DISTRICT COURT

FOR THE EASTERN DISTRICT OF CALIFORNIA

UNITED STATES OF AMERICA, Plaintiff, v. BRYAN SCHWEDER, et al., Defendants.	Case No. 2:11-CR-449-KJM SUPPLEMENTAL DECLARATION OF DR. BERTHA MADRAS, PhD., IN SUPPORT OF OPPOSITION TO MOTION IN LIMINE [Dkt. Nos. 329 & 334]. Date: September 4, 2014 Time: 10:00 am Judge: Hon. Kimberly J. Mueller

I, Bertha K. Madras, Ph.D, declare as follows:

1. I am a Professor of Psychobiology at Harvard Medical School, Department of Psychiatry. My office is located in the Alcohol and Drug Abuse Program at McLean Hospital, an affiliate hospital of Harvard. My opinions, qualifications, and CV were previously submitted in this matter with my direct written testimony. (*See* Dkt. No. 324). I submit this declaration in response to Defendants' motion in limine to exclude or limit my testimony.

2. In addition to the academic and public service set forth in my CV, I have engaged in developing research data to fulfill FDA requirements (pre-clinical chemical design, animal testing), and am knowledgeable of FDA requirements (toxicology testing, shelf life, reproducible chemistry, purity, pyrogenicity, IND requirements, clinical study design) in virtually every stage of the FDA drug-approval process. This includes Phase I and Phase II clinical trials, and part of the Phase III clinical trials (testing on human subjects). Along with collaborators, I was intimately involved in inventing the drug Altropane (which helps in early diagnosis of Parkinson's disease) and in procedures for the FDA-

approval process. I have been co-inventor of numerous chemicals (19 patents) and conducted pre-clinical screening and testing in preparation for clinical research, have served as a consultant for private industry on development of drugs for clinical testing, and served on advisory boards and numerous grant review committees (NIDA) focused on drug discovery and development of medications for human use (service on NIH special emphasis panels to review grants, or on medications development advisory board (e.g. ZMH1 ERB-C (01)S, ZDA1, GXM-A 11, ZDA1-JXR-D(06), others).

3. A segment of my course for fourth year medical school students involved discussions on evaluating clinical research on marijuana as a medicine.

4. From 2006-2008, I served as the Deputy Director for Demand Reduction at the White House Office of National Drug Control Policy ("ONDCP"). I was appointed to this position by the President of the United States and confirmed by the United States Senate, with unanimous consent. In this position, I had access to and investigated available marijuana data, ranging from numerous databases to individual research manuscripts. One of my projects was to seek evidence from these data bases and the biomedical literature on the medical uses of marijuana for a variety of medical indications and potential adverse effects. Using standard criteria, I examined clinical reports for the number of subjects, the disease state, quality of study (e.g. blinded, randomized, placebo-controlled or equivalence, cross-over trials, open-label, survey reports, protocol-driven, number of drop-outs and why, current medication use, experience with marijuana), outcome measures (objective, self-reported), side effect evaluation and quantification. Attached hereto as **Exhibit A** is an article I wrote about my work and experience at ONDCP. A partial list of the data bases and resources to which I had access at ONDCP is listed in § 2.2 of that article on page 373. In my work at ONDCP, it was important to be familiar with and understand this information, including information about marijuana's supposed medical applications, and to communicate it to a broad range of policy-makers, scientists, physicians, medical societies, and the general public.

5. Since leaving ONDCP, I have continued to conduct research in this area and to be familiar with the very latest scientific research. I recently served as the principal editor on a 2014 textbook entitled "The Effects of Drug Abuse on the Human Nervous System," which includes a chapter by the renowned marijuana expert Dr. Harold Kalant, on the effects of cannabis and

cannabinoids on the human nervous system. Attached hereto as **Exhibit B** is a copy of the title page of the book as well as the page containing his conclusions of the chapter on the effects of cannabis and cannabinoids on the human nervous system.

6. With due respect for modesty, I am considered a highly informed multidisciplinary research scientist with in depth knowledge of what is known and unknown on how marijuana use affects the brain and the body. It is my opinion that the marijuana plant lacks the required consistency and purity and medically acceptable route of administration to be treated generally as a medicine at this time, and we simply do not yet know enough to determine whether it has effective medical uses, if alternatives are safer, nor whether its short-term or long-term adverse effects are outweighed by such medical applications. We do know that marijuana has harmful effects, both to the brain and the body. We should therefore adhere to the FDA's well-established system for evaluating medicines, and let the medical and scientific information develop.

I swear that the foregoing is true and correct to the best of my knowledge. Executed this 19th day of August, 2014, at Belmont, Massachusetts.

By: _____
BERTHA K. MADRAS, Ph.D

Exhibit A

Ann. N.Y. Acad. Sci. ISSN 0077-8923

ANNALS OF THE NEW YORK ACADEMY OF SCIENCES
Issue: *Addiction Reviews 2*

Office of National Drug Control Policy

A scientist in drug policy in Washington, DC

Bertha K. Madras

Department of Psychiatry, Harvard Medical School, Southborough, Massachusetts, USA

Address for correspondence: Bertha K. Madras, PhD, Department of Psychiatry, Harvard Medical School, NEPRC, 1 Pine Hill Dr., Southborough, MA 01772-9102. bertha_madras@hms.harvard.edu

This essay describes how a basic scientist was thrust into the epicenter, the political cauldron of our national drug control policy, and how the experience altered her professional trajectory and perspective.

Keywords: Office of National Drug Control Policy (ONDCP); demand reduction; addiction; prevention; intervention; treatment

Psychoactive drugs, used for nonmedical purposes, can adversely affect people from *in utero* to old age, from the cradle to the grave. Individuals, families, societies, and nations bear a heavy burden, with drug abuse and addiction among the most prevalent, consequential, costliest, and deadliest of neuropsychiatric disorders. National and international drug policies to address this public health burden are imperative.

Drug policy has benefited from the perspective of biological sciences. Driven by principles of homeostasis, the drug-exposed brain adapts to the uncontrolled deluge of drug-induced signals, by modifying gene/protein expression, cell biology, neural circuits, and recalibrating motivational and volitional control.[1,2] On the basis of the preponderance of evidence for these biobehavioral changes, the scientific community increasingly has designated addiction as a brain disease.[3] The disease model is also penetrating national and international public policy. For example, in June 2009, Antonio Costa, the executive director of the United Nations Office on Drugs and Crime, stated that drug use should be treated as an illness in need of medical help and appealed for universal access to drug treatment. Yet, integrating scientific evidence into public policy is not simple. It is a historical reality that public policies are forged from a mosaic of opinions, propounded by scientific, medical, political, special-interest, moral, ethical, and legal pundits.

This essay describes how a basic scientist was thrust into the epicenter, the political cauldron of our national drug control policy, and how the experience altered my professional trajectory and perspective. For decades, my academic life was immersed in investigating the neurobiology of addictive drugs, other neuropsychiatric disorders, and developing novel diagnostic and therapeutic agents. Teaching and forays into the public domain (e.g., a museum exhibit) were pleasurable responsibilities and civic duties to educate medical students, train a new generation of scientists, or respond to public cravings for objective scientific information to anchor personal and political views. In February 2005, this career path unexpectedly lurched in a new direction, initiated by an invitation to interview in Washington, DC, for the position of deputy director for Demand Reduction in the White House Office of National Drug Control Policy (ONDCP), within the Executive Office of the President.

> A 1988 congressional bill had authorized the White House Office of National Drug Control Policy (ONDCP), with a mandate to develop policies, priorities, and objectives for the Nation's drug control program, *to reduce illicit drug use*, manufacturing, trafficking, drug-related crime and violence, *and drug-related health consequences.* Its mandate also was to evaluate, coordinate, and oversee international and domestic anti-drug efforts of

doi: 10.1111/j.1749-6632.2009.05278.x

Ann. N.Y. Acad. Sci. 1187 (2010) 370–402

executive branch agencies, to sustain and complement State and local anti-drug activities. Within the Agency, the Deputy for Demand Reduction coordinates policy and programs for drug prevention, intervention and treatment in our nation. [http://www.whitehousedrugpolicy.gov/about/index.html.]

1. Appointment process and initial challenges

In considering this unique honor and opportunity, I grappled with a cost–benefit analysis of relinquishing a gratifying research program, long-standing collaborations, training and teaching, and the likelihood of circumscribed freedom to pursue an idea or express a viewpoint publicly. Could political waters be successfully navigated with scientific evidence, the compass of the academic realm, the bedrock of my profession? Would there be sufficient time to accomplish *something,* considering the lengthy processes for security clearance, ethics agreement, and Senate confirmation? Could my academic and research career be resuscitated when this period ended, for I was required ethically, to relinquish everything (e.g., research grants, manuscripts, collaborations, postdocs, scientific speaking engagements, memberships in scientific organizations)? Scientific and personal accounts of addiction and motivation to reduce this public health burden drove me to accept the nomination. After a lengthy vetting process for top-secret security clearance, a personal and policy exchange with a Senate subcommittee, the lengthy nomination process was nearing an end. The Senate Health, Education, Labor, and Pensions subcommittee voted the nomination out of committee, onto the Senate floor, for a full Senate vote. With Senate confirmation scheduled, this linear process took a harsh political detour. On October 24, 2005, Senator Charles Grassley placed a hold on the Senate confirmation process:

> Mr. President, I have notified Senate leadership of my intent to object to any unanimous consent request relating to the nomination of Bertha K. Madras to the position of Deputy Director for Demand Reduction. This action has nothing to do with Ms. Madras or her qualifications for the position to which she has been nominated. I have taken this action because there are a number of outstanding issues regarding the activities and operation of the Office of National Drug Control Policy that should be resolved before considering this nomination. I am hopeful that, with the cooperation of the Office of National Drug Control Policy, these issues can be resolved shortly.

[Senator Grassley lifted the hold September 12, 2006, and the Senate confirmed the nomination by unanimous consent the next day.]

It was a strain to be caged in virtual limbo, with no time frame given for lifting the hold, unable to submit grants, plan long-term research projects, collaborate, deliver presentations, or attend meetings. The confinement was mercifully relieved by President Bush's recess-appointment months after the hold was placed. Assuming office within days of the appointment, I found a new office desk piled high with House and Senate bills, talking points, statistics, briefing books, newspapers and daily media clips, budget books, federal agency documents, "blue folders," speaking engagements and lists of meet and greets, briefings on organizations, waiting for comments, approval, concurrence, and action plans. Dusk on that first day was a time for reflection, on whether the piles on my desk would dilute and compromise tangible progress for demand reduction, what to focus on during the brief appointment time, and whether my background would be a benefit or a barrier.

The first perceived barrier was an unrealistic compulsion to verify assertive statements with primary scientific sources. As blocks of solitude for reading did not exist during deadline-driven 10- to 16-hour days, nighttime became a sanctuary for searching and creating an extensive library of primary source materials. A lesser challenge, and designated as a deep flaw by a highly skilled media trainer, was my scientific speaking demeanor, a conscious suppression of my natural tendency to deliver exciting research results with intensity. The media trainer was determined to excise this undesirable trait and convert me to a rapid-fire, passionate sound bite delivery system. On the political front, my reliance on objective data as a key to persuasion was constantly challenged. Scientific data were a powerful engine in garnering support from politicians and the biomedical community, but bundling scientific evidence with analysis of resistance to novel ideas, appeals to values, to ethics, to conscience, to empathy with the plight of others with, combined to

drive progress, politics, and policy. While adopting a broadened strategy for this environment, my decisions derived from facts, statistics, and outcomes.

The "war on drugs" parlance in the media did not resonate with my background or public health perspective. For years, my public addresses quoted Hippocrates . . . "from the brain and from the brain only arise our pleasures, joys, laughter, and jests, ..." This quote evolved into: "within the brain and brain only resides our humanity—our capacity to compose music, create literature, poetry, and art, view galaxies, predict black holes, conjure up calculus, justice, law and charity, the laws of physics and principles of genetics, design computers, medications, rockets, love and contemplate our existence and the meaning of life. . . ." "This is not a war on drugs; it is a defense of our brains—the repository of our humanity." The call for public health solutions to this problem was based on this defense of our brain, body, and behaviors.

A lyrical appeal to defend our brains was appropriated from neuroscience. Drugs propagate extraordinary hedonic signals, overpowering signals of natural rewards, suppressing the salience of essential rewards, eventually supplanting the drive for natural, rewarding behaviors embedded in the brain. As addiction sets in, an entire set of survival behaviors, attending work or school, focusing on commitments, goals, and creativity become secondary, as the brain increasingly focuses on a narrow set of compulsive, uncontrollable goals, a drug-centered existence. Even in those motivated to become and maintain abstinent, the drug-adapted brain spontaneously, or on cue, generates drug cravings months or years after withdrawal symptoms have ceased, cravings that trigger relapse at vulnerable periods. A simple ingested chemical can imprint itself on the brain, create sensations that surpass, suppress, surmount or supplant natural rewards, transform personality, and usurp the pursuit of fundamental human priorities and pleasurable pursuits: survival, family, health, intellectual, and creativity.

Another challenge was to develop a persuasive response to views, albeit minority views, that drug-seeking/using behavior is normative, acceptable, inevitable, a rite of passage, and that policies should focus on reducing "drug-associated harm," not on reducing demand for drugs or treating addiction. In my view, "harm reduction" is incompatible with strong evidence from addiction biology and medicine that drug use is associated with elevated risks to health, behavior, education, and employment and can lead to the treatable brain disease of addiction. To counter arguments for "harm reduction," I frequently posed three questions: "How many people do you know who initiate drug use intending to become addicted?" "How many recovering addicts do you know who no longer harbor the disease of addiction, yet regret their recovery and long to return to the addicted state?" "How many addicted people do you know who benefit more, physically, personally, socially, emotionally, and psychologically, from programs that accept and facilitate continued uncontrollable drug use or from treatment programs and recovery support services?" Surprisingly, these rhetorical questions have not been fully explored by research. I viewed acceptance of the inevitability of use and mitigation of potential adverse consequences, without equal support for prevention and treatment per se, as poor medical, public health, and national policy. The Congressional bill that authorized the formation of ONDCP mandated that ONDCP should "reduce illicit drug use . . . and drug-related health consequences." Prevention, intervention, and effective treatment would and should be the sine qua non of Demand Reduction policy, unless Congress alters the language. No less than the United States, the World Health Organization, and the United Nations consider drug use and addiction as public health burdens, illnesses, to be addressed by prevention, intervention, and treatment.

2. Challenges of demand reduction

With 2 years of effective time, I faced systemic challenges, including a small, albeit dedicated staff, a fragmented Office of Demand Reduction (a few years prior to my arrival, several programs, responsibilities, and personnel had been exported to other ONDCP sectors), a management style unfamiliar to academia, a request to focus primarily on administrative oversight of four grant programs, budgets that were planned 18–24 months ahead of time. These challenges were unremarkable and surmountable compared with the colossal public health burden of Demand Reduction. Foraging material for research, teaching, public outreach, and museum exhibit(s) had exposed me to abundant and relevant information: prevention

strategies, risk factors and subpopulations, psychiatric comorbidity, prescription drug abuse, pharmacology, genetics and neurobiology, brain imaging, medical consequences, screening tools, brief interventions, emergency department response, evidence-based treatment, treatment cost-effectiveness, recovery support services, drug discovery and medications, and drug courts. Several controversial issues had been incorporated into my course for medical students in the format of formal debates (e.g., drug legalization/decriminalization, medical marijuana, needle exchange, addiction definitions). Yet to sculpt an effective role, I felt it necessary to consume mountains of new material and statistics to comprehend the challenges of demand reduction.

2.1. Challenges: the drugs

Legal statutes delineating the mission of ONDCP were clear. The focus was illicit drugs. In reality, this boundary was diffuse and constantly shifting, with drugs of various chemical classes raising national concerns: (a) nicotine, a legal nonintoxicating, but addictive drug with significant health risks; (b) alcohol, a legal drug, which in small, infrequent doses, is nonintoxicating and has health benefits but, at high and/or frequent doses is an intoxicating, addictive drug with significant health risks; (c) inhalants, legal substances, such as toluene or gasoline, which engender psychoactive, intoxicating effects, can be severely addictive and cause serious neurological and organ system damage; (d) marijuana, cocaine, heroin, amphetamine(s), hallucinogens, Schedule I or II psychoactive drugs with high abuse or addiction potential, no approved medical purpose, and associated with increased health risks, morbidity, and mortality; (e) prescription medications, some legally obtained but used inappropriately by intended or unintended persons for psychoactive purposes, with high abuse, addictive, and overdose potential (e.g., opioid analgesics); (f) prescription drugs obtained without an appropriate diagnosis with/without prescription used by intended/unintended persons, for "chemical coping," "self-medication," and functional improvement (e.g., ADHD drugs for cognitive enhancement, opioid analgesics for sleep anxiety problems, and anabolic steroids for performance enhancement); (g) over-the-counter psychoactive drugs (e.g., cough medicines) with overdose and addictive potential; (h) over-the-counter drugs that can serve as precursors for production of illegal drugs (e.g., pseudoephedrine converted to methamphetamine); (i) marijuana used for medical purposes but not approved by the U.S. Food and Drug Administration (FDA) and approved in states via ballot initiatives, with scant evidence for several medical conditions (e.g., Alzheimer's disease) claimed to be alleviated by the inhaled drug; and (j) a legal and powerful hallucinogen Salvinorin A, with inadequate evidence for scheduling it. These boundaries were more virtual than real. Several institutions and programs with Demand Reduction oversight (e.g., National Institute on Drug Abuse [NIDA] and Substance Abuse and Mental Health Services Administration [SAMHSA]) addressed legal and illegal drugs. In my first few months, a strategy to address a spectrum of drugs emerged but the context for this strategy requires perusing the human element of use and consequences.

2.2. Challenges: drug use in specific populations and consequences

The more equipped with epidemiological and other public health survey data, the more it became ethically compelling to expand leadership beyond administrative oversight of four grant programs. Most data within the following sections are derived from a variety of sources, some in primary literature and others from national databases, Arrestee Drug Abuse Monitoring Program (ADAM).[4] Centers for Disease Control and Prevention (CDC),[5] the National Center on Addiction and Substance Abuse at Columbia (CASA),[6] the Drug Abuse Warning Network (DAWN),[7] National Survey of Substance Abuse Treatment Services (DASIS),[8] Department of Labor (DOL),[9] Health Behavior in School-aged Children (HBSC),[10] Inventory of Substance Abuse Treatment Services (ISATS),[11] Monitoring the Future (MTF),[12] National Comorbidity Survey (NCS),[13] National Epidemiological Survey on Alcohol and Related Conditions (NESARC),[14] National Survey on Drug Use and Health (NSDUH),[15] National Vital Statistics System (NVSS),[16] Treatment Episode Data Set (TEDS),[17] and Youth Risk Behavior Surveillance System (YRBSS).[18]

1. Incidence in general population. Drug use in the United States is the highest among nations of the world. A significant proportion of the population engages in risky, problematic use (e.g., binge alcohol

consumption: 40.3 million people) and illicit drugs, including nonmedical use of prescription drugs and steroids (19.9 million people), excluding tobacco products.[15] Every sector of society is affected by drugs: educational institutions and their students, the workplace and the employed, the health care system and patients, and the criminal justice system and the defendants. Momentous encounters with individuals profoundly affected by drugs—politicians, scientists, homeless people, prisoners, desperate parents of 14-year-old addicts, fathers and mothers with deceased children—continue to haunt me. Visits to Native American tribal lands and tribal chairmen informed me that Mexican drug cartels were filtering in, not only to sell drugs but also to marry Native American women, so as to operate within sovereign boundaries, concealed from conventional scrutiny. The high demand for illicit drugs within our borders influences the economies, drug use, and crime rates of bordering (e.g., Mexico, Canada), and noncontiguous nations. Nations with lucrative production or transit zones for the United States and European markets are at risk for escalating drug use and addiction within their borders (e.g., Pakistan, Afghanistan, Mexico, and Iran) and for hosting wealthy, illegitimate governments operating in parallel with legally elected and appointed officials. Reducing the demand for drugs in our nation can only have a positive, global effect.

2. The undiagnosed. While studying the NSDUH statistics for 2005, I was startled to learn that nearly all people harboring a substance use disorder (SUD), more than 20 million people according to *Diagnostic and Statistical Manual of Mental Disorders*, 4th ed. (DSM-IV) criteria, do not feel they need treatment and do not seek treatment; at least 20 million Americans harbor a medical diagnosis of abuse/addiction (DSM-IV), need treatment but do not receive it. Others know they need help but have no clinical assistance in obtaining it.[15] A different statistic highlights the markedly high incidence of positive screens for substance use in health care settings; 22.7% of a population ($N = 459{,}599$) presenting for other health reasons, self-reported that they engaged in a spectrum of substance use, from risky, problematic to abuse/addiction that triggered an intervention.[19] Diagnosis and intervention for the at-risk population and treatment of the disease of addiction, is as essential for this problem as for any other medical disease requiring prevention and treatment services.

3. At-risk specific populations: the adolescent. Specific populations have unique vulnerabilities to the effects and consequences of drug use, including adolescents, 18- to 25-year-olds, the unemployed, the elderly, pregnant women, gang members, school dropouts, racial, and ethnic subpopulations. Some of these risks and consequences are summarized in the following sections.

Initiation of drug use is an adolescent phenomenon, with at least 60% of new initiates falling below the age of 18, with a higher percentage for tobacco and alcohol use. Adolescent drug use is a unique public health challenge, warranting aggressive prevention and intervention policies: (a) age of onset of drug use is declining; (b) initiation of one drug accelerates use of other drugs, during adolescence; (c) drug initiates during early and midadolescence, in contrast with adult onset of use, are at much higher risk for developing addiction during adolescence or later in adulthood. Risk analyses demonstrate considerably higher rates of addiction with early onset of use of marijuana, cocaine, other psychostimulants (e.g., amphetamines), hallucinogens, opioids, inhalants, alcohol use, smoking, and prescription drugs (see references). Not only are the rates higher, but progression to addiction is higher, if involvement with drugs occurs prior to 18 years of age. With each year of delay of onset of use, the likelihood of lifetime drug abuse and dependence is reduced significantly; the odds of developing prescription drug abuse decreases 5% with each year of delay of nonmedical use[20–29]; (d) psychiatric symptoms are higher in adolescent users; (e) drug use is associated with risk-seeking behavior, delinquency, and criminal behavior; (f) adolescent drug use is associated with a discernibly higher likelihood of injury or death; and (g) adolescent use is associated with compromised school performance, absenteeism, higher school dropout rates, gang membership, and later involvement in criminal behaviors.[18] Prevention, intervention, and early diagnosis and treatment of addicted adolescents are national imperatives. Considerable effort by the federal, state, and local governments (e.g., media campaign, safe- and drug-free schools, drug-free communities, and school-based prevention), and private sector programs are targeted to youth, particularly in school. Fortunately, drug use among 8th, 10th,

and 12th graders has declined 24% since 2002,[12] with a similar but smaller decline for the 12- to 17-year-olds.[15] This significant and robust decline should portend a reduction in number of addicted in the future.

4. At-risk specific populations: the 18- to 25-year-olds. Although youth drug use has declined since 2002, and even earlier, a trend perceived since 1996, this declination largely has not carried over to 18- to 25-year-olds.[6,15] This cohort steadfastly remains the highest users and harbors the most addicted populations. Approximately 40% of this age range attends some form of higher education; the rest are in the workplace or are unemployed. On college campuses, marijuana reportedly is associated with concentration problems, driving while high, missing class, and placing oneself at risk for physical injury. A significant proportion of cannabis-using college students meet diagnostic criteria for cannabis-use disorder.[30] Federal law mandates that institutions of higher education receiving federal funding have drug-free policies in place as well as enforcement of these regulations. For most institutions of higher education, prevention takes the form of requiring the student to sign a document indicating awareness of the school policy; and enforcement is a rare event. Because drug use is detrimental in the workplace, many positions require drug testing as a condition before employment or random testing during employment. Accordingly, drug use can exclude users in certain designated jobs, such as in the federal government, Department of Defense, government contractors, transportation, and other specific industries, narrowing the employment opportunities for 18- to 25-year-olds. Prevention and intervention during this critical developmental stage, to prevent potentially harmful trajectories, is warranted.

5. At-risk specific populations: older adults. Drug use among 50- to 60-year-olds has nearly doubled in the past 5 years,[15] reflecting the persistence of a drug culture among the baby-boomers of the 1970s. Among the consequences are exacerbation of costly medical conditions, such as heart disease and diabetes, which are more common in older adults, and higher susceptibility to the damaging effects of drug/medications/alcohol interactions, because they are more likely to take multiple medications and metabolize them more slowly. Drinkers are at higher risk for infection because alcohol compromises the immune system and are at higher risk for falls and other accidents, involving loss of balance and impaired judgment.[31] Prevention, intervention, and treatment are likely to positively influence health and reduce health care costs.[32]

6. At-risk specific populations: veterans. Veterans, including those returning from the wars in the Persian Gulf region with posttraumatic stress disorder and traumatic brain injuries, are in need of assistance for SUDs and prescription drug misuse. An average annual 7% of veterans aged 18 and older experienced severe psychological distress, 7.1% met the criteria for past year SUDs, and 1.5% were co-occurring. Younger veterans and those with lower family incomes are more likely to report both problems.[33]

7. Psychiatric comorbidity. In mental health settings, 20–50% of patients had a lifetime co-occurring SUD, whereas conversely, in a substance use treatment center, 50–75% had a co-occurring mental health problem, with most not severe. Overall, SUDs are present in more than 9% of our population, and more than 9% also have a diagnosable mood disorder. More than 5 million adults have a serious psychiatric illness combined with an SUD.[13]

8. Prescription drug abuse. Nonmedical use of prescription drugs is high and has increased significantly since 2002, with misuse of opioid analgesics constituting more than 70% of the total use of prescription drugs for nonmedical purposes. Since 2003, there were more new initiates into prescription drug abuse than marijuana. Prescription drug abuse ranks second after marijuana in number of users (6.9 million people), and the number of people addicted to prescription drugs, 2.16 million, also ranks second to marijuana, with numbers rising.[15] Alcohol and other drug users and abusers are at higher risk for misusing prescription drugs, with varied reasons for use. The CDC has reported the highest rate of drug overdose–related deaths in the past 40 years, due primarily to prescription opioid overdoses.[34] Most people who misuse prescription drugs obtain them free from friends and family, a challenge to prevention specialists and to law enforcement agencies.[15] Another major challenge is iatrogenic addiction, or addiction to an opioid analgesic by an individual with no previous history of addiction, who has lawfully obtained and used the drug for a legitimate medical purposes via a prescription. The incidence and prevalence of iatrogenic addiction is not firmly established, with rates

varying widely in the literature, nor is the effect on the individual and on society documented. From a policy perspective, prescription drug abuse is a novel challenge that requires development of significant new policies, programs, and research.

2.3. Challenges: effect of substance use

Proponents of legalization or decriminalization of Schedule I drugs frequently proclaim that drug use is a victimless crime. There is much evidence to the contrary.

1. Effect of substance use on medicine, health, health care costs. Medical and psychiatric conditions occur more frequently in people diagnosed with an SUD, increasing suffering and health care costs. Substance abuse can be associated with or be a causal agent for: (a) injuries, accidents, trauma, violence, drug crises, and overdose, leading to increased use of emergency departments, associated health care costs, and lost work time, added criminal justice costs[35–37]; (b) exacerbation of medical conditions (diabetes, hypertension, sleep disorders, and depression); (c) induction of medical diseases (e.g., stroke, hypertension, and cancer, addiction); (d) increased risk of infections, infectious diseases (e.g., human immunodeficiency virus (HIV)–AIDS and hepatitis C), which can affect employment, family finances, and stress; (e) affecting the efficacy of medications, again leading to increased morbidity; (f) abuse of prescription medications, which can lead to addiction or overdose; (g) affecting adversely the developing fetus, low birth weight, premature deliveries, stillbirths, and developmental disorders; and (h) higher incidence of medical conditions in family members of drug users.[38–42]

2. Effect of substance use on children and families of substance users. More than 6 million children, approximately 9% of all children, live with at least one parent who abuses or is dependent on alcohol or an illicit drug. Young people with parents who are addicted to alcohol or illegal drugs are four times more likely to become addicted if they choose to drink alcohol or use illegal drugs. A child whose parent has a substance abuse problem is at greater risk for physical illness, injuries, and abuse. It is estimated that more than 70% of child abuse cases involved substance-abusing parents. Drug use affects more than children within a family. Families with a member harboring a DSM-IV diagnosis of abuse addiction have more health care problems and higher costs.[5,43]

3. Effect of substance use on crime. Most arrestees, probationers, and parolees test positive for illicit drugs. In the 2008 ADAM II,[4] between 49% and 87% of male arrestees tested positive for an illicit drug. State and local prisons are crowded with prisoners who test positive for drug use and engage in drug distribution. Individuals may be referred to substance abuse treatment through the criminal justice system either as part of a diversionary program before formal adjudication or as part of a formal sentencing program. For certain drugs, criminal justice referrals outrank the percentage of referrals to treatment from other sources.[44,45] With steady growth of the source of referrals, adequate resources are needed to meet the needs of criminal justice referrals. Treatment completion and transfer to another level of care are predictors of longer-term positive treatment outcomes. Compared with all other referral admissions, criminal justice system referral admissions were slightly more likely to complete treatment in 2007 (49% versus 46%) and less likely to drop out of treatment (22% versus 27%), indicating that coerced treatment can have a positive outcome.

4. Effect of substance use on highway safety. The National Highway Traffic Safety Administration (NHTSA) issued its first report on the incidence of drugged driving in July 2009.[46] The roadside survey indicated that the percentage of individuals driving with illegal levels of blood alcohol has steadily declined over the past several decades but that a disturbingly high percentage of people are now driving while under the influence of drugs. Compared with 1973, during which 7.3% of drivers were legally drunk with blood alcohol content level of 0.08% or higher, the latest study found that this rate had fallen to 2.2%, the low rates still accounting for more than 13,000 deaths each year on highways. Of nighttime, weekend drivers, 16.3% were driving under the influence of psychoactive prescription and illegal drugs, as detected in saliva or blood. Heading the illegal drug list were marijuana (8.6%) and cocaine (3.9%), with 3.9% testing positive for prescription or over-the-counter medications. NHTSA is currently conducting research on the relationship between drug levels in motorists and traffic accidents, using the research protocol designed previously to establish hazardous levels of blood alcohol.

5. Effect of substance use in the workplace. More than 75% of illegal drug users hold either full-time or part-time jobs and more than 60% of adults know someone who has worked under the influence of alcohol or drugs. Alcohol and drug abuse create significant safety and health hazards and are associated with adverse outcomes in the workplace. Intoxicants can lead to decreased productivity, fewer work hours, increased absenteeism, poor employee morale, high job turnover, and higher unemployment. Heavy alcohol use is associated with negative attitudes at work, performance problems, and poor work quality. Health care costs for employees with alcohol problems are twice those for other employees, with alcohol and drug abusers being 3.5 times more likely to be involved in a workplace accident. Substance abusers also add costs in health care claims, especially short-term disability claims. Substance abuse costs American businesses approximately $81 billion annually in lost productivity, absenteeism, poor job performance, and accidents, and 500 million workdays are lost annually from employee substance abuse.[47,48] The elderly in the workplace have an added set of problems.[49] To diminish this challenge, federal employees and certain industries (e.g., transportation, nuclear energy) mandate random drug testing, with attendant problems.

Clearly, a national drug control strategy should incorporate accountability and outcome measures not only for reduced drug use, but also for a reduction in drug-related consequences.

3. Demand reduction portfolio

With the magnitude of the problem, it was important to assess the potential reach and effect of the four grant programs I had been charged to oversee. Three of the interesting grant programs (the fourth was drug courts), Random Student Drug Testing (RSDT); Screening, Brief Intervention, Referral to Treatment (SBIRT); and Access to Recovery (ATR) were innovative and had been introduced by the administration in 2003–2004. Collectively their direct effect was on fewer than 1.5 million people and their budgets, totaling approximately $155 million, were a fraction of the approximately $4.9 billion Federal Demand Reduction budget documented annually in fiscal years (FY) 2007–2009. The corresponding supply reduction budget was about $9 billion, for a total of approximately $14 billion. The combined ONDCP budgets paled in comparison with conservative to comprehensive estimates of a $*151.4 billion* annual effect of drugs, or combined with alcohol and tobacco, $510.8 billion on our nation.[50,51]

Were demand reduction dollars distributed appropriately, were the programs effective, and which ones should be scaled upward? Reasonable criteria for demand reduction policy effectiveness were a reduction in drug use and treatment needs. National surveys monitored past 30 days, past year, and lifetime drug use; the number of people harboring a DSM-IV abuse/addiction diagnosis; the number of treatment episodes; drug mentions in emergency departments; and overdose deaths among others. For adolescents, drug use was showing a steep and critical downward trend for protecting youth from future addiction.[12,15] Certain national statistics, however, were not receding; they were stable or increasing. Drug initiates and use among 18- to 25-year-olds had not realistically budged, drug use in the aging population was increasing, prescription drug abuse was climbing, treatment needs were stable or increasing, and drug consequences, emergency department mentions, and overdose deaths were increasing.[7,15,34] With these statistics, how could a public health strategy be constructed that would reduce at-risk populations, assist the addicted/afflicted, the adolescent, the 18- to 25-year-olds, the unemployed, the pregnant women, those engaged in problematic use, the unidentified addict, the elderly, the veteran with traumatic brain injury, and native Americans? Out of a tangle of competing responsibilities, a strategy emerged from one grant program, which could be implemented systemwide. Before focusing on this strategy, it is instructive to view the interplay of evidence-based practices, policy, and politics.

3.1. Four specific grant programs in the federal demand reduction portfolio

The largest of the new grant programs, ATR, needs placement in the context of existing federally funded prevention and treatment program, the state block grants.

3.1.1. SAMHSA, state block grants, and ATR

Most of the demand reduction budget, more than $3 billion, was encumbered by SAMHSA, primarily

for its Substance Abuse Prevention and Treatment (SAPT) state block grants that provided treatment, competitive grants to address targeted needs, such as treatment in drug courts, ATR, SBIRT, and an array of other targeted programs and national surveys. The current SAPT block grant funds treatment capacity for states, territories, Pacific jurisdictions, and a tribal organization, according to a formula. It is the largest source of federal funding to the states for substance abuse prevention and treatment, serving an average of 2 million people annually.[52] Public sources (i.e., federal, state, and local governments) are estimated to account for three-quarters of spending for substance abuse programs, with private insurance contributing the remainder. The SAPT Block Grant, with its required state maintenance of effort, provides the basic national addiction treatment infrastructure.

How well were the state block grants performing? In the 1990s, long before my appointment, NIDA had issued a comprehensive document on principles of evidence-based effective treatment services, which I had referred to as a guide for standard of care. Over the past 6 years, agencies and the Office of Management and Budget (OMB) had assessed more than 1000 programs (98% of the federal budget) by using the federal Program Assessment Rating Tool (PART),[53] a diagnostic tool that assesses the management and performance of federal government programs to increase accountability and effectiveness and provide best value for taxpayers. SAPT was among only 3% of programs receiving an "ineffective" score, based on: (a) the lack of an independent evaluation of its programs; (b) the formula used to allocate resources to states was not distributed according to need; and (c) current measures for monitoring effectiveness were measures of process or outputs, and not quantifiable, effectiveness outcomes. Subsequently, SAMHSA required use of the National Outcomes Measure System (NOMS), which helped to initiate Web-based data acquisition and management, to contract an evaluation of the SAPT grant and publish its findings recently.[52] The evaluation highlighted some significant accomplishments in the program, including increased abstinence from alcohol and drugs, small increases in school attendance and in stable housing, and a decline in arrests comparing arrest rate at admission with rates at discharge. Weaknesses were described, mainly process ones.

Calls for Congress to penalize the SAPT "ineffective" program by a 10% budget reduction were rebuffed by Appropriations Committees, after receipt of a letter signed by 223 national, state, and local organizations supporting SAPT, along with requests for a budget increase. Incentives for improved performance were also rejected in the 2009 final omnibus bill, notwithstanding the administration's recommendation to offer an incentive reward for effective programs to the top 20% of the block grant recipients, as gauged by the NOMS. Thus, both strategies failed to penalize perceived poor performance and reward good performers, a stark reminder that government-run programs and processes do not necessarily respond to evidence-based outcomes and respond to political pressures.[54] In the final 2009 omnibus bill, SAPT received a $21.3 million increase; drug courts received a $23.8 million increase (but well below the $69 million requested in 2006 and 2007). The stimulus package supported no additional funding for addiction services.

Overall, SAMHSA has seen a slight 0.2% budget increase from 2004 to 2008, within the same period that saw significantly higher budget increases for National Institutes of Health and the CDC. Penalizing the SAPT budget is impractical, in the face of major deficits in treatment slots, the likelihood that treatment needs will expand with SBIRT (see following text), meager salaries for a work force characterized by high turnover, and deficient infrastructure (e.g., computers and lack of integration with health care services). One possible response is, while expanding the program budget, requiring improved delivery of services and outcome measures. Nationally, we need to generate statistical projections for treatment needs, develop a service provision strategy to match these needs, and link the budget stringently to realistic measures of quality of service and outcomes. Mainstreaming treatment into medical and other health care facilities, "medicalization," and/or adopting their best practices from medicine—requiring electronic record keeping; integrating health care, treatment, and social services; provision of medications for withdrawal and during treatment; treatment for comorbid conditions (e.g., other psychiatric disorders and HIV–AIDS); required documentation for long-term outcomes; requiring long-term engagement after discharge as for any chronic disease; adapting evidence-based practices and stringent training at federally funded

treatment sites; merit analysis; and impact studies. There are many strategies for recovery and various categories of people with treatment resistance or risk for relapse,[14] warranting evidence-based alignment of people with SUDs into suitable environments. If SBIRT[55] becomes a routine service in health care settings, rapid expansion of treatment resources and *seamless, timely, proximal, high-quality* provision of treatment services is recommended.

In a lengthy, negotiated process, SAMHSA recently revised its NOMS[56] to incorporate quantifiable outcome and process measures for treatment: morbidity, drug-free tests after 6 months of treatment, housing, employment, education, crime, access and capacity, treatment retention, perception of care, cost-effectiveness, and use of evidence-based practices. These progressive steps are encouraging but do not include a requirement to document treatment outcomes long after discharge, provision of long-term follow-up care or medical care.

ATR.

> If only I had someone who cared about me when I was a kid; my mother was a user; I got into drugs, then meth; they cared for me here like they're my parents; I told my mother she had to clean up for my graduation; when she arrived, I was so proud of her . . . A woman in a residential Access to Recovery program.

The innovative Access to Recovery (ATR) treatment program,[57] administered by SAMHSA, was launched by President Bush in his 2003 State of the Union Address; it had three main objectives: consumer choice, increased capacity, and outcome oriented. Congress appropriated $100 million in each of the 2004–2008 budgets for SAMHSA to launch and sustain this initiative. Some state grantees designed their programs for specific populations, focusing on parolees, on adolescents, on methamphetamine addicts, on Hurricane Katrina survivors, on parents, on populations newly released from prison, in the workplace, and on people within the criminal justice system (sometimes linking them to drug courts). Grantees used the new funds to supplement, not supplant, current funding and built on existing programs, including SAPT. From 2004 to 2009, ATR supported treatment and recovery for 277,000 people (with possibly some duplicates). This comprehensive program addressed some fundamental treatment voids by: (a) closing the gap between treatment seekers and treatment slots and providing recovery support services, including medical detoxification; (b) offering treatment seekers the freedom to structure their recovery with services and programs that resonate with their personal and perceived needs; (c) expanding the list of providers to include faith-based and community organizations; (d) offering a host of integrated services to treatment seekers through a voucher system, which could tilt treatment from failure to success, such as housing assistance, job training, educational assistance, transportation, child care, medical detoxification, serving the incarcerated prior to release, inpatient and outpatient treatment modalities, residential services, peer support, relapse prevention, and case management; and (e) requiring computerized intake, discharge, and 6-month follow-up data on each treatment seeker, so as to measure success by abstinence, attainment of employment or enrollment in school, involvement with the criminal justice system, stable housing, social support, access to care, and retention in services.

By 2007, ATR was becoming an existential threat to the state block treatment grant program. The program provided treatment-seekers with computerized vouchers to pay for integrated treatment and recovery support services. As a newcomer to the field, ATR and its voucher system was amenable to development of a customized computer database, enabling analyses of which services and service providers were effective and cost-effective. Incentives for providers were feasible in the form of rewards, as were reductions in reimbursement, depending on outcome measures. A key to accountability of this new treatment initiative was the linking of reimbursement for services to demonstrate abstinence from drug and alcohol use, after discharge. Because of its perceived success, several states continued to fund ATR services after the granting period was over. In overseeing this program, SAMHSA provided me outcome measures, based on Government Performance Results Act (GPRA) data and arranged ATR site visits. Outcome measures provided by specific ATR grantees were promising, with high rates of abstinence at 6 months after intake and improvements in measures of social stability (housing, employment, etc.). With the accessibility of computerized databases, I strongly advocated that ATR sites link to academic centers and publish outcome measures and

other evaluations of the program in peer-reviewed manuscripts or accessible documents. State officials, health care insurance providers, administrators, and treatment providers voiced strong support for the fundamental concepts of ATR, its flexibility, choices, and database. Some treatment center administrators claimed a compelling need for computerization of records and admitted to using the computerized database program and its applications for non-ATR patients, a fine example of the government serving as a catalyst for progress.

The successes of ATR and SAPT treatment services and outcomes are documented in data and statistics, but there remain voids: on comparative retention time in treatment and reasons for quitting; definitions of treatment completion; short-term abstinence; long-term abstinence; time to relapse for 1 or more years after discharge; personal satisfaction with treatment; long-term involvement in criminal justice; and durability of educational, housing, employment assistance. We also need to know the cost-effectiveness, health care savings, and effect on children and families of the two types of programs, which recovery support services were most requested and most valued, the benefits of faith-based services, on an individual basis. We can not compare the two approaches with regard to recovery support services, especially on an individual basis and in subpopulations (e.g., job training, a high school diploma, and housing assistance) that are more than or equally important as a treatment program per se, because the SAPT block grants do not carry reporting requirements for recovery support services. Accordingly, it is difficult to compare the long-term effect of ATR and/or SAPT on individual lives, or comparative effectiveness. A more sophisticated level of judgment awaits the release of a systematic evaluation by an independent government contractor, due in 2010.

This narrative highlights a major tension between service and research throughout federally funded programs: the need for rigorously obtained data sets is offset by the need to provide service to all in need (unlike a clinical trial encumbered by inclusion and exclusion criteria) and by personnel not trained in research methods. In my view, it is possible to structure a service program around reporting requirements that can address fundamental scientific questions, if structured well at the onset. If accumulating evidence continues to demonstrate program effectiveness, a task force of experts should conduct a systems analysis on how to expand the reach of this program and sources of financial support.

3.1.2. Department of Education, Office of Safe and Drug-Free Schools, and RSDT

> I love drug testing. It stops my friends from pushing drugs on me. My father would kill me if he knew I was using drugs. I am his big hope for my family; he wants me to go to college and so do I . . . A young Hispanic male in a high school with an RSDT program. In a number of schools, some students claimed the program provided them with a reason to resist peer pressure to use drugs.
>
> In one public school, I entered the building through a heavy metal door, with building windows replaced by metal sheets to block drive-by shootings. A large proportion of the students had a history of delinquent and criminal behavior, and a history of drug abuse. The school principal was profoundly committed to this RSDT program, expressing his view in a press conference, that this could be the instrument that turns these kids, in his empathetic words 'society's discards,' around. To this day, I wonder how the program is functioning. [Author's note.]

In my brief residence in Washington, DC, no other program or policy was more charged with conflicting values, political views, passionate debate, than RSDT. Although adolescent student drug use had declined significantly by 24% in recent years,[12] the same survey (Monitoring the Future) revealed that nearly half of 12th graders reported drug use in their lifetime, and *almost one-third* reported using marijuana at least monthly. Scientific evidence (Sections 2, 2.2, and 3) provides compelling reasons to prevent drug use in youth. Prevention programs targeted to youth abound: the federally funded Media campaign (initiated during President Clinton's term), state block prevention grants, drug-free communities grants, school-based programs, and others. Declining use among high school students has been claimed by every major prevention program. Intriguingly, parents are a critical determinant of whether children will use drugs or abstain,[15] but prevention programs are infrequently targeted to parents and most schools do not enlist the

assistance of parents in developing or maintaining drug education programs.

RSDT had its partial roots during the Vietnam War. In response to an alarmingly high rate of heroin and marijuana use by U.S. military personnel in Vietnam, President Nixon, enlisting the advice of Dr. Jerome Jaffe, required a negative drug test as a condition of discharge and return to the United States. A second wave of testing was precipitated by an airplane crash in May 1981 on the flight deck of the aircraft carrier *USS Nimitz*, which resulted in the deaths of 14 crewmen and 45 injured. Forensics revealed that several of those involved had tested positive for marijuana metabolites. President Reagan responded to this incident by implementing a "Zero Drug Tolerance" policy and mandatory drug testing for all active-duty military personnel. In 1982, more than 27% of service personnel tested positive for drugs, a level which, after implementing universal, frequent random testing, declined precipitously to the current level of less than 2%. A site visit to a major testing facility at Fort Meade, MD, highlighted military efficiency in automated processing of hundreds of thousands of samples each year that arrived daily by the truckloads. With concerns for public safety, the federal government expanded drug testing to workers in safety-sensitive industries in the late 1980s,[58] becoming the standard for several private and government employees (my random test was in 2008).

By the late 1980s and early 1990s, the positive outcomes in adult populations and the high level of adolescent drug use spearheaded public and private schools to adopt random drug testing as a school-based drug prevention program. Resisted in certain schools, the issue was weighed by the United States Supreme Court twice, in 1995 and 2002. In its 1995 decision, the Court determined by a 6–3 decision that drug testing of student athletes is constitutional. In June 2002, the U.S. Supreme Court broadened the authority of public schools to test students for illegal drugs, with a 5–4 decision, ruling to allow random drug tests for all middle and high school students participating in competitive extracurricular activities, and providing guidance on how to structure these programs; the results were to be handled in strictest confidence, be nonpunitive (no academic or legal consequences), thereby limiting repercussions to extracurricular activities.[59] In 2003, the Department of Education, spearheaded by Dr. Robert Dupont's advocacy with ONDCP leadership, issued a small pilot project of direct grants to schools that had community agreement to implement this program. The president highlighted this pilot project in the January 2004 State of the Union Address. Over the years, small annual budgets ($1.1 million–$11 million) were allocated for the federal program, which framed it according to the Supreme Court decisions, and provided additional guidance, including chain of custody guidelines and linkage to counseling for a positive test. By 2007, 25.5% of districts with middle and high schools had adopted a student drug testing policy and approximately 14% had a random drug testing program,[60,61] most initiating the program with other funding sources. Opposition to the Supreme Court rulings and to the modest federal grant program came from certain ethicists and organizations including the Drug Policy Alliance, the American Civil Liberties Union, and the American Academy of Pediatrics. A policy statement published in the Academy journal, *Pediatrics*, was notable for its social/political views, reasonable scientific questions, and selected scientific citations.[62]

At several points during my term, the program escalated to a political and media frenzy. Summits organized to educate schools, parents, and others on the Supreme Court rulings; the rationale; program requirements; and outcomes became rallying points for the Drug Policy Alliance. The Summit stage was occupied largely by powerful advocates, school principals, teachers, lawyers, parents, and students, who shared their experiences and outcome measures with audiences. For 2008, with the Department of Education budget for the program at its peak, I embarked on a virtual radio tour across the nation to describe the grant program. Through airwaves across thousands of miles in 45 states, I tallied from scribbled, unscientific notes the views of interviewers and call-ins. Overall there was a consensus that drug use is not healthy for teenagers. More than 95% of the radio talk show hosts (more than 100) supported this form of prevention, some supporting it only after the primary purposes (deterrence), the stringent requirements (strict confidentiality and nonpunitive), and a venue for counseling or specialty treatment, were explained. Five interviewers vehemently challenged the program on the basis of privacy concerns, with several stating on the airwaves that they enjoyed "smoking pot." Some

administrators and educators from various cities voiced their concerns about the program, "how can kids stop using, how can we get parents to help, if the parents are heavy users or addicts?"—a valid concern[63]—or "what if 90% of the kids test positive," or "can we trust that the records will remain confidential?" Other educators who had wanted to adopt the program in their school district reported threats of lawsuits.

How good is the evidence that RSDT is effective and causes no harm? On the basis of evidence from adult organizations that require random testing in adult populations, programs are effective in reducing use. School-based controlled studies are limited, with mixed results.[64,65] Limited reports from individual schools generally are quite positive. For example, Hunterdon Central Regional High School in New Jersey saw significant reductions in 20 of 28 drug use categories after 2 years of a drug testing program (e.g., cocaine use by seniors dropped from 13% to 4%). A National Impact Evaluation of Random Student Drug Testing from the Department of Education is designed to assess the effects of school-based random drug testing programs, by comparing outcomes for a single year. It has collected data from drug testing results and data garnered through student surveys, schoolwide record review, and staff interviews. Designed as a cluster randomized controlled trial, the study is the first of its kind sponsored by the department and may contribute information about the effect of RSDT on student drug use. Yet it may not be definitive, because statistical power may be compromised by the short time frame of the study and small sample size. Future research should build on this protocol, using a longer time frame, using a larger sample size, and using additional principles of effective testing programs, such as testing on the entire eligible pool at least once a year, randomized testing formats, volunteer recruitment of a large proportion of the student body, testing programs combined with evidence-based prevention curricula for students and parents, and an effective provision of counseling or treatment for positive tests. Reduction of drug use alone is a critical outcome measure, but other parameters of effect need to be measured, such as school grades and performance, absenteeism and school drop-out rates, engagement in extracurricular activities, delinquency and criminal activity, health care costs, sibling and family drug use, and progression to addiction. Even without the "gold standard" of a randomized controlled trial, enough schools have shared internal data, and views that the program had changed the school climate, to lend credibility to the program.

This program has the potential to be effective. No drug testing program should be implemented without educating students and their parents on the potentially adverse consequences of drugs and symptoms of abuse/addiction, a void in many schools. Recruiting a high percentage of the study body and their parents into the program could potentially enhance a culture of disapproval toward drugs. Other key factors are the school culture and community standards, parents' views and use of drugs, stringent adherence to policies and procedures of confidentiality and chain of custody of samples, external laboratory confirmation, and the ready availability of personnel experienced in diagnosis, counseling, and specialty treatment for students who test positive. Adolescent substance abuse is inadequately addressed in health care settings, a void that needs policy and program intervention.[66] Verbal, written, or computerized screening may also be effective in identifying youth and young adults in need of help, especially in health care settings.[67–69] To my dismay, in one high school, I was informed by an astute observer, who was assigned to screen students with the CRAFFT questionnaire,[68] that she had suspected approximately 70% false negatives, based on "body language," and enlisted a psychiatrist assigned to this project to conduct lengthy interviews of the same students. Apparently, after the screening program began at the school, students had urged their classmates to answer "no" to all verbal screening questions giving added weight to random student drug testing.

3.1.3. Department of Justice: drug courts

> Every week when I showed up in court, I looked at two doors, one door led to freedom for a week, the other led to jail. Each week the judge told me to leave through the freedom door. Today I can leave through that freedom door and not come back; now I am free . . . in a poem recited by a drug court graduate during graduation ceremonies.

Drug courts divert nonviolent substance abusing offenders from prison and jail into treatment, in an effort to break the cycle of criminal behavior,

alcohol and drug abuse, and incarceration. A decade of research indicates that drug courts reduce crime by lowering re-arrest and conviction rates, improving substance abuse treatment outcomes, reuniting families, and producing measurable cost benefits. From a single pilot program in Miami in 1989 to over 2030 drug-related courts in every state, our nation leads the world in providing this reasonable approach to drug-related crime in State or local courts. The Second Chance act, signed into law in April 2008, provides improved prisoner recovery services, including schooling and drug treatment inside prisons. The drug court system functions at a high level of professionalism, supported by a National Drug Court Institute that trains judges and other court-related personnel in effective procedures, collects evidence-based outcome measures, and serves as an advocate for extending these services to an increasing number of eligible substance abusing offenders.[70] From 2005 onward, research continues to demonstrate evidence for the effectiveness and cost-effectiveness of drug courts. Four independent meta-analyses have concluded that drug courts significantly reduce crime rates an average of 7–14%, with some courts reaching values of a 35% reduction in crime and recidivism. With strong evidence to support their effectiveness, I viewed expansion of the drug court system and associated treatment capacity to be justified, especially because fewer than 10% of the eligible population receive these services. Congress allocated only $10 million for drug courts, instead of the requested $69 million in 2006 and 2007. I focused on increased data collection and outcome measures, education of our representatives on Hill, supported a perceived need to incorporate scientific information in the training of drug court judges (my office provided the annual federal budget for the Drug Court Institute), and advocated for the provision of drug screening and interventions in juvenile courts. SAMHSA has funded a pilot program to explore this concept.

3.1.4. SBIRT

> During the brief intervention triggered by a positive screen for heavy alcohol use, I asked the elderly woman, a native Alaskan, what she liked to do most of all, but could no longer do. 'My greatest pleasure', she responded, 'is teaching my granddaughter how to fish for salmon. But I can't wade into the cold water any longer because my feet hurt too much.' 'I told her that if she cut down on drinking, her circulation may improve and she would feel less pain in her feet. Maybe she could again be able to teach her granddaughter how to fish for salmon' . . . A practitioner of SBIRT in Alaska.

Screening , brief intervention and referral to treatment (SBIRT) is an evidence-based four-step process designed for use in health care settings, to identify substance users in need of assistance. Step 1, screening, uses an evidence-based brief questionnaire to identify a spectrum of substance use (tobacco, alcohol, illicit drugs, and prescription drugs abuse), extending from risky, problematic, to the disease of addiction. It yields a numerical score reflecting the severity of the problem, and guides the level of intervention. Screening alone can, in some cases, raise awareness, reduce use, and have preventive effects. For those that screen positive and fall into a low-moderate risk category (the majority of positive screens) a brief intervention provides feedback of the score, raises awareness of risks, motivates, and establishes goals and strategies to reduce use and related risks. It can significantly reduce substance use. For individuals whose screening score indicates that they are within the moderate-higher risk range, brief treatments are provided over several counseling sessions. They avoid the more costly use of the specialty substance use treatment. For severe symptoms alone or combined with complicated psychiatric symptoms, patients are referred to specialty treatment. In 2004, 2 years before my arrival, a few dedicated experts had shepherded SAMHSA toward funding a demonstration SBIRT service program,[55] the first federal program in the country.

4. Dawning of a strategic plan

4.1. Background

Prior to assuming office, I was aware of several manuscripts testifying to the effectiveness of screening for substance abuse followed by brief interventions (SBI) for smoking cessation and risky alcohol use. In 2002, when one of my predecessors in this office, Dr. Andrea Barthwell, solicited my recommendations for ONDCP, I mentioned SBI as a strategy worthy of examination, for smoking and alcohol, but I was uncertain about the literature for illicit drugs, a significant void. I knew this concept was old, with a fledgling description of the effectiveness of brief interventions in late 1970s, and that

several clinician researchers, working on the front lines in this field, had accumulated a steady stream of effectiveness and cost-effectiveness data from randomized controlled trials.

4.2. Initial phase

In May 2006, during my inaugural monthly update to the ONDCP director on the four grant programs, my staff presented a routine summary table of SBIRT, how many people screened, how many offered a brief intervention, and a brief treatment or a referral to specialty treatment in the seven state programs that had received grants. During the presentation, I contemplated whether this program had reporting requirements for effectiveness data and later asked for and studied the government-issued SBIRT RFA (request for proposals). In a critical convergence from extensive reading in June 2006, key pieces of a strategy were beginning to form: (a) the SBIRT RFA stipulated that each grantee collect and report on GPRA data, including 6-month follow-ups on alcohol and drug use and social consequences, for those provided SBIRT services; (b) a surfeit of SBIRT literature existed on its effectiveness in reducing heavy alcohol use; on reducing morbidity, mortality, social, and legal consequences; and reducing health care costs, with a notable deficit in corresponding literature for drug use; (c) the United States Preventive Services Task Force (USPSTF)[71] and the Institute of Medicine[72] had recommended routine alcohol SBI; (d) the *Journal of Trauma*[73,74] dedicated an issue to an SBI meeting, summarizing key players and notably, primary challenges, including lack of reimbursement for these services; (e) the World Health Organization and others had developed evidence-based screening tools for alcohol and drugs[75]; (f) the CDC reported approximately 381.9 visits per 100 people to physicians or hospitals annually[76]; and (g) powerful advocates (e.g., Dr. L. Gentilello) had garnered support of the American College of Surgeons, Committee on Trauma for implementation of screening and brief interventions (alcohol) as a requirement for verification of Level 1 Trauma Centers in our nation and Dr. Eric Goplerud was a central figure in calculating cost-effectiveness data for businesses and states.

Thus, the dawning of national strategic plan was emerging, to partly address the public health challenges listed earlier in Sections 2, 2.2, and 2.3. Could SBIRT, administered in health care and other settings (e.g., the court system), reduce drug use and its consequences across multiple sectors of our society? As the CDC reported a high proportion of our population visiting a health care provider annually, could this visit to health care professionals provide the opportunistic teaching moment for a wide swath of our population? Could the GPRA[77,78] data provide sorely needed SBIRT data for drugs and prescription drugs in a service setting, although not in a randomized controlled trial? Could SBIRT become the focal point, the centerpiece for a Demand Reduction strategy with potential to address multiple challenges—large-scale use of illicit drugs (and tobacco and alcohol) by people at risk, or those who abuse, the addicted, the unidentified, the prescription drug abusers, and the elderly—with a single set of procedures? Was SBIRT an exquisite convergence of prevention, intervention, and treatment strategies or a concept/practice that justifiably was gathering dust in the archival literature, or not put to widespread practice for a host of reasons,[79] including resistance to change? Was SBIRT a "low-tech," highly effective procedure that could reduce use and consequences more effectively than high-technology advances?[80] In studying SBIRT challenges, I studied the *Journal of Trauma* issue, enlisted key players, and discussed challenges with them and with the American Medical Association (AMA) leadership. What followed from June 2006 to December was a systematic analysis of the potential and challenges of SBIRT, a copious number of action plans, and an explosion of activity in the Office of Demand Reduction.

1. Can SBIRT identify the 20 million people with a DSM-IV SUD? The case for early detection and treatment. Nearly all people who harbor an SUD, more than 20 million people according to DSM-IV criteria, do not feel they need treatment and do not seek treatment: 23.5 million people aged 12 or older needed treatment for an alcohol or illicit drug abuse/addiction problem. Of these, an estimated 2.3 million received treatment at a specialty facility. The overwhelming majority, almost 95% of people with substance use problems who did not receive treatment, did not recognize they had a problem.[15] They remained unrecognized and unassisted. Most of those who recognized their problem made no effort to seek treatment. A fortunate 25% or so recover spontaneously from alcoholism,[14] a cohort with limited risk factors. With each added risk

factor (genetics, physical or psychological child abuse, psychiatric comorbidity, extreme stress, and lack of social supports), the likelihood of spontaneous recovery and treatment success diminishes. Early detection and intervention has the potential of sparing an individual 1–3 decades of compromised health, education, and productivity during the "silent interim" prior to seeking treatment. Early detection is logical: (a) adolescents are at much higher risk for developing an addiction to alcohol and many other drugs than initiates 18 and over; (b) treatment is more difficult in people who initiate use early and have been exposed for a long period; (c) most people are in their mid-40s when they seek treatment for alcoholism, even though the onset of the disease is during late teens to 20s; and (d) criminal justice is a major referral system for treatment, especially among nondaily users of alcohol, marijuana, cocaine, and methamphetamine (not heroin). Early detection may avert involvement in the criminal justice system. In my view, it is as necessary to diagnose and treat the disease of addiction as it is for any other chronic disease. Treatment is sought long after an SUD begins, often when the disease has progressed significantly, and has become much harder to treat. Could SBIRT offer solutions to several challenges simultaneously?

2. Can SBIRT identify populations engaged in risky, problematic use? The case for early detection. Early detection and intervention is also sound public policy for populations of risky users who have not reached DSM-IV medical diagnostic criteria. On the basis of the most recent NSDUH survey,[15] past-month users of illicit drugs (19.9 million) and heavy alcohol users (~40 million) exceed the number of people (21 million) harboring a DSM-IV diagnosis of abuse/addiction. The addicted state is not the only condition that engenders drug-related consequences. Under the influence of intoxicating levels of alcohol (e.g., binge drinkers) or other drugs, the nondependent user is at risk for a serious trauma, injury, violence, infection from a contaminated needle, unplanned pregnancy, a failed exam, discharge from employment, addiction, medical, psychiatric, social, and emotional consequences. The size of this population presenting in health care settings is estimated to be more than 40 million Americans.[19] Intervening in this cohort could have a major positive effect on their lives and health care costs.

3. Conceivably, but not proven, if SBIRT were mainstreamed into health care, could it address these additional public health challenges? Can SBIRT do the following?

- Reduce medical and psychiatric conditions that occur at higher frequency in DSM-IV abuse/dependent patients (injuries, trauma, depression, sleep disorders, HIV–AIDS, other infections, cancer, cardiovascular disease, and others)?
- Reduce the progression to addiction, thereby reducing incidence of addiction and associated medical conditions in family members of patients with SUDs who suffer higher rates of medical problems?
- Reduce drug use in subpopulations, especially in adolescents, a high-risk group for addiction?
- Reduce the risks of drug exposure in fetuses? Exposure to heavy alcohol or drugs *in utero* can cause harmful developmental, behavioral, and physical effects.
- Prevent adverse drug interactions? It is routine for physicians to inquire about all patients' medications (drugs), to prevent drug interactions and compromised effectiveness of prescribed medications, yet physicians do not routinely inquire about all nonmedical substance use.
- Reduce prescription drug misuse and abuse? Prescription drug abuse is much more common in alcohol and illicit drug abusers.
- Reduce overdose deaths due to prescription drug misuse? Currently these are higher than at any period in recent history and far exceed deaths due to heroin or cocaine.
- Reduce extensive use of emergency departments and trauma centers, injuries, trauma, and violence related to intoxication?
- Reduce health care costs associated with SUD, as SBI saves an estimated $4 for each $1 expended?
- Reduce the need for the justice system to continue to be the primary source of referrals to treatment? SUDs are largely undiagnosed by medical professionals. It is time for the health care system to replace the justice system as the primary gateway to treatment.

4.3. Accumulating evidence: the federal SBIRT program outcome data

The documented effectiveness of SBIRT for reducing heavy alcohol use was extensive, but corresponding data for illicit or prescription drug abuse research were sparse, even though evidence is mounting that medical conditions are overrepresented in illicit drug abusers and family members.[38–42] With the reporting requirements for the RFA in hand, I requested the SBIRT outcome data and assembled a gifted team from NIDA and SAMHSA to examine the hundreds of pages of 6-month follow-up data from the federal SBIRT program ($N > 400{,}000$). Dr. Wilson Compton of NIDA and I exchanged glances of imprudent exuberance across the table, when we viewed the data, collected in naturalistic settings. SBIRT services were implemented in a range of medical settings across six states. A diverse patient population (Alaska Natives, American Indians, African Americans, whites, Hispanics) was screened and offered score-based progressive levels of intervention (brief intervention, brief treatment, referral to specialty treatment). In a secondary analysis of the SBIRT service program, drug use data were compared at intake and at a 6-month follow-up, in a sample of a randomly selected population (10%) that screened positive at baseline. Of 459,599 patients screened, 22.7% screened positive for a spectrum of use (risky, problematic, and abuse/addiction). Most were recommended for a brief intervention (15.9%), with a smaller percentage recommended for brief treatment (3.2%) or referral to specialty treatment (3.7%). Among those reporting *baseline illicit drug use*, rates of drug use at 6-month follow-up were 67.7% lower ($P < 0.001$) and heavy alcohol use was 38.6% lower ($P < 0.001$), with comparable findings across sites, sex, race/ethnicity, and age subgroups. Among persons recommended for brief treatment or referral to specialty treatment, self-reported improvements in general health ($P < 0.001$), mental health ($P < 0.001$), employment ($P < 0.001$), housing status ($P < 0.001$), and criminal behavior ($P < 0.001$) were found. SBIRT was feasible to implement and the self-reported patient status at 6 months indicated significant improvements over baseline for illicit drug use and heavy alcohol use, with functional domains improved, across a range of health care settings and a range of patients.[19] An analysis of health care savings from the State of Washington SBIRT program (WASBIRT) indicated that the program saved, for each 1000 Medicaid patients, ~$1.9 million–$2.4 million/year.[81]

More recently, the World Health Organization completed a randomized controlled, multinational study for drugs, largely confirming the conclusions of federal SBIRT data, that screenings and interventions for illicit drugs reduce use.[82] The USPSTF had recommended SBI for alcohol as a preventive procedure in 2004[71] and the National Commission on Prevention Priorities scored SBI for alcohol a 9, as a prevention priority, just below a score of 10 for childhood vaccinations, daily aspirin for at-risk populations and smoking cessation, on the basis of effectiveness and cost-effectiveness.[83,84] A 2–5% reduction in drug use annually is considered a highly significant and unusual change.

With this and other information, the time was ripe to assess the federal program, catalyze additional research, disseminate the results, and develop a strategy to mainstream evidence-based successful SBIRT programs into our health care system as a standard of care. As the private sector had not significantly advanced SBIRT as routine services,[79] could the federal government insert itself into the process and catalyze implementation?

4.4. Demand reduction and SBIRT dissemination

Behavioral change can be effected by incentives, data-driven reasoning, and disincentives. I reasoned that the availability of a reimbursement method specific for SBIRT (i.e., billing codes), endorsements by major health care organizations, cost-savings, and effectiveness data would provide strong incentives for implementing these procedures in health care settings. Moving forward would also require education for medical and health care workers (e.g., continuing medical education [CME] courses); Web-based training and questionnaires; education of state Medicaid directors and federal, state, and local officials with a public health portfolio; and additional research on SBIRT for drugs and prescription drug abuse, subpopulations. Garnering Joint Commission accreditation review (formerly the Joint Commission on Accreditation of Healthcare Organizations [JCAHO]),[85] federal partnerships, and

other concepts and strategies were beginning to form in these early months.

My initial campaign began on four fronts, to meet with leadership of the AMA in Chicago and present the case for SBIRT, publish the federal GPRA[77,78] data for SBIRT, work to obtaining billing codes for these services, and enlist the counsel and collaborators of experts in the federal government and private domain. A petition to the Centers for Medicaid and Medicare Services (CMS) to adopt SBI Medicaid billing codes ("H" HCPCS)[86] was a priority and I urged ONDCP to support adoption of these codes (July 2006). More important were AMA-CPT billing codes for SBIRT services, as the CPT codes were the coin of the realm in our health care system, preferred by state Medicaid officials, Health Resources and Services Administration (HRSA), health care insurers, and others.[87] With a team of dedicated professionals (Drs. L. Gentilello, E. Goplerud, D. Lewis, and T. Stegbauer), we navigated this unfamiliar, unpredictable, and intense process, succeeding by April 2007 to obtain billing codes that became effective January 2008. Medicare then followed by adopting the CPT code language in the form of a "G" code designation. With codes in hand, and the federal SBIRT outcome data, other strategies fell into place and progress became possible: (a) to successfully petition CMS at Health and Human Services to line item federal matching Medicaid funds (more than $250 million in FY 2009) for state Medicaid SBIRT services. Medicaid is a federal–state partnership for the poor and costs are jointly shared; (b) to successfully petition the Office of Personnel and Management to include the codes in the critical Federal Employee Health Benefits (FEHB) annual "carrier" letter sent to more than 250 federal health care insurance providers.[88] This letter guides third-party insurers on health care issues of prime importance to the federal government and their employees for that year; (c) at least 70% of federal employees' health care insurance plans would reimburse for SBIRT services and (d) at least 86 third-party health care insurance providers would reimburse for SBIRT services for the general population; (e) to receive commitments from Indian Health Services and HRSA[89] of significant funds and training to implement SBIRT services in their national systems. Indian Health Services had implemented SBIRT in more than 40 health care settings.[90] HRSA, through 3600 health care centers throughout the United States, provides health care for more than 12 million people who are medically underserved. In 2008, HRSA agreed to incorporate SBIRT into their health care system and in 2009, reporting requirements for SBIRT services were required; (f) to receive a commitment from the Veterans Administration (VA) in making SBI for alcohol mandatory in their health care system. In the June 11, 2008, *VHA Handbook*, chapter 15 specifically directed all VA health programs, primary care, hospital, and behavioral health, to routinely screen patients for alcohol problems and to provide brief interventions for those patients who screen positive. The electronic medical record for the VA acquired an automatic prompt of the first three alcohol consumption questions from the AUDIT screener for first visit, annually, and for patients with previous positive alcohol screen. The mandated requirement and the automatic prompt boosted VA screening rates to more than 95%; (g) to enlist NIDA to develop a Web-based screening questionnaire,[91] to issue SBIRT RFAs for research, and to convene joint expert panels on SBIRT; (h) to enlist SAMHSA to issue an RFA for a Medical Residency Training program[92]; (i) to educate state Medicaid directors by personal visits, letters, and phone calls on the wisdom of "turning on the codes" in their state Medicaid plans. At least 10 (currently 17) state Medicaid directors understood the value of SBIRT services and "adopted the codes"; and (j) to promote SBIRT on college campuses and dissemination of outcome measures.

Advocacy from the medical community was another important goal. My office hosted three White House Summits on Medical Education in Substance Abuse,[93] with a focus on SBIRT and curtailing prescription drug abuse. Federal agencies and medical associations were active participants in these summits and generated a large and feasible list of recommendations for educating and promoting these services. After meetings in which the scientific evidence was presented, the leadership of AMA, the Accreditation Council for Continuing Medical Education (ACCME), the Federation of State Medical Boards, and other organizations adopted policies advocating for SBIRT and SBIRT training in medical schools, residencies, and CME courses. In 2007, the ACCME highlighted SBIRT as demonstration of their new requirements for CME courses in the nation. The Joint Commission agreed to host a wiki site to garner comments for SBIRT as a first step in

assessing the rationale for making SBIRT a requirement for accreditation. Even the United Nations Economics Council weighed in with a declaration of support, after a formal request from this office. By mid-2008, we had designated 2007–2008 a leap year for SBIRT. None of this progress would have been possible without the weight of scientific evidence of effectiveness and cost-effectiveness. Other gains are listed in Section 6.

5. Other responsibilities in the federal government and private sector

5.1. Federal agencies

At the federal level, ONDCP was to provide oversight, coordination, advice, and education on demand reduction policies and programs, as well as to certify the budgets relevant to drug policies within federal agencies. Recruiting federal agencies into the Demand Reduction mission was collegial and highly effective. Their enlistment was made specifically when I was equipped with a tangible set of recommendations, requests, strategies, or plans. We spoke or met, as needed with: Department of Education (Safe- and drug-free schools); Department of Defense (including the National Guard); Department of Health and Human Services [including Centers for Disease Control and Prevention (CDC), Food and Drug Administration (FDA), Health Resources and Services Administration (HRSA), Agency for Healthcare Research & Quality (AHRQ), Centers for Medicare and Medicaid Services (CMS), Indian Health Services (IHS), National Institute on Alcohol Abuse and Alcoholism (NIAAA), National Institute on Drug Abuse (NIDA), Office of the Surgeon General, Substance Abuse and Mental Health Services Administration or SAMHSA (Center for Mental Health Services, Center for Substance Abuse Prevention, Center for Substance Abuse Treatment, and the Office of Applied Studies)]; Department of Justice (including Bureau of Justice Assistance, Drug Enforcement Agency (DEA), and the Office of Juvenile Justice and Delinquency Prevention); Department of Labor; Department of State (Bureau for International Narcotics and Law Enforcement); Department of Transportation (including National Highway Traffic Safety Administration (NHTSA), and the Office of Drug & Alcohol Policy & Compliance); Department of Veterans Affairs (Veterans Health Administration); Office of Personnel and Management (Federal Employee Health Benefits [FEHB]); and the Department of Commerce and the Small Business Administration.

5.2. NIDA, NIAAA, and SAMHSA

Bound to scientific principles, I frequently contacted NIDA's director, Dr. Nora Volkow, and other personnel, to involve or enlist the assistance of NIDA in new programs or initiatives. Among the many examples of productive collaborations were NIDA's involvement with a manuscript on the federal SBIRT program, enhancement of the SBIRT research portfolio, development of an expert opinion panel on prescription drug abuse screening and on SBIRT, generating a Web-based training and screening program for drugs, and involvement with White House Medical Education Summits. Although alcohol was not among the substances listed in Congressional ONDCP authorization (with the possible exception of underage drinking), NIAAA (Dr. T.K. Li) was a noteworthy ally in efforts to implement effective programs and assist us in education and other programs. A critical partner, SAMHSA and their leadership were important allies, providing collaborations, administration, and implementation of a myriad of programs in their portfolio, including ATR and SBIRT.

5.3. Private organizations and public outreach

Engagements with the private sector were an essential component of the office. In discussions fortified by scientific and epidemiological data from large federal data sets, medical organizations were receptive, effective, and efficient and were an excellent resource for recommendations (e.g., AMA, American Psychiatric Association, ACCME, Federation of State Medical Boards, American Academy of Addiction Psychiatry, National Nurses Association, American Society of Addiction Medicine, American Academy of Family Physicians, Association of American Medical Colleges, American College of Surgeons–Committee on Trauma, and Association for Medical Education and Research in Substance Abuse). Among treatment-focused organizations, we found strong allies and solid recommendations. Organizations captured data and equipped us with the necessary information for advocacy in congressional budget discussions (e.g., National Drug Court Institute, National Association of Alcohol and

Drug Abuse Counselors, Association for Addiction Professionals or NAADAC, National Association of Lesbian and Gay Addiction Professionals, National Association of Drug Court Professionals, American Association for Treatment of Opioid Dependence, Substance Abuse Program Administrators Association, Johnson Institute, and Treatment Assessment Screening Center). Other organizations, including health care (e.g., American Health Insurance Plans and American Hospital Association), prevention (e.g., Partnership for Drug-Free America, Community Anti-Drug Coalitions of America (CADCA), Drug-Free America Foundation, Behavioral Health Institute, National Families in Action, Lion's Club, National High School Athletic Coaches Association, and Recovery Month), were excellent allies and a source of wise counsel and recommendations. Encounters at meetings and roundtables were a platform to share forthcoming initiatives and to gather valuable input for the national drug control strategy and for opportunities to assist them. Requests for speaking engagements resulted in more than 180 speeches delivered during this period.

To educate the public on programs, policies, science, we organized media events (print, TV, radio, Web), presentations at town hall meetings, Grand Rounds, Plenary speeches at national meetings or other venues. Many visits to publicly and privately funded treatment centers were instrumental in shaping my views on effective and ineffective programs and strategies to address them.

5.4. Congress

Bipartisanship on Demand Reduction issues was notable during my service. Committed members of Congress recognized the magnitude of the problem and worked together to advocate for strong, effective programs. In meetings with members or staff on both sides of the House and Senate, I was struck by their mutual support for effective Demand Reduction programs, for example in meetings with Congressman Patrick Kennedy (D) and Congressman Jim Ramstad (R). During congressional testimony on prescription drug abuse, the methamphetamine crisis, and anabolic steroids, reasonable, insightful and relevant questions were posed by both parties. In concert with our Legislative Affairs office, we performed extensive educational outreach to Congress, in formal presentations and personal visits, and had opportunities to comment on the National Drug Control Strategy, on agency budgets, and on the Media campaign. Yet some budget decisions deeply disappointed me and remain so: administration request for $69 million for Drug Courts was reduced to $10 million in 2006 and 2007.

5.5. States, cities, and hospitals

The separation of federal and state rights and domains is sensitive. In my position, it was legal to educate state lawmakers and officials on federal programs, on initiatives, and on other specific issues. With organized visits to 35 states, I reached out to state governors' offices, Medicaid directors, state insurance legislators, state legislatures on Medicaid services and billing, on legislative bills introduced at the state level, state substance abuse and mental health directors and administrators, and other state and urban officials. We visited mayors' offices, public health officials, educators, and physicians to disseminate new grant or program information and collect information of local concerns.

In a memorable roundtable Psychiatry Grand Round session, I viewed the appalling challenges of a team of health care professionals dedicated to the well-being of a cohort of unemployed, homeless, schizophrenic, and HIV-positive heroin addicts and silently wondered, if we had integrated prevention, intervention, and mental health services at the time they were early teenagers, could the course of their lives have been different? On other occasions, site visits to VA hospitals to promote SBIRT, provided wrenching first-hand accounts of the challenges faced by Gulf War, Iraqi, and Afghanistan war veterans, the personal stories of those afflicted with posttraumatic stress disorder, the association of traumatic brain injury with substance abuse, and the substance abuse challenges of older veterans. On a visit to the southwest, through pleas and tears, Spanish-speaking mothers asked for treatment for their children. They were 12- to 14-year-olds who had become addicted to "heroin–Tylenol PM ("cheese"), sold to them by classmates. My next stop was a juvenile treatment center with several empty beds and unclear reasons given as to why residential beds are empty when children are in need. The visual and emotional experiences reverberate to this day.

5.6. Emerging threats to public health and safety

In response to an emerging threat to public health and safety, I organized a multidisciplinary fentanyl forum on escalating fentanyl-associated deaths in intravenous heroin addicts, fact-gathering visits to Dallas during the "heroin cheese" deaths, information gathering from various federal agencies on the status of the hallucinogen Salvinorin A, and a panel of experts to address prescription drug abuse.

5.7. International

Several nations sought policies and programs from Office of Demand Reduction to address their burgeoning drug use problems. Some nations took direction and funding from "harm reductionists" in government or private organizations; others desired evidence-based, prevention/intervention/treatment integrated strategies. We communicated and formed collaborations, organized binational or multinational meetings, arranged for visits and site visits for officials, and provided slide presentations and manuals and data to several nations that supported our public health approach and requested documents. Staff with United Nations (UN) expertise presented policies, positions, programs, and materials at UN meetings.

5.8. Science

Although I craved attendance at scientific meetings, such as the Society for Neuroscience, the College on Problems of Drug Dependence, and the American College of Neuropsychopharmacology, my allegiance to a scientific perspective and appetite for information had to find other sources. Highly skilled career professionals at ONDCP deluged me with refreshing discussions and critical analyses of epidemiological and budgetary data. My invitations to scientists for research presentations at ONDCP (e.g., on genetics, prescription drug issues, emergency department casualties, treatment improvement, computerized screening for substance abuse and mental health, and opioid medications) were valuable and helped shape policy and planning.

In my core responsibilities, I viewed every program, baseline data, outcomes and evaluation through a prism of stringent parameters of basic or clinical research. The standards were unrealistic. De facto service programs provide services and can not be constructed as a research program, with the regulatory restraints of informed consent, institutional review board approval, recruitment inclusion/exclusion criteria, objective, independent verification, etc. Nonetheless, the federal government was committed to program improvement, by assessing programs through the Program Assessment Rating Tool (PART). The PART review was designed to identify a program's strengths and weaknesses, for the purposes of guiding funding and management decisions aimed at making programs more effective. In rating program performance, the factors include program purpose and design; performance measurement, evaluations, and strategic planning; program management; and program results. The analytical questions are consistent, allowing programs to show changes over time, as well as comparisons between similar programs. In viewing some of the PART language for treatment programs, I recommended strengthening it. For follow-up surveys of treatment completers, is it realistic to stipulate that an independent observer not associated with a treatment center and not the treatment provider pose the question? Can abstinence after treatment completion and in follow-up surveys be independently confirmed by a biometric test or by other means? (A biometric test also has weaknesses, as it is a snapshot in time.) Also needed were universally applied, comprehensive definitions of specific outcome measures and treatment completion so that treatment effectiveness could be compared across sites and programs, to eventually achieve semi- or quantitative measures. Key outcome measures were also needed long after discharge from a treatment program. A critical test of program effectiveness, the status of a discharged person during the period of high risk for relapse, 3–24 months after discharge, should be a required reporting measure. The lack of uniform baseline data collection across sites was notable when trying to assess the effectiveness of RSDT across grantee sites. Service programs are evaluated by standards that can challenge publication in high-quality peer-reviewed journals. As service programs, they can not be constructed with the rigor of standard scientific methods. Nevertheless, a panel of dedicated experts could assist in generating pre– and post–data collection requirements for programs that would elevate the strength of the outcome measures, tighten standards, and improve programs.

6. Summary of some accomplishments

By the time my service was completed, the Office of Demand Reduction had accomplished more than 130 operational priorities, many with quantifiable metrics; some are listed in the following. They would not have been possible without collegial collaborations and with solid scientific data.

6.1. Prevention, intervention, treatment, and SBIRT

1. Billing codes. CMS adopted SBIRT Medicaid codes in July 2006 and "H" codes became effective January 2007. As a team, we petitioned the AMA CPT Board to adopt new billing codes for screening and brief interventions (SBI) for substance abuse for all physicians in health care settings (2006–2007), becoming effective in January 2008 and forming the basis for new Medicare "G" codes, adopted in January 2008.

2. Medicaid set-aside. Petitioned CMS to include a line item in federal Medicaid budget for SBIRT billing reimbursement. CMS actuaries calculated and included a line item in the budget for 3 years, including $265 million for FY 2009 to match state Medicaid payments.

3. SBIRT services reimbursement for federal employees. The Office of Personnel and Management oversees health care insurance for all 8 million federal employees and their families. Petitioned the Office of Personnel and Management to include the new billing CPT codes in the annual Federal Employees Health Benefits "Carrier" letter, which guides more than 250 health care insurers on new government policies and initiatives. Of the 242 new CPT codes for 2008, SBI codes were the only ones highlighted and described in the 2008 "Carrier" letter. As of this date, more than 70% of federal employees (5.6 million) health care services will be covered for these services via third-party insurers.

4. SBIRT services reimbursement in state Medicaid plans. Educated states to adopt new SBIRT Medicaid codes, via personal visits to state Medicaid directors, joint letters with AMA leadership, phone calls to state Medicaid directors. Within 1 year, ~10 states adopted Medicaid codes for SBI, and currently 17 states have included SBIRT in state Medicaid plans.

5. SBIRT services reimbursement by health insurance providers. Petitioned health insurance providers to reimburse health care providers for screening, brief interventions. Based on *e*Value8 *survey,* at least 86 health care insurance companies will reimburse for the new codes (http://www.nbch.org/evalue8).

6. SBIRT services in VA health care system. Petitioned the VA mental health services to mandate SBI for alcohol in the entire VA health care system. As of June 2008, alcohol SBI services were mandated in all VA centers.

7. SBIRT services in Indian Health Services. Petitioned Indian Health Services to expand SBI in health care centers. At least 40 centers in the nation are now offering these services.

8. SBIRT services in HRSA. Petitioned HRSA to incorporate SBIRT services into grant system and Medical Centers. As of September 2008, HRSA committed more than $200 million for SBIRT in 2009 and SBIRT services are embedded in HRSA health care center forms.

9. NIDA research. Petitioned NIDA to develop new RFAs for SBIRT for drugs, generating a document on prescription drug screening, and others.

10. NIDA computerized screening. Requested that NIDA develop a Web training site for SBIRT and integrate with NIAAA. In April 2009, NIDAMED went live. Advocated that NIDA implement SBIRT in NIDA treatment programs, in planning phase.

11. SBIRT federal program outcome data. Developed a collaborative team (ONDCP–NIDA–SAMHSA) to publish SBIRT program and outcome measures. The published manuscript demonstrated significant decline in drug and heavy alcohol use (>35%) at 6-month follow-up across sites, sex, age, drugs, and subpopulations.[19]

12. SAMHSA and SBIRT in juvenile court system. Petitioned SAMHSA to develop an SBIRT RFA grant program for SBI in juvenile justice system and the RFA was issued.

13. SAMSHA and SBIRT Medical Residency Training program. Petitioned SAMHSA to develop an RFA for Medical Residency Training for SBIRT, with a provision to require training of people outside the residency program. I wrote letters to every medical school in the nation and every major teaching hospital to alert them to the new program. First 11 medical residency grants awarded September 2008, of 55 applications received.

14. Medical education. My office organized and hosted three White House Summits on Medical Education in Substance Abuse, with key representatives from many sectors of the medical community. Each well-attended Summit provided an opportunity for medical professionals and organizations to become engaged in SBIRT and prescription drug abuse and make recommendations, several of which have been implemented or initiated.

15. Medical education in SUD and SBI in medical training centers. By requesting that the administration increase medical education training (medical school and residency) and SBIRT programs to $56 million in the federal budget, and requiring that each medical school/residency training program become a focal point for training of SBIRT providers across each state; that each program demonstrate financial sustainability after a period of 3 years. The FY 2010 request was funded at the $29 million level. Promoted SBIRT by delivering 15 grand rounds at major medical teaching centers across the nation to educate residents, academic physicians, and others on the value of SBIRT programs.

16. JCAHO. In discussions with a representative from JCAHO, we discussed the feasibility of an SBIRT requirement for accreditation. Although JCAHO deferred a decision because of potential parallel regulations issued by CMS, a wiki site was established to receive comments and a new formal procedure was initiated in September 2009.

17. Screening for illicit and prescription drugs in Level I Trauma Centers. We educated the American College of Surgeons, Committee on Trauma on the need to expand SBIRT services in Level I Trauma Centers, for illicit drugs and prescription drugs. I received commitments from 20 Level I Trauma Centers to engage in this expanded service.

18. Federation of State Medical Boards support. We educated the Federation of State Medical Boards on the need to adopt new policies for medical education on SBIRT. They adopted a policy in support of SBIRT education for physicians and trainees as well as education on prescription drug abuse.

19. ACCME support. We educated the director of ACCME, Dr. Kopelow, on the need for SBIRT in CME training programs for their new regulations on CME courses. ACCME used SBIRT to demonstrate their new CME course requirements and policies during 2007 and issued a video explaining SBIRT on their Web site (2008).

20. SBIRT and prescription drug abuse screening. We requested that SAMHSA SBIRT grantees extend SBIRT services for prescription drug abuse. Ninety-three percent of federally funded sites now screen for prescription drug abuse.

21. SBIRT and prescription drug abuse screening on college campuses. We requested that SAMHSA College SBIRT grantees expand SBIRT for prescription drug abuse to College Campus SBIRT sites. More than 50% of sites screen for prescription drug abuse.

22. A consensus on a prescription drug abuse questionnaire. We requested that ONDCP and NIDA develop a consensus panel/meeting on prescription drug abuse SBIRT. Report is now available.

23. SAMSHA and seamless screening and treatment provision. Petitioned SAMHSA to develop a strategic plan to provide seamless treatment (ATR) for those identified via the SBIRT program and SAMSHA developed this strategic plan, including feasibility plan.

24. Informal request to FDA to consider abuse/addiction/overdose to schedule II opioid drugs as a reportable adverse event and in post-marketing survey. Progress has been made.

25. Biometric screening for prescription drug abuse. Requested that SAMHSA convene a panel of experts to discuss feasibility of including scheduled prescription drugs on testing panels for the workplace. Panel convened August 2008 and made recommendations.

26. Developed a strategic plan to address prescription drug abuse.

27. Treatment. Wrote and advocated for expansion of treatment and budget but with stringent criteria for improving quality of SUD treatment in several documents, including the need to "medicalize" quality of care; advocated a requirement for best practices for substance abuse treatment including the following: expansion of effective treatment services, in view of SBIRT's widening reach; ***seamless, timely, and proximate entry into treatment upon diagnosis*** through SBIRT or other venues; electronic patient records/integration; frequent, consistent long-term patient follow-up to prevent relapse; provision of psychiatric services and medications; AIDS counseling and treatment; medication assistance; creative incentives for patients to remain in treatment; provision of recovery support services (transportation, child care, assistance

to families, job training, housing, educational development); evidence-based treatment programs; performance-dependent reimbursement based on improved data collection from each treatment center (numbers referred versus numbers admitted); proximity in time and location of referral to treatment; retention in program and length of retention; treatment failures and completion coupled with definition and number of treatment completers; relapse rates over 2–5 years; periodic treatment reinforcement and duration of follow-up; and many other indicators of effective treatment for each treatment center funded by federal funding through state block grants. These criteria were incorporated into various documents. This is a long-term and critical initiative, requiring intensive oversight, cost accounting, strategic planning.

28. ATR. Coordinated internally and externally the development and shepherding of ATR treatment services and data collection. Strongly advocated for ATR research, evaluation, and reporting of ATR data. Requested that SAMHSA develop a comprehensive ATR electronic manual, to enable program replication in multiple sites and nations and requested that SAMHSA work with states to promote sustainability in the absence of federal finding. ATR sustainability was accomplished in several states and the *ATR Manual* was produced and made available electronically.

29. Public education. Developed presentations and written documents to educate school officials, teachers, parents, communities on latest scientific information on the magnitude of the substance abuse problem among youth and the consequences of youth drug use to the brain and the risks for addiction.

30. Workplace. Worked with multiple sectors in the business community to alert them to SAMHSA drug-free workplace kit (e.g., Small Business Administration, Department of Commerce, Chamber of Commerce, and Department of Labor) to promote drug-free workplaces. Increased the number of sites with prevention policies and programs by more than 3 million person-reach and increased the percentage of persons with access to educational information about drug and alcohol use in the workplace.

31. College campuses. Promoted SBIRT on college campuses and disseminated outcome data, with meetings, addresses, and other venues.

32. Drugged driving. Encouraged NHTSA to disseminate findings of drugged driving research and accelerate research on consequences of drugged driving. NHTSA data was reported in July 2009.

6.2. Outreach to policy makers and other nations

1. Education of policy makers. Communicated to policy makers the view that substance abuse is a public health challenge, substance use is a continuum, from risky, problematic use to abuse to addiction and addiction is a disease. Increased public awareness of the importance of preventing nondependent users to progress to addiction.

2. UN. Advocated UN involvement in SBIRT programs/services and obtained a UN resolution in support of SBIRT services.

3. Mexico. Collaborated with Mexican government officials at several meetings to implement effective prevention and treatment programs in Mexico. We organized a State Department–sponsored U.S.–Mexico binational meeting to advocate for implementation of evidence-based prevention, intervention and treatment programs in Mexico. Mexican officials implemented SBIRT in >40 sites and RSDT in >43 sites. Mexican leadership stated an interest in implementing ATR and drug court programs. Unconfirmed, as of October 2008, Mexico changed a law to enable implementation of drug courts in Mexico.

4. Eastern Europe. Educated newly emerging Eastern European countries on effective Demand Reduction programs, by organizing a State Department–sponsored Eastern European Demand Reduction meeting to educate this sector of the European community on evidence-based prevention, intervention, and treatment programs.

5. Other nations. We educated several representatives from various nations on effective Demand Reduction programs, by presenting evidence-based Demand Reduction programs or by visits to program sites.

7. Policy lessons from modern brain biology

The science of drug use and addiction can inform and shape drug policies in the realm of demand reduction or supply reduction. Although rudimentary, the science has yielded several

fundamental principles with core relevance to drug policy:

1. The rewarding effects of drugs are universally sensed by the mammalian brain (even the fruit fly) and not only by small subpopulations of humans. Control of drugs is a necessary public health measure, to prevent an array of adverse consequences.
2. Drugs produce a cluster of biochemical, cellular, physiological, behavioral, and psychological effects that can propel individuals into the detrimental state of addiction. A disease model of the addiction is justified, as is the policy shift to a public health domain and treatment provision.
3. A disease model and evidence-based treatment, including medications, should motivate medical professionals to contribute to diagnosis, intervention, and treatment of SUDs.
4. Adolescents and persons with psychiatric disorders are at high risk for use and addiction and warrant specific prevention and intervention policies and programs.
5. All drugs of abuse produce psychological or physiological withdrawal signs, indicative of altered and adapted brain and body biochemistry. The availability of medication assistance to suppress or reverse adaptive responses that trigger drug craving should be an integral component of research and treatment and assist in mainstreaming treatment into health care settings. Yet there are few effective medications to reduce drug cravings, prevent relapse, and facilitate recovery, one of several reasons why health care professionals do not universally screen for use/addiction. Although not universally effective or enduring, there are more than 25 different medication formulations for smoking cessation and at least three for alcoholism. In contrast, approved medications to treat addictions to illicit drugs are available to less than 30% of the estimated 7 million people addicted to any illicit drug. Only those addicted to heroin or prescription opioids can avail themselves of approved medications to assist in recovery (methadone, buprenorphine, naltrexone, and naloxone). Treatment of prescription opioid abuse/addiction (25% of total) with medications traditionally used for heroin addiction, is still in the experimental phase. Yet the heroin-addicted population is but a fraction, 4%, of the population estimated to harbor DSM-IV signs of abuse/addiction to illicit drugs. The remaining populations (marijuana 60%, cocaine 20%, other stimulants 5%, hallucinogens 5%, and inhalants 2.5%) do not have the benefit of medication-assisted recovery. The dearth of medications alone justifies the quest to understand the underlying biological processes of addiction and relapse and identify novel leads for medications development.
6. Biological research can inform legal opinions and supply reduction policies. A current controversy is the sentencing law governing powder versus "crack" cocaine. Under current law, possession of 5 g of crack cocaine triggers the same mandatory minimum sentence as possession of 500 g of powder cocaine. At least double the dose of powder cocaine (cocaine, HCl), compared with "crack" (cocaine, sodium bicarbonate), is needed to achieve the same plasma levels and brain occupancy of its target and produce the same degree of euphoria. Users of smoked crack cocaine are more likely than powder cocaine users to experience clinical features of cocaine dependence, to use more crack and high doses of other illicit drugs, to incur more medical illness, and to have higher incidence of HIV–AIDS. "Ice," a methamphetamine hydrochloride salt, was created for the same purpose, to enable brain entry at higher concentrations than the conventional, ingested salt form of methamphetamine. Biological research can inform regulatory bodies, by measuring the addictive potential of drugs, their pharmacokinetic properties, their toxic effects, their effect on morbidity and mortality, and their psychoactive and intoxicating effects. Such information provides the infrastructure to drug scheduling; formulating legal penalties for distribution; and establishing local, state, national, and international laws.
7. State ballot initiatives are an unsafe mechanism for drug approval. Over the past 40 years, we have witnessed two important cases of ballot initiatives: one for the ineffective,

potentially dangerous laetrile for cancer, and the other for smoked marijuana. The stringent FDA regulations requiring recruitment into a randomized placebo-controlled trial of hundreds of subjects for a phase II evaluation and approval followed by recruitment of thousands of subjects (not only experienced marijuana users) for a phase III trial, with necessary documentation of adverse events and detailed record keeping of drug effects on physiology and other parameters, was circumvented for several medical indications listed for marijuana in 12 state ballot initiatives (e.g., Alzheimer's disease, glaucoma, seizures, epilepsy, and others). This mechanism of drug approval compares unfavorably with systematic research and ongoing compliance with stringent FDA regulations for drug approval. Isolated cannabinoids have potential for medicinal purposes, but in the smokable form, with inhalation of hundreds of chemicals of unknown pharmacology and drug interactions, this represents a retrogressive step in our drug approval system.

8. In a similar vein, data are needed to address an emerging challenge with *Salvia divinorum* and/or Salvinorin A, an unusual kappa opioid receptor agonist synthesized by various species of mint plants, is a powerful hallucinogen. It is estimated that 756,000 have used the drug in the past year, most being 18- to 25-year-olds.[15] The Drug Enforcement Administration (DEA) has not placed this drug in a scheduled status, but as of November 2008, 13 states have enacted legislation placing regulatory controls on *Salvia divinorum* and/or Salvinorin A, others have enacted other forms of legislation restricting the distribution of the plant, and legislative bills proposing regulatory controls are pending in seven other states. Salvinorin A and/or *Salvia divinorum* have been placed under regulatory controls in Australia, Belgium, Denmark, Estonia, Finland, Italy, Japan, Spain, and Sweden. Although it is a drug of interest and concern, the DEA has not scheduled this drug, because documentation on its adverse consequences are not adequately collected in the United States. For example, the Drug Abuse Warning Network or medical examiner reports do not collect data on this drug. DEA decisions on this hallucinogen await additional scientific information.

8. Future

Upon my departure from ONDCP, I generated a list of recommendations and initiatives arising during my term of office.

Prevention and intervention: we need

- improved effective and more prevention programs that incorporate the latest science into prevention, and equip parents, educators, and major sectors of drug users with knowledge that resonates with their backgrounds. School-, parent-, and community-focused programs need to be evidence based and systematic throughout our nation. (The science-based CD we produced in 1995, "Changing your mind: drugs in the brain" is still in demand.) For example, informal polling indicates that most people, other than addicts, are unaware that marijuana can be addictive or that prescription opioids, used inappropriately, are dangerous.
- to mainstream SBIRT in our health care systems, engaging in early detection and interventions. SBIRT is a potential gateway program for assisting an estimated 23% of our population that are screened in health care settings and trigger the need for an intervention, brief intervention, brief treatment, or specialty treatment.[94–96]
- to increase Medicaid share of SBIRT reimbursement as an incentive for States to catalyze SBIRT implementation.
- to mainstream SBIRT into health care will require several policy and program initiatives. Several of these recommendations arose from strategic planning in the Office of Demand Reduction during my tenure in 2006–2008; others were made in a briefing paper on SBIRT we commissioned for our Third National Leadership Conference on Medical Education in Substance Abuse (January 16, 2008). Among these integrated recommendations are: (1) physician education through medical school, residency, CME courses shaped according to how they practice and how they learn; (2) shape personal health beliefs and practices of physicians; (3) provide review and feedback through quality

assurance programs; (4) engage authoritative sources to champion these practices; (5) include these practices in licensure or certification (e.g., American College of Surgeons, Committee on Trauma mandate for SBI in Level I Trauma Centers); (6) provide guidance through clinical protocols as adopted by the VA system or HRSA; (7) incorporate these services into performance standards; (8) engage purchasers and payers of care (e.g., FEHB); (9) increase the number of insurers willing to pay and eliminate the Uniform Policy Provision Law (UPPL) that prevent coverage; and (10) disseminate the availability of the CPT (99408, 99409), Medicaid H0049 H0050, Medicare codes, and others.

- an improved system for tracking prevention strategies with outcome measures. (e.g., the decline in youth drug use since 2002 has many claimants).
- a *rapid* monitoring system of emerging drug threats, based on reports from emergency departments, the courts and prisons, Internet sites, and a rapid response team to respond to these emerging threats or challenges, such as fentanyl, Dallas heroin-"cheese," Salvia divinorum, others.
- to broadcast questions of assessment or self-assessment, in the workplace, on college campuses, in the media, which generate scores on where their substance use lies along a spectrum of risk within current norms, and what to do if a score triggers the need for intervention.
- a consensus on the safety and ethics of cognitive enhancers. International disapproval for anabolic steroids and other types of athletic performance enhancers is based on the perception that they create an unfair advantage, a nonlevel playing field in sports. Where does society stand on cognitive enhancers? Their use is widespread on college campuses. How should we, or should we, draw boundaries at medications to treat diseases and medications to elevate people above baseline levels of performance?
- strategic systems approach to address specific problems and populations, such as Salvinorin A, the 18- to 25-year-olds, the elderly, pregnant women, drugged drivers, multigenerational drug-using families, and others.
- to support professional training in SBIRT and the addictions, via Innovative Strategies for Transforming the Education of Physicians (iSTEP), grants to medical school and hospitals, to CME programs, in local and regional training sessions, and for federal agencies actively engaged or considering SBIRT (e.g., HRSA).
- to integrate screening for substance abuse and mental health, because of the high rate of comorbidity.
- widespread screening in juvenile justice system, in courts, in prisons, and provisions for interventions.

Treatment: we need to reform treatment by

- developing strategic plan to expand access to treatment and improve quality.
- improving documentation of services and finances of the federally supported treatment centers, defining more appropriately treatment outcomes, and improving the infrastructure of treatment centers.
- medicalizing elements of treatment (e.g., integrating treatment with psychiatric services, health care, medications provision, and AIDS detection and treatment) and adopting electronic record-keeping and other practices common in health care delivery systems.
- integrating recovery support-social services (e.g., job training, housing assistance, child care, and transportation assistance) into treatment.
- putting into practice in our treatment centers, evidence-based practices and verification of quality of training and treatment services in federally supported and private treatment settings.[97]
- matching federal funds to excellence in treatment services and outcomes.
- providing seamless entry into treatment (e.g., within proximity to the facility which identified those in need, with little or no waiting time, and ready access to support services).
- incorporating electronic records (e.g., ATR databases) into treatment facilities, to document treatment effectiveness (admissions, dropouts and terminations, completion, and long-term outcomes), most requested support services, others.

- incorporating practices that reflect addiction as a chronic disease, long-term treatment follow-up contact and care, and long-term documentation of treatment outcomes.
- rewarding treatment centers with high rates of treatment entry, low rates of drug positives, treatment completion, low rates of relapse, and long-term care, and publish effectiveness data of individual government-sponsored programs and treatment centers.
- more and effective medications to treat a range of drug addictions.
- developing improved definitions and measures of successful treatment programs, treatment completion, long-term aftercare, etc. Create a federal manual to define these measures and guide treatment centers.
- rewarding programs that keep people in treatment, which demonstrate positive outcomes on the basis of well-defined definitions of success.
- expanding drug courts and drug treatment in prisons. Less than 20% of the incarcerated in need of treatment receive treatment. Fewer than 10% of people eligible for drug court treatment receive it.
- incorporating SBIRT-type screening and interventions into drug court programs and prisons, so as to match treatment needs with drug users.
- expanding drug treatment programs to accommodate the treatment needs of increasing numbers identified by SBIRT.
- generating more and improved data on the costs of substance use/addiction to various sectors of society, the cost-effectiveness of SBIRT and treatment, and what public or private sectors benefit from the cost offsets of effective programs, to clarify how and who should help finance a massive expansion of treatment projected by SBIRT and other programs.

Policy: we need

- to generate accurate data on the costs of substance use/addiction to various sectors of society, to balance public or private contributions for cost offsets of effective programs
- to mainstream SBIRT in our health care systems. SBIRT has the potential for assisting an estimated 23% of our population that have screened positive in health care settings and triggered the need for an intervention.
- a detailed analysis of treatment needs likely to arise from expansion of SBIRT programs, the form these treatment services should take, and how, where to catalyze their growth, and how to fund this expansion.
- improved national survey data that can provide meaningful information on national needs for intervention and treatment, to define and measure policies and outcomes. For example, a screening questionnaire, such as the Alcohol, Smoking, and Substance Involvement Screening Test (ASSIST), can document the number of users across a spectrum of risky, problematic, abuse, addiction (frequency and amount) consequences of use and generate estimated populations in need of brief interventions, brief treatments, or referral to specialty treatment.
- improved, timely surveys for emerging threats, to enable a rapid response team that addresses a problem before it expands and a system for rapid expansion of relevant research.
- to articulate goals, operational priorities, strategies, and performance measures on each component of the complex federal drug control strategy, based on wisely selected epidemiological data and other measures, and provide for independent evaluation of outcomes, to guide federal allocation of resources for drug programs.
- to establish baseline data at the outset of new programs (e.g., a novel media campaign) to enable accurate association/causality analysis of outcome measures.
- to coordinate demand reduction policies with other nations and develop means for translation of effective programs into other languages. In my experience other nations welcome information on effective, evidence-based demand reduction programs.
- to integrate budget discussions with our federal partners. Federal agencies currently generate budgets that are then modified and "certified" by ONDCP, with the Office of Management and Budget (OMB) as an intermediary. This process does not permit face-to-face consensus building of national priorities in these service and research budgets.
- a clear and unequivocal policy statement of the federal view on drug use, the adverse

consequences of drugs, and support for prevention, intervention, and treatment.
- to educate the public on how the FDA approves medications. Our nation has witnessed ballot initiatives passed for a fraudulent, ineffective cancer treatment (laetrile) and for smokeable marijuana (after a half-century antismoking campaign), by well-funded media campaigns by private sources. The marijuana ballot initiatives are based on inadequate and unacceptable clinical trials, in the absence of evidence for specific indications (e.g., Alzheimer's disease) or reporting of adverse events. To prevent ballot initiatives from becoming a paradigm for circumventing rigorous FDA standards, the public needs to be informed of the process and whether current evidence matches FDA requirements.
- to assess all grant programs under the rubric of Demand Reduction, with a view to analyzing their cost–benefits and developing a strategic plan for dissemination and sustainability or termination, if necessary.
- a strategic plan for prescription drug abuse that integrates all sectors involved (medical and dental community, pharmacies, pharmaceutical companies, public, FDA, Prescription Drug Monitoring program,[98] law enforcement, research, public, and media).
- in our international programs, coordinated supply and demand reduction programs.

Research: we need

- to enhance support of research via AHRQ or a division at the National Institutes of Health that promotes translational research, of a different kind, on challenges (human behavior, infrastructure and resource constraints, organizational inertia)[96] to widespread dissemination of evidence-based programs, such as SBIRT.
- research on which sectors of society benefit financially and socially from reduced drug use (e.g., states, cities, court and prison systems, hospitals, workplace sectors, health care, and other insurance companies) and enlist their support and collaboration in promulgating effective demand reduction programs.
- more research and resources for medications development.
- more brain imaging research, with its visual effect for public education.
- research on SBIRT: long-term drug use and other outcomes? Does SBIRT attenuate progression to drug addiction? What is the duration of effect of a brief intervention? Why do some people not respond? Why do some programs get ineffective responses? Are brief interventions effective for all classes of drugs, including prescription drugs? How effective is brief treatment? Does SBIRT for illicit drugs reduce associated costs to society? How frequently should the brief intervention be administered to reinforce the message? Can telephone, electronic, or other forms of interventions or reinforcement be effective? Is SBIRT effective on subpopulations (e.g., adolescents, college students, pregnant women, adolescents, the elderly, and the homeless)? Does SBIRT reduce HIV–AIDS and other health-related conditions? Is SBIRT's effectiveness inversely correlated with risk factors for use and addiction (e.g., childhood abuse, psychiatric comorbidity, and stress)?, and many others.
- prescription drug abuse research, as prescription drug abuse increases morbidity and mortality and threatens the foundation of legitimate scheduled medicines. We need pharmacoepidemiology research on opioid prescribing practices for short- and long-term pain management, particularly for dentists, emergency department physicians, and internists. We need outcome measures (e.g., iatrogenic addiction and pain) in long-term pain management with opioids, and comparison of opioids and other analgesics for long-term pain management and adverse events for pain patients. We need research on treatment for adolescent opioid addiction (and for other addictions in adolescence, as well).
- randomized controlled trials research on "take-home" Narcan programs, a politicized, controversial program.
- systematic research to clarify trends, such as escalating drug use in the 50- to 60-year-olds, and prevention strategies for these subpopulations.
- research in identifying objective biological criteria or markers for the disease of addiction and the state of recovery, for defining reversibility or irreversibility of adaptive states, and for identifying genetic susceptibility.
- to buoy federal programs with quality research and evidence. Intuition, feelings, values,

pressures, and beliefs jump-start many a federal policy and program—often, but not always, for the common good. Scientific scrutiny should insert itself at the very inception of a well-meaning new program—to acquire critical baseline data and then postprogram data for comparison—of sufficient rigor to be reportable in peer-review articles.

- to excavate federal data buried in servers. Outside experts should have access (with no identifiers) to GPRA/NOMS-required reporting, and weigh in on outcome measures.
- to apply ONDCP Counter Technology Assessment Center funds to address a specific research agenda that can be directly linked with a strategic policy and plan. For example, the AMA consortium of medical schools, iSTEP, is a unique medical education research collaborative that brings together individuals and institutions from across the continuum of physician learning to conduct rigorous research on how physicians learn. With research and curriculum development, iSTEP could accelerate SBIRT and addiction treatment education throughout the medical education system in the nation.

9. Summary

My service was a rare privilege, to view our nation's challenges through a colossal magnifier, to serve the nation, and witness some tangible progress. Without exuberant, dedicated collaborators from the public and private sector, progress would have been minimal. Yet is was a fledgling effort.

My White House days gave me an opportunity to expand my experiences from the laboratory to the highest perspective on the nation's public health. Equipped with a scientific background, textbook knowledge, a host of scientific evidence derived from brain imaging, molecular and cell biology, behavioral and cognitive testing, and essays on legalization, on personal, civil and privacy rights, I was yet unprepared for the disturbing evidence, viewed from national statistics and a vast array of personal encounters, of the devastating effects of drug use on both public health, welfare, and public safety. I also discovered that decades of drug policy have been mired in an endless debate, waged along a virtual mobius strip and fueled by culture wars. These apparently irreconcilable, ideological battles, based largely on personal views and experiences, should be replaced by a rational assessment of the human, medical, social, and financial impact of nonmedical use of drugs. We need to forge a new policy consensus, based on a public health, welfare, and safety paradigm, in the best interests of our nation's, indeed the world's public health. There are many promising ways to create strong and effective policies to reduce the level of nonmedical drug use and its associated consequences, some in existence, others buried in the scientific literature. Their implementation is not fully realized. Ideological battles promulgate inertia, diminish resolve to scale up effective programs, and send confusing messages to our most vulnerable populations, the young, the poor, the school drop-outs, and the unemployed. I return to my home base with an elaborated perspective, a quickened sense of urgency, not only to extend knowledge and science but to employ this powerful knowledge more effectively to achieve significant reductions in nonmedical drug use of illegal and prescription drugs. Intriguingly, nonmedical use of prescription drugs significantly devalues the argument frequently heard that the reason for the drug problem is that drugs like marijuana are illegal and degrades the "legalization solution." Meager is the crime or the dollars exchanged for most nonmedical use of prescription drugs, yet the number of people addicted to, or have died from overdoses (primarily opioids), is escalating. A balanced policy of demand and supply reduction is where drug policy needs to be focused. For there should be no peace of mind among the committed, as long as fellow Americans are lying on the streets of a major city, their bodies shrunken by heroin and heroin-induced AIDS, too intoxicated with drugs, too dehydrated, and too remote from hope to take their life-sparing AIDS and antipsychotic medications. There should be no peace of mind among the committed as long as a girl of 14 is in a residential treatment program for marijuana addiction, the drug introduced by her brother when she was 8 years old; or as long as parents first learn that their son is addicted to prescription drugs or to inhalants, when they are called to a morgue; or when a father is too intoxicated and incapacitated to act while his young daughter is suffocating under his watch. There should be no peace of mind, until parents no longer claim they did not know marijuana was addictive and did not know that prescription drugs can be abused.

Even in the context of a global economic crisis, we can not marginalize this problem—a stable, enduring commitment is essential, for the sake of those affected, for the sake of our children, our public health, our economy, our safety, and our humanity. This burden drains hope, promise, and dollars from every sector, public and private, and raises health care, economic, workplace, and legal system costs.

At the end of this odyssey, I sit at my old desk, filled with a hopeful grant application, manuscripts in preparation, and the first few graphs of new molecular data on mRNA expression of axonal guidance molecules, to explore a theory of why adolescents are more susceptible to addiction.

Conflicts of interest

The author declares no conflicts of interest.

References

1. Madras, B.K. 2006. *Introduction; Cocaine; in the Cell Biology of Addiction.* B.K. Madras, C.M. Colvis, J.D. Pollack, *et al.*, Eds.: 1–12. Cold Spring Harbor Laboratory Press. Cold Spring Harbor, NY.
2. DuPont, R.L., B.K. Madras & P. Johansson. 2010. Drug policy—a biological perspective. In *Lowinson & Ruiz's Substance Abuse: A Comprehensive Textbook*. J.H. Lowinson & P. Ruiz, Eds: Chapter 77. Lippincott, Williams & Wilkins, Wolters Kluwer Health. Philadelphia, PA.
3. Leshner, A.I. 1997. Addiction is a brain disease, and it matters. *Science* **278:** 45–47.
4. ADAM: http://www.ondcp.gov/publications/pdf/adam2008.pdf.
5. CDC: http://www.cdc.gov/nchs/FASTATS/druguse.htm.
6. CASA: http://www.casacolumbia.org/templates/Home.aspx?articleid=287&zoneid=32 an The National Center on Addiction and Substance Abuse at Columbia University Report: No safe haven; children of substance-abusing parents, January 1999.
7. DAWN: https://dawninfo.samhsa.gov/default.asp.
8. DASIS: http://www.oas.samhsa.gov/dasis.htm#nssats2.
9. DOL: http://www.dol.gov/asp/programs/drugs/workingpartners/stats/wi.asp.
10. HBSC: http://www.icpsr.umich.edu/cocoon/SAMHDA/SERIES/00195.xml.
11. ISATS: http://wwwdasis.samhsa.gov/dasis2/isatsonline.htm.
12. MTF: http://monitoringthefuture.org/.
13. NCS: http://www.hcp.med.harvard.edu/ncs/ncs_data.php.
14. NESARC: http://aspe.hhs.gov/hsp/06/Catalog-AI-AN-NA/NESARC.htm.
15. NSDUH: http://www.oas.samhsa.gov/nhsda.htm.
16. NVSS: http://www.cdc.gov/nchs/nvss.htm.
17. TEDS: http://www.oas.samhsa.gov/2k2/TEDS/TEDS.cfm.
18. YRBSS: http://www.cdc.gov/HealthyYouth/yrbs/index.htm.
19. Madras, B.K., W.M. Compton, D. Avula, *et al.* 2009. Screening, brief interventions, referral to treatment (SBIRT) for illicit drug and alcohol use at multiple healthcare sites: comparison at intake and 6 months later. *Drug Alcohol Depend.* **99:** 280–295.
20. Anthony, J.C. & K.R. Petronis. 1995. Early-onset drug use and risk of later drug problems. *Drug Alcohol Depend.* **40:** 9–15.
21. Chen, C.Y., M.S. O'Brien & J.C. Anthony. 2005. Who becomes cannabis dependent soon after onset of use? Epidemiological evidence from the United States: 2000–2001. *Drug Alcohol Depend.* **79:** 11–22.
22. Chen, C.Y., C.L. Storr & J.C. Anthony. 2009. Early-onset drug use and risk for drug dependence problems. *Addict. Behav.* **34:** 319–322.
23. Grant, B.F. & D.A. Dawson. 1998. Age of onset of drug use and its association with DSM-IV drug abuse and dependence: results from the National Longitudinal Alcohol Epidemiologic Survey. *J. Subst. Abuse* **10:** 163–173.
24. McCabe, S.E., B.T. West, M. Morales, *et al.* 2007. Does early onset of non-medical use of prescription drugs predict subsequent prescription drug abuse and dependence? Results from a national study. *Addiction* **102:** 1920–1930.
25. O'Brien, M.S. & J.C. Anthony. 2005. Risk of becoming cocaine dependent: epidemiological estimates for the United States, 2000–2001. *Neuropsychopharmacology* **30:** 1006–1018.
26. Palmer, R.H., S.E. Young, C.J. Hopfer, *et al.* 2009. Developmental epidemiology of drug use and abuse in adolescence and young adulthood: evidence of generalized risk. *Drug Alcohol Depend.* **102:** 78–87.
27. Stone, A.L., C.L. Storr & J.C. Anthony. 2006. Evidence for a hallucinogen dependence syndrome developing soon after onset of hallucinogen use during adolescence. *Int. J. Methods Psychiatr. Res.* **15:** 116–130.
28. Storr, C.L., R. Westergaard & J.C. Anthony. 2005. Early onset inhalant use and risk for opiate initiation by young adulthood. *Drug Alcohol Depend.* **78:** 253–261.
29. Wagner, F.A. & J.C. Anthony. 2002. From first drug use to drug dependence; developmental periods of risk for dependence upon marijuana, cocaine, and alcohol. *Neuropsychopharmacology* **26:** 479–488.

30. Caldeira, K.M., A.M. Arria, K.E. O'Grady, *et al*. 2008. The occurrence of cannabis use disorders and other cannabis-related problems among first-year college students. *Addict. Behav.* **33:** 397–411; see also Rimsza, M.E. & K.S. Moses. 2005. Substance abuse on the college campus. *Pediatr. Clin. North Am.* **52:** 307–319, xii.
31. Friedmann, P.D., L. Jin, T. Karrison, *et al*. 1999. The effect of alcohol abuse on the health status of older adults seen in the emergency department. *Am. J. Drug Alcohol Abuse* **25:** 529–542.
32. SAMSHA: http://www.samhsa.gov/OlderAdultsTAC/SA_MH_%20AmongOlderAdultsfinal102105.pdf.
33. SAMHSA: http://www.oas.samhsa.gov/Veterans.htm.
34. CDC: http://www.cdc.gov/Washington/testimony/2008/t20080312a.htm.
35. London, J.A., G.H. Utter, F. Battistella & D. Wisner. 2009. Methamphetamine use is associated with increased hospital resource consumption among minimally injured trauma patients. *J. Trauma* **66:** 485–490.
36. Prekker, M.E., J.R. Miner, E.G. Rockswold & M.H. Biros. 2009. The prevalence of injury of any type in an urban emergency department population. *J. Trauma* **66:** 1688–1695.
37. Ramchand, R., G.N. Marshall, T.L. Schell, *et al*. 2009. Alcohol abuse and illegal drug use among Los Angeles County trauma patients: prevalence and evaluation of single item screener. *J. Trauma* **66:** 1461–1467.
38. Mertens, J.R., Y.W. Lu, S. Parthasarathy, *et al*. 2003. Medical and psychiatric conditions of alcohol and drug treatment patients in an HMO: comparison with matched controls. *Arch. Intern. Med.* **163:** 2511–2517.
39. Mertens, J.R., C. Weisner, G.T. Ray, *et al*. 2005. Hazardous drinkers and drug users in HMO primary care: prevalence, medical conditions, and costs. *Alcohol Clin. Exp. Res.* **29:** 989–998.
40. Mertens, J.R., A.J. Flisher, M.F. Fleming, C.M. Weisner. 2007. Medical conditions of adolescents in alcohol and drug treatment: comparison with matched controls. *J. Adolesc. Health* **40:** 173–179.
41. Ray, G.T., J.R. Mertens & C. Weisner. 2007. The excess medical cost and health problems of family members of persons diagnosed with alcohol or drug problems. *Med. Care* **45:** 116–122.
42. Ray, G.T., J.R. Mertens & C. Weisner. 2009. Family members of people with alcohol or drug dependence: health problems and medical cost compared to family members of people with diabetes and asthma. *Addiction* **104:** 203–214.
43. NSDUH: http://www.oas.samhsa.gov/2k9/SAparents/SAparents.htm; http://www.oas.samhsa.gov/Treatan/treana08.htm.
44. SAMHSA: http://wwwdasis.samhsa.gov/teds04/tedsd2k4web.pdf.
45. SAMHSA: http://wwwdasis.samhsa.gov/teds06/tedsd2k6_508.pdf.
46. NHTSA: http://www.nhtsa.dot.gov/portal/site/nhtsa/menuitem.18e416bf1b09b6bbbf30811060008a0c/document #811175.pdf.
47. SAMHSA: http://oas.samhsa.gov/work2k7/toc.cfm.
48. SAMHSA: http://csat.samhsa.gov/IDBSE/employee/TheCostofSubstanceAbuse-wpb7.pdf.
49. http://csat.samhsa.gov/IDBSE/employee/OlderWorkersandSubstanceAbuse-wpb2.pdf.
50. NIDA: http://www.drugabuse.gov/NIDA_notes/NNVol13N4/Abusecosts.html.
51. SAMHSA: http://download.ncadi.samhsa.gov/prevline/pdfs/SMA07-4298.pdf.
52. SAMHSA: http://www.tie.samhsa.gov.
53. PART: http://www.whitehouse.gov/omb/expectmore/rating/notperform.html.
54. SAMHSA: http://www.samhsa.gov/Budget/FY2010/SAMHSA_FY10CJ.pdf.
55. SBIRT: http://sbirt.samhsa.gov/about.htm/.
56. SAMHSA: http://www.nationaloutcomemeasures.samhsa.gov/.
57. SAMHSA: http://atr.samhsa.gov/.
58. DOT: http://www.dot.gov/ost/dapc/rates.html.
59. http://www.preventionnotpunishment.org/pdfs/VernoniaSupremeCourtCase.pdf and http://www.preventionnotpunishment.org/pdfs/BoardofEducationofIndependentSchoolDistrictNo92.pdf.
60. SHPP: http://www.cdc.gov/HealthyYouth/SHPPS/2006/factsheets/pdf/FS_AlcoholOrOtherDrugUsePrevention_SHPPS2006.pdf.
61. Ringwalt, C., A.A. Vincus, S.T. Ennett, *et al*. 2008. Random drug testing in US public school districts. *Am. J. Public Health* **98:** 826–828.
62. Council on School Health, American Academy of Pediatrics; Committee on Substance Abuse, American Academy of Pediatrics. 2007. The role of schools in combating illicit substance abuse. *Pediatrics* **20:** 1379–1384.
63. CASA: http://www.casacolumbia.org/absolutenm/articlefiles/380-2009%20Teen%20Survey%20Report.pdf.
64. Goldberg, L., D.L. Elliot, D.P. MacKinnon, *et al*. 2003. Drug testing athletes to prevent substance abuse: background and pilot study results of the SATURN (Student Athlete Testing Using Random Notification) study. *J. Adolesc. Health* **32:** 16–25. Erratum in: *J. Adolesc. Health* 2003 Apr;32(4):325.

65. Goldberg, L., D.L. Elliot, D.P. MacKinnon, *et al*. 2007. Outcomes of a prospective trial of student-athlete drug testing: the Student Athlete Testing Using Random Notification (SATURN) study. *J. Adolesc. Health* **41:** 421–429. Erratum in: *J. Adolesc. Health* 2008 Jan;42(1): 107.
66. Griswold, K.S., H. Aronoff, J.B. Kernan & L.S. Kahn. 2008. Adolescent substance use and abuse: recognition and management. *Am. Fam. Phys.* **77:** 331–336.
67. Knight, J.R., S.K. Harris, L. Sherritt, *et al*. 2007. Adolescents' preference for substance abuse screening in primary care practice. *Subst. Abus.* **28:** 107–117.
68. Knight, J.R., L. Sherritt, L.A. Shrier, *et al*. 2002. Validity of the CRAFFT substance abuse screening test among adolescent clinic patients. *Arch. Pediatr. Adolesc. Med.* **156:** 607–614.
69. Cook, R.L., T. Chung, T.M. Kelly & D.B. Clark. 2005. Alcohol screening in young persons attending a sexually transmitted disease clinic. Comparison of AUDIT, CRAFFT, and CAGE instruments. *J. Gen. Intern. Med.* **20:** 1–6.
70. NDCI: http://www.ndci.org/ndci-home/.
71. USPSTF: http://www.ahrq.gov/clinic/pocketgd.htm.
72. IOM Committee on Crossing the Quality Chasm: Adaptation to Mental Health and Addictive Disorders. 2005. *Improving the Quality of Healthcare for Mental and Substance-Use Conditions: Quality Chasm Series*. National Academy Press. Washington, DC.
73. Gentilello, L.M. 2005. Confronting the obstacles to screening and interventions for alcohol problems in trauma centers. *J. Trauma* **59**(3 Suppl.): S137–143; discussion S146–166.
74. Sise, M.J., C.B. Sise, D.M. Kelley, *et al*. 2005. Implementing screening, brief intervention and referral for alcohol and drug use: the trauma service perspective. *J. Trauma* **59:** 619–622.
75. WHO: http://www.who.int/substance_abuse/activities/assist/en/index.html.
76. CDC: http://www.cdc.gov/nchs/data/nhsr/nhsr008.pdf.
77. http://www.whitehouse.gov/omb/mgmt-gpra_gplaw2m/.
78. http://www.samhsa.gov/grants/tools.aspx.
79. Kuehn, B.M. 2008. Despite benefit, physicians slow to offer brief advice on harmful alcohol use. *JAMA* **299:** 751–753.
80. Woolf, S.H., R.E. Johnson, R.L. Phillips, Jr. & M. Philipsen. 2007. Giving everyone the health of the educated: an examination of whether social change would save more live than medical advances. *Am. J. Public Health* **97:** 679–683.
81. WASBIRT: http://www.dshs.wa.gov/pdf/hrsa/dasa/ResearchReports/MACO091807.pdf.
82. WHO: http://www.who.int/substance_abuse/activities/assist_technicalreport_phase3_final.pdf.
83. NCPP: http://www.prevent.org/content/view/43/71/.
84. http://www.prevent.org/images/stories/clinicalprevention/article%201669p.pdf.
85. JCAHO: http://www.jointcommission.org/AboutUs/Fact_Sheets/joint_commission_facts.htm.
86. CMS: http://www.cms.hhs.gov/hcpcsreleasecodesets/anhcpcs/List.asp.
87. CPT: http://www.ama-assn.org/ama/pub/physician-resources/solutions-managing-your-practice/coding-billing-insurance/cpt.shtml.
88. FEHB: https://www.opm.gov/carrier/carrier_letters/2008/2008-06.pdf.
89. HRSA: http://bphc.hrsa.gov/policy/pal0902.htm.
90. IHS: http://www.ihs.gov/nonmedicalprograms/nc4/Documents/ASBI_Manual.pdf.
91. NIDA: http://www.drugabuse.gov/nidamed/.
92. SAMHSA: http://download.ncadi.samhsa.gov/enetwork/archive/2008/SAMHSA_Grants_csat_3_7_08.html.
93. ONDCP: http://www.ondcp.gov/publications/medical_educ_2006/medical_educ_2006.pdf.
94. Etz, R.S., D.J. Cohen, S.H. Woolf, *et al*. 2008. Bridging primary care practices and communities to promote healthy behaviors. *Am. J. Prev. Med.* **35**(5 Suppl.): S390–397.
95. Woolf, S.H. 2008. The power of prevention and what it requires. *JAMA* **299:** 2437–2439.
96. Woolf, S.H. 2008. The meaning of translational research and why it matters. *JAMA* **299:** 211–213.
97. NIDA: Treatment approaches for drug addiction. National Institute on Drug Abuse. http://www.nida.nih.gov/PDF/InfoFacts/Treatment08.pdf.
98. DEA: http://www.deadiversion.usdoj.gov/faq/rx_monitor.htm.

Exhibit B

The Effects of Drug Abuse on the Human Nervous System

Edited by:
Bertha Madras
Michael Kuhar

Book 2 in the Neuroscience-Net Reference Book Series
John E. Johnson, Jr., Managing Editor

Academic Press is an imprint of Elsevier
The Boulevard, Langford Lane, Kidlington, Oxford OX5 1GB, UK
Radarweg 29, PO Box 211, 1000 AE Amsterdam, The Netherlands
225 Wyman Street, Waltham, MA 02451, USA
525 B Street, Suite 1800, San Diego, CA 92101-4495, USA

First edition 2014

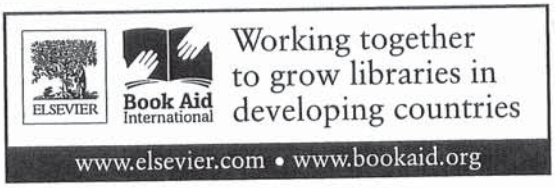
Library of Congress Cataloging-in-Publication Data
The effects of drug abuse on the human nervous system / edited by Bertha Madras, Michael Kuhar. -- First edition.
p. ; cm.
Includes bibliographical references.
ISBN 978-0-12-418679-8
I. Madras, Bertha, editor of compilation. II. Kuhar, Michael J., editor of compilation.
[DNLM: 1. Substance-Related Disorders--physiopathology. 2. Nervous System--drug effects. 3. Risk Factors. 4. Substance-Related Disorders--epidemiology. WM 270]
RC564
362.29--dc23
2013039438

British Library Cataloguing in Publication Data
A catalogue record for this book is available from the British Library

ISBN: 978-0-12-418679-8
The charcoal drawing on the cover is by Vivian Felsen and is from the collection of Bertha Madras.

For information on all Academic Press publications visit our web site at store.elsevier.com

Printed and bound in USA
14 15 16 17 18 10 9 8 7 6 5 4 3 2 1



3. CONCLUSIONS

- There has been enormous progress made in recent years, in analyzing the structure and functions of the endocannabinoid system in the nervous system, and it is clear that it is involved in modulating a very broad range of nervous system activities, including synaptic transmission, neuronal growth and maturation, integration of incoming information from many different sources within the body and outside, and linkage between information and responses. However, there are still large gaps in knowledge at the cellular level, and knowledge of the basic workings of the endocannabinoid system still do not offer comprehensive understanding of the effects at the level of the whole organism, including the subjective effects underlying nonmedical use, and the functional effects that may be therapeutically useful or harmful.
- In theory, such a broad range of functions offers the possibility of many therapeutic applications, and it seems probable that in the future many clinically useful developments will become available. They will be useful to the degree that they offer highly selective and controllable degrees of intervention in the workings of the endocannabinoid system, which crude cannabis (marijuana) does not offer, and to the extent that they are therefore free of the undesirable psychoactive effects of currently available cannabinoids.
- There are major differences between the low-dose effects of endogenous cannabinoids and the higher-dose and more prolonged effects of phytocannabinoids. As a result, most of the potentially therapeutically useful effects of cannabinoids are likely to come from the development of endocannabinoid derivatives and analogs, while the higher-dose effects are mainly related to the adverse effects of crude cannabis preparations. The major adverse effects in the nervous system are related to alterations in neuronal growth and maturation, and to impairments of cognitive function including memory and executive functions.
- As with most drugs, the adverse effects are closely related to the age at which use begins, the amount and duration of use, and the length of time after cessation of use.

REFERENCES

Akirav, I., 2011. The role of cannabinoids in modulating emotional and non-emotional memory processes in the hippocampus. Front. Behav. Neurosci. 5, 1–11 Article 34.

Alger, B.E., 2009. Endocannabinoid signaling in neural plasticity. Curr. Top. Behav. Neurosci. 1, 141–172.

Alger, B.E., Kim, J., 2011. Supply and demand for endocannabinoids. Trends Neurosci. 34, 304–315.

Alonso-Alconada, D., Alvarez, F.J., Alvarez, A., Mielgo, V.E., Goni-de-Cerio, F., et al., 2010. The cannabinoid receptor agonist WIN55,212-2 reduces the initial cerebral damage after hypoxic-ischemic injury in fetal lambs. Brain Res. 1362, 150–159.

Alonso-Alconada, D., Alvarez, A., Hilario, E., 2011. Cannabinoid as a neuroprotective strategy in perinatal hypoxic-ischemic injury. Neurosci. Bull. 27, 275–285.