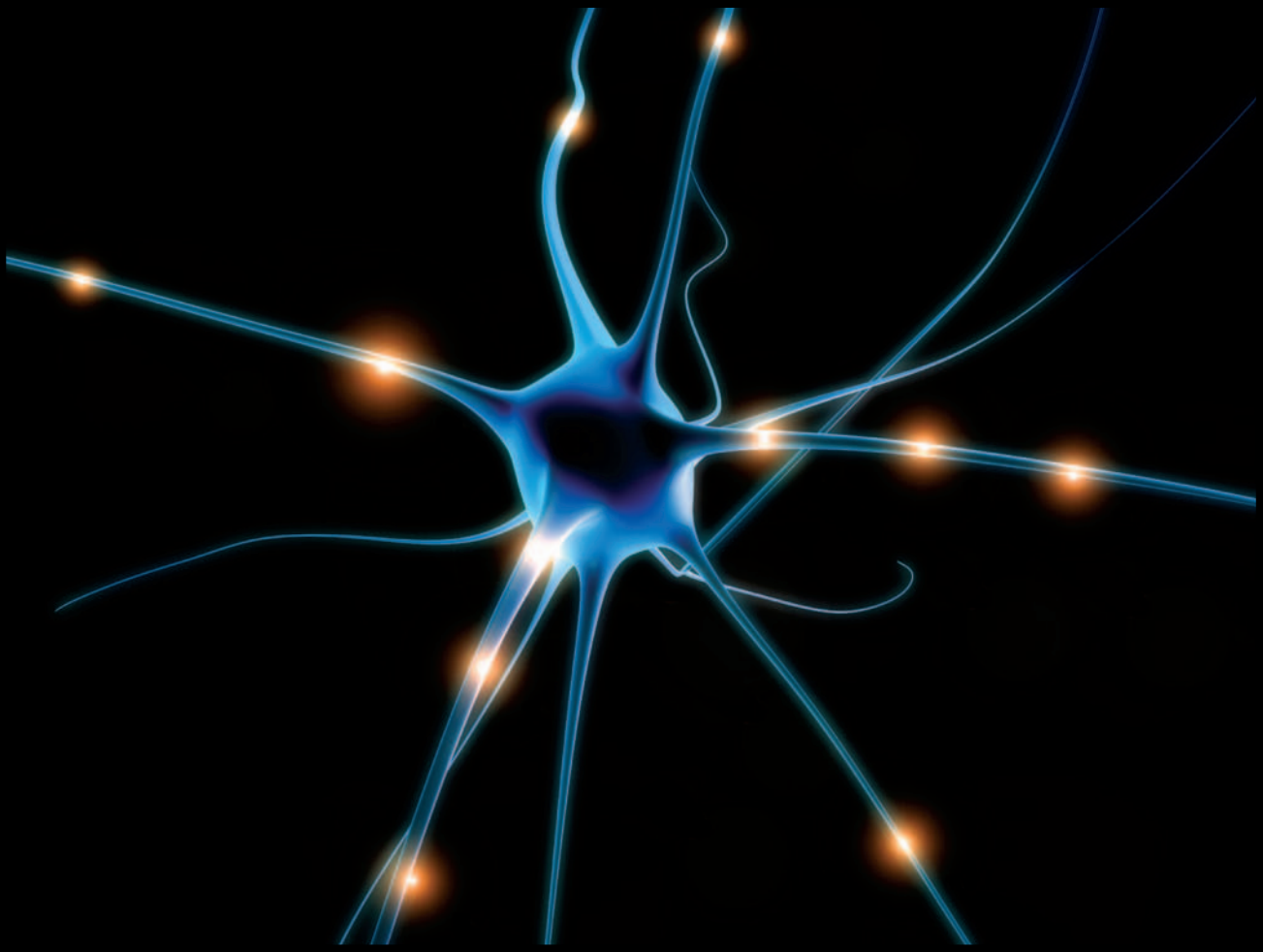
NIDA

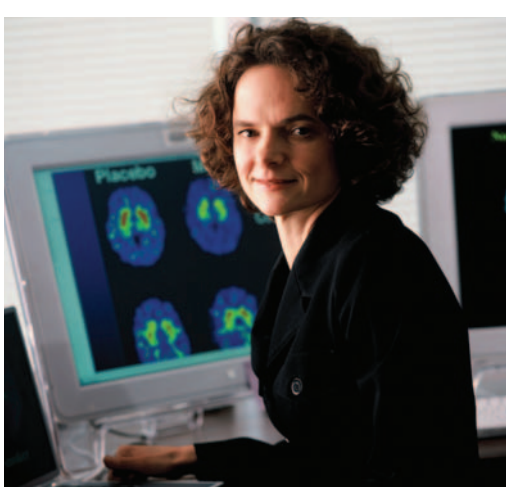
NATIONAL INSTITUTE ON DRUG ABUSE



National Institutes of Health
U.S. Department of Health and Human Service

NATIONAL INSTITUTE ON DRUG ABUSE

By NIDA Director Nora Volkow, M.D.



Recent scientific advances have revolutionized our understanding of drug abuse and addiction and their prevention and treatment. Most of these advances were achieved through research supported by the National Institute on Drug Abuse (NIDA).

NIDA supports most of the world's scientific studies on the health aspects of drug abuse and addiction. NIDA-supported scientific studies address questions ranging from the most basic to the most pragmatic--from molecules and neurobiology to managed care and community outreach.

NIDA not only is seizing upon unprecedented opportunities and technologies to further understand how drugs of abuse affect the brain and behavior, but also is working to ensure the rapid and effective transfer of scientific data to policymakers, drug abuse practitioners, other health care providers, and the general public.

The Disease of Addiction

The standard criteria for diagnosing addiction require that a person compulsively seeks and uses a substance despite suffering harmful consequences. Researchers have traced the etiology of this behavior to drug-induced changes in brain structure and function.

While each addictive substance has its own mechanism of action, studies have shown that they all produce feelings of euphoria by massively increasing the action of the neurochemical dopamine in the brain's reward system. With repeated exposures to these extreme drug-triggered dopamine surges over an extended period of time, the reward system loses its responsiveness to naturally satisfying activities, such as eating and sex, and all the things we normally do to enrich our lives. At this point, the individual is addicted, and the only thing he or she cares deeply about is getting and taking the drug.

Research also has shown that addiction can be treated. Medication and behavioral therapies support abstinence and promote the restoration of normal tone in the brain's reward system. Although addiction is a chronic disease marked, like other chronic conditions, by alternating periods of recovery and episodes of relapse, long-term recovery and a normal, healthy life are achievable goals.

NIDA research has generated and validated a variety of effective treatments for addiction. Recently, NIDA-supported researchers provided the empirical research that led the Food and Drug Administration to approve buprenorphine, a new medication that physicians in office-based primary care can use to treat patients' opiate addiction. We continue to seek to expand the treatment repertoire, with the ultimate aim of providing every patient with interventions that suit his or her substance of addiction, individual characteristics, and social and cultural situation.

NIDA and Minority Health Research

NIDA's mandate is to use the power of science to generate drug abuse prevention and treatment interventions to meet the needs of each and every affected individual and community in the Nation. Accordingly, all NIDA Divisions seek to understand and respond to special issues affecting drug abuse, its prevention, treatment, and consequences among racial and ethnic minorities. The broad context for NIDA's minority health research is that while the prevalence of abuse is similar across groups, the health and social consequences for minorities are much graver than those for Caucasians.

In 2006, the Institute funded over 400 such studies, ranging from basic neuroscience, to clinical and behavioral issues, to epidemiology and prevention. Some of the key issues they address are:

- **Burden of consequences:** Minority drug abusers are more likely than White abusers to go to prison for drug-related crimes. NIDA researchers design and test population-based and culturally tailored strategies and treatments to break the cycle of crime and drug abuse, with its disproportionate impact on minorities. Minority drug abusers also have higher rates of HIV infection and AIDS mortality; a discussion of NIDA's response to this critical health disparity appears elsewhere in this Special Report.
- **Responses to drugs:** Groups, as well as individuals, differ in their physiological responses to drugs. For example, African American smokers tend to metabolize nicotine more slowly than Caucasians, and so feel the urge to smoke less frequently--although they develop tobacco dependence equally quickly and severely. NIDA scientists are working to develop a range of medication and behavioral treatments to match the variety of physiological responses to drugs.
- **Stigma:** Scientific research has established unequivocally that drug addiction is a treatable medical disease, but many people continue to see it as a moral failure. Such attitudes adversely affect communities' willingness to offer appropriate treatment and patients' chances of recovery. Racial and ethnic minority populations suffer disproportionately, partly because many people believe incorrectly that they have higher rates of illicit drug abuse. NIDA sponsored health communication researchers are working to replace false views with correct ones, including messages shaped to fit the diverse cultural conceptions of racial and ethnic minorities.
- **Risk, resilience, and prevention:** The factors that raise or lower vulnerability to drug abuse vary between cultural groups. For example, while attentive parenting and participation in socially constructive activities lessen anyone's likelihood of abuse, identifying strongly with one's ethnic heritage reduces risk most among minority youths. Similarly, studies endorse an emphasis on family involvement in prevention programs for Hispanic youth. NIDA studies such differences and uses the information gained to fashion powerful community-tailored prevention programs.

NIDA's Special Populations Office

The NIDA Special Populations Office (SPO) coordinates the Institute's minority-directed research, concentrating especially on areas where there are significant gaps in knowledge and/or clear disparities in prevention and treatment. The SPO also promotes research on drug abuse in minority populations and minority participation in drug abuse research. To learn how you can get involved, see the Training Opportunities section at the end of this Special Report.

4 out of 10 U.S. AIDS deaths are related to drug abuse.

NIDA's Focus on HIV/AIDS

The National Institute on Drug Abuse has played a central role in the effort to control the spread of HIV since the beginning of the epidemic. Today, NIDA devotes one third of its budget to this objective.

NIDA's HIV/AIDS research portfolio has evolved along with the epidemic. In the 1980s, NIDA research showed that methadone treatment lowers opioid abusers' risk of HIV. NIDA-designed outreach and education projects proved that drug abusers could and would change their injection practices to reduce the risk of viral transmission. These demonstrations led directly to a dramatic reduction in the number of new HIV infections related to injection drug abuse--which dropped from 19,943 in 1995 to 6,938 in 2004.

In recent years, heterosexual activity, related to both injection and non-injection drug abuse, has increased in prominence among HIV transmission factors. Accordingly, NIDA scientists have turned their attention to searching for highly effective means to persuade people to avoid the risky sexual and other behaviors that can result when drug intoxication impairs judgment. Another primary line of research seeks to understand--in order to prevent and treat--the ways that drug effects combine with viral effects to accelerate HIV disease progression and aggravate HIV symptoms.

Minority communities, with their disproportionate burden of HIV/AIDS, may benefit particularly from these research efforts. In addition, much of NIDA's health disparities research examines the special issues of HIV/AIDS in minority populations.

African-Americans: Higher Prevalence, Worse Prognosis

Although African Americans make up only 12 percent of the U.S. population, they accounted for 50% of the new AIDS cases diagnosed in 2004. Of persons diagnosed with AIDS since 1995, a smaller percentage of African-Americans (60 percent) than Whites (70 percent) remained alive 9 years after diagnosis. Among factors underlying these statistics, NIDA scientists have identified:

- A higher likelihood that a particular episode of sexual activity or injection drug abuse will result in HIV transmission: The elevated prevalence of HIV in the African-American community raises the chances that a sexual or needle-sharing partner will have the virus.
- Lack of awareness of HIV status: Compared to other groups, African-Americans are infected with HIV for a longer time before being diagnosed. The implications of this are twofold. First, individuals who do not know they have HIV may be less likely to change their behaviors to avoid passing it to others. Second, their disease is more advanced at the time of diagnosis, and can present greater treatment challenges.

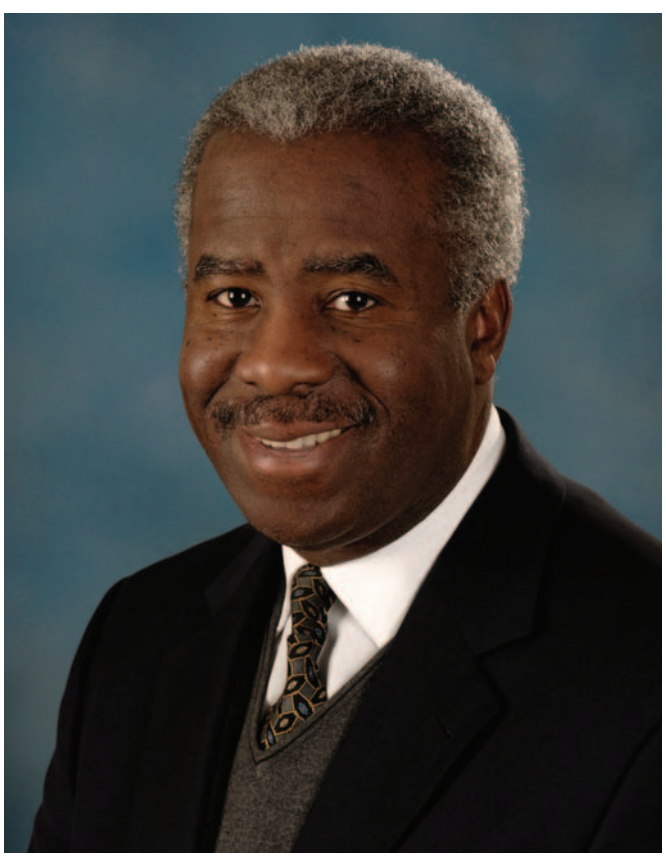
Greatly concerned about the disproportionate consequences of drug abuse on the African American population, NIDA initiated an African American Initiative in 2004. Its purpose is to identify ways for NIDA to become more strategic and supportive of efforts to ameliorate HIV/AIDS and criminal justice consequences of drug abuse in the African American population. Currently the initiative's specific HIV-related research foci include:

- Access to HIV treatment and services available to drug-abusing African-Americans;
- Connections between HIV/AIDS and criminal justice involvement;
- Mental health issues that influence HIV high-risk behaviors; and
- Sociocultural factors that enhance, sustain, or perpetuate health disparities.

Walter Royal, M.D.

Associate Professor of Neurology
University of Maryland School of Medicine

Dr. Royal is an associate professor of neurology at the University of Maryland School of Medicine and research associate director for the VA Multiple Sclerosis Center, East, and the Maryland Center for Multiple Sclerosis. Before joining the faculty at Maryland, Dr. Royal was an associate professor of medicine (neurology) and anatomy and neurobiology at Morehouse School of Medicine in Atlanta, Georgia. He directed the Johns Hopkins Multiple Sclerosis Center from 1998-2000.



Walter Royal, MD

Special Report: What got you interested in medicine in general and research in particular?

Dr. Royal: I didn't expect to pursue a career in medicine at all when I went to college. But as an undergraduate at Harvard, I began working in a retrovirus lab, initially as a part-time job and then for my senior honors thesis. Once I was exposed to research, I really got interested in going on to medical school. I attended Dartmouth, where I became fascinated with neurology, mainly due to the neurologists and neuroscience faculty there.

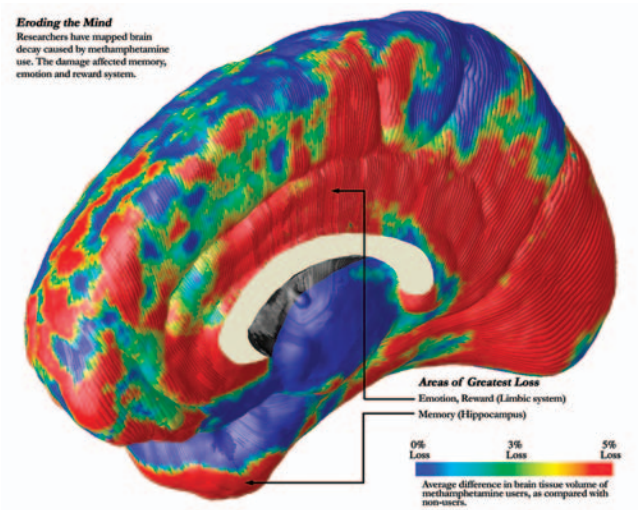
SR: What was it that interested you about medicine, versus going the strict research, PhD, route?

Dr. Royal: I was really interested in treating people. I didn't really know if I wanted to do research when I went to medical school. After I got there, I started looking for ways to build a research background so that I could enrich my knowledge of medicine and provide good quality clinical care.

The other issue is that my mother was diagnosed with multiple sclerosis when I was just about to enter high school. Because of that, even though I wasn't aware of it, my interest in research probably had been percolating for a long time. After Dartmouth, I went to Johns Hopkins on a fellowship and ended up working with researchers who were studying multiple sclerosis and looking at the retrovirus as a possible contributor.

SR: You continue to research multiple sclerosis, but your other major focus is HIV.

Dr. Royal: Just as I was finishing my two-year fellowship at Hopkins, another retrovirus was appearing on the scene—HIV. I was one of many virologists and neuroscientists who



suddenly became "experts" in HIV because of their prior experience and knowledge in studying these types of viruses. I began looking at HIV-infected drug users. At that time Baltimore had an estimated 30,000 injection drug users, which was just an enormous number. Our research was not only significant for learning about interactions between drug use and HIV infection in general, but also yielded information that was pertinent for addressing the epidemic right here in the city. As a native Baltimorean, I saw an opportunity to have some impact on my immediate surroundings and people I knew.

SR: It must have been an exciting time to become a researcher, but also kind of a terrifying time, too, to be on the front lines at the beginning of an epidemic.

Dr. Royal: It was. Back in those days, there were no treatments, so the effect of an HIV diagnosis on patients and their families was dramatic and horrendous. It was a very emotional time, a very panic-stricken time for a lot of patients, and even society at large. Of course, research provided some hope, and gave people a bit of a bright light to turn to.

SR: Can you talk a little about your current research with drug abuse and HIV?

Dr. Royal: The impact of drugs is multi-pronged in the context of HIV infections. People who use drugs exhibit behaviors that put them more at risk for becoming infected. For instance, active drug users are more likely to have unprotected sex, share contaminated needles, and so forth.

In addition, it appears that various drugs, such as cocaine, methamphetamines, and morphine enhance replication of the virus. These drugs cause cells to tend to express receptors that promote HIV infection, leading to more severe intracellular manifestations of the virus. Potentially, the damage that's done could be more dramatic and could lead to a more rapid progression of HIV.

Now that we have drugs and therapies on the scene for treating HIV infections and suppressing viral replication, we know that the metabolic effects of illicit drugs can increase the toxicity of certain anti-retroviral drugs or reduce their clinical effect by increasing their clearance.

SR: Have you seen a shift in drug use—or a shift in types of drugs used—have an effect on HIV infection?

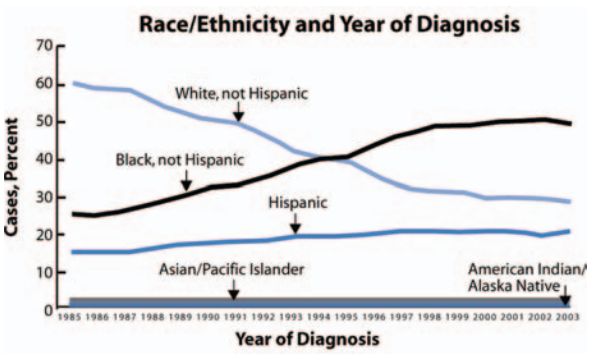
Dr. Royal: Yes. Methamphetamine has become more prevalent in many areas of the country. It's really become the drug of choice. Even apart from HIV infection, these drugs are associated with adverse effects on the nervous system. In particular, Linda Chang at the University of Hawaii has shown that methamphetamine use can cause long-term damage to brain cells similar to that caused by strokes or Alzheimer's disease; and those abnormalities can persist—or even progress—after methamphetamine use discontinues. If you couple the use of methamphetamine and the presence of HIV infection, the severity of the abnormalities seen on those studies is increased. It's clearly a large problem among the HIV-infected population.

SR: Has any of your research looked at minority populations?

Dr. Royal: Well, of course, African Americans are disproportionately affected by HIV infection, so in that sense our research is significantly targeted to that population.

Some of our recent research has looked at vitamin A and its effects in the context of HIV. This research, which is funded by NIDA, gives us a chance to look at an issue that's of global importance, in that the vitamin A deficiency is highly prevalent in a number of areas of the world, especially developing countries. For HIV-infected drug users with vitamin A deficiency, the overall risk of HIV-related morbidity and mortality may also be higher.

We have been honing in on vitamin A's interaction with drugs of abuse. We've been able to demonstrate that opiates may alter



the immunomodulatory effects of vitamin A. By doing so, they could potentially affect the clinical outcome of studies involving retinoid administration to HIV-infected drug users and increase the risk for the development of HIV-related complications, including neurological disease.

SR: What do you think minority medical students might bring to the table as medical doctors and researchers that is needed now and in the future?

Dr. Royal: Minority doctors bring to the table the diversity that's needed to be sure that questions that are important for minority patients are addressed. There's also the very important issue of representing a perspective that can only come from one's own experiences, from one's own community. There's the commitment to promote attention to medical issues and research questions that may not impact as much the wider population, but are very important for a specific minority population. Of course, we all benefit from everything we learn, but as we learn more, we're becoming more aware of the fact that there are specific treatment-related issues, and issues related to pathogenesis that tend to be different between groups. Understanding those differences not only helps us understand the disease within that specific population, but it also enhances our knowledge in ways that help everyone.

SR: If you had one piece of advice to give to students reading this, what would it be?

Dr. Royal: Be sure to use your present situation to prepare yourself as best you can, and seek out strong and committed mentors. It's not always easy, but you can reach your goals by taking advantage of opportunities that are presented and maintaining your commitment.

Other NIDA Focus Issues

Prescription Drug Abuse

The nonmedical use or abuse of prescription drugs is a serious and growing public health problem in this country. The elderly are among those most vulnerable to prescription drug abuse or misuse because they are prescribed more medications than their younger counterparts. Most people take prescription medications responsibly; however, an estimated 48 million people (ages 12 and older) have used prescription drugs for nonmedical reasons in their lifetimes. This represents approximately 20 percent of the U.S. population.

Also alarming is that fact that the 2006 Monitoring the Future survey of middle- and high-schoolers nationwide found that 9.7 percent of 12th-graders reported that 9.7 percent of 12th-graders reported using Vicodin without a prescription in the past year, and 4.3 percent reported using OxyContin—making narcotics among the most commonly abused prescription drugs by adolescents.

The abuse of certain prescription drugs—opioids, central nervous system (CNS) depressants, and stimulants—can alter the brain's activity and lead to addiction. While we do not yet understand all of the reasons for the increasing abuse of prescription drugs, we do know that accessibility is likely a contributing factor. In addition to the increasing number of medicines being prescribed for a variety of health problems, some medications can be obtained easily from online pharmacies. Most of these are legitimate businesses that provide an important service; however, some online pharmacies dispense medications without a prescription and without appropriate identity verification, allowing minors to order the medications easily over the Internet.

NIDA hopes to decrease the prevalence of this problem by increasing awareness and promoting additional research on prescription drug abuse. Prescription drug abuse is not a new problem, but one that deserves renewed attention. It is imperative that as a Nation we make ourselves aware of the consequences associated with the misuse and abuse of these medications.

NIDA Profile

Carmen Green, M.D.

Associate Professor, Department of Anesthesiology
University of Michigan School of Medicine

Dr. Carmen Green has conducted pioneering research on the roles of race, ethnicity, age, and gender in pain management, including differences among black and white Americans presenting for chronic pain management, and racial differences in physical and psychosocial health among black and white women with chronic pain. She is medical director of the acute pain service in the multidisciplinary pain clinic, principal investigator for the Michigan Pain Outcome Studies Team, and associate director for the investigator core for the Michigan Center for Urban African American Aging Research. In 2003, Dr. Green became the first African American to be awarded tenure in her department.

Carmen Green, M.D.

SR:Did you know when you went to medical school that you were interested in research?

Dr. Green: My earliest commitment was taking care of underserved populations. I got some exposure to research in my last year of medical school, but it didn't feel like I was doing anything that was going to change the world. When I got into residency, however, I realized I could use clinical research to figure out why there were such disparities in health. At the time, no one was doing any research on disparities in the occurrence of pain and its treatment.

I had always been curious why people got different qualities of care, and I had always been fascinated by patients' stories. I was able to bring those two things together in research. My patients' stories are now what drives our research questions and helps us interpret the answers.

SR: Did you ever consider getting a Ph.D.?

Dr. Green: With a medical degree, you get to touch patients and ask research questions. That was the right path for me, and it has made all the difference in the world. That said, I did consider going for a PhD, and in fact it still crosses my mind--along with getting a master's in public health or public policy. I'm a continuing learner. Right now I'm taking a year-long sabbatical to work in D.C. on Capitol Hill in health policy with a program sponsored by the Robert Wood Johnson Foundation.

SR: Can you talk about what you're most excited about in your research right now?

Dr. Green: Ours is a society where pain is increasing because people are surviving accidents or diseases that once would have been fatal, like cancer, and are often ending up with chronic pain problems. There's a lot of confusion around patients who use opioid or narcotic analgesics for legitimate pain complaints and people who are using them illicitly. It gets even more complicated in the minority communities. We've looked at the assessment of pain and access to pain care and overall, no matter how you look at it, the pain complaints of minorities often go unheard. What's worse, even when they are heard, they're

often receiving a lesser quality of care. And of course, their pain decreases their physical, social, and emotional health and quality of life.

So that's what we've been doing—looking at minority populations and their access to pain care. One paper that I think would be of particular interest to your readers compared supplies of pain medications in pharmacies located in predominantly minority and white communities throughout Michigan. We found only a 50% sufficient supply rate of pain medication in the former, versus 90% in the latter. We're just starting to scratch the surface of addressing these issues. [Ed. Note: the research study appeared in the October, 2005 issue of *The Journal of Pain*, Vol. 6, Issue 10, Pages 689-699.]

SR: Why do these disparities exist?

Dr. Green: Many reasons. One is the physician or healthcare provider variable—there just isn't enough access in minority communities. Another is the patient variable—there can be differences in the way that people communicate with regards to their pain, whether it is gender-related, race-related, or even age-related. Then there are some health systems barriers, particularly if you talk about racial minorities in relation to trust of the medical system, access to the medical system, things of that nature. These things have been shown over and over again, but yet you don't see many strategies that have been developed to address them. That's why I think ending disparities will require a large-scale paradigm shift.

SR: You mentioned you're doing a health policy fellowship with RWJF this year. Can you talk a little about it?

Dr. Green: I'd always been interested in health policy. Now that I've been a doctor for a while and have had the opportunity to watch my research take off in many good directions, I realize I want even more to find out how to take it to the next level. So I applied for a RWJF Health Policy Fellowship. The program is designed for mid-career professionals, to allow us to take what we have learned from our daily experiences in the medical center and apply it to the community.

We go out and learn how policy works from the top down. First we spent about three-and-a-half months learning about policy from a variety of organizations in D.C.—the White House, CDC, NIH, Heritage Foundation, Urban Institute. In January of this year, I went to the Senate and started working with Senator Christopher Dodd (D-CT), the second-ranking Democrat on the Health, Education, Labor and Pensions committee. I hope to learn how the legislative process works, help create new bills, and really become a working member of his staff. It's a unique position to be in.

For students who are really interested in health policy, I would highly recommend applying for one of these fellowship programs; there are others besides RWJF. You get a chance to take what you've learned with your patients and use it to shape policy that can affect millions.

SR: What one piece of advice would you give to a medical student who was possibly interested in a research career?

Dr. Green: If you're really interested in a research career, go for it. There are a lot new programs to help people with funding. The NIH, in particular, is doing a lot of great things to improve recruiting and training of young and emerging minority scholars.

And though I always say research is not a way to make a whole lot of money, you do feel good when you put your head to the pillow at night. My private practice is very important. But to be in academic medicine, to be able to ask important questions, to turn those questions into a study, to report that study in a journal—it's hard work, but it really does pay off. You see how you can make really a fundamental difference in the lives of the people.

I'll tell you what really keeps me going. We recently had an elderly African American patient, and as she rolled off in her wheelchair, she turned to me and said, "Somebody has to study our people." It's experiences like that.

NIDA's HIV/AIDS Public Awareness Campaign

Increasingly since the mid-1990s, heterosexual contact has grown in importance as a route of transmission of the HIV virus. This development has been especially pronounced among African-Americans and women. Often, drug abuse plays a role; either the transmitting partner has contracted the virus through injecting drugs, or the receiving partner is under the influence of a drug and fails to exercise caution.

NIDA recently launched a public awareness campaign to highlight this important issue. Its centerpiece is a televised public service announcement that shows young women text messaging on cell phones about a friend who became infected with HIV after using drugs and having sex at a party. The dialogue says, "She got high, got stupid, and now she has HIV." The announcement continues to air on television stations across the country.

The PSA was produced in collaboration with students from the Duke Ellington School of the Arts, a Washington, D.C., public high school. Students were involved in developing the concept for the PSA and also performed the lead roles. The intent is to dispel the myth that drug abuse can lead to HIV infection through injection and to promote awareness of the consequences of the risky sexual behavior that can follow any type of drug use.

NIDA Training Opportunities

Ready to get involved? Here's how.

Minority Supplements

This program provides funding to principal investigators on existing research projects to support minority or disabled students or investigators who want to pursue a career in biomedical or behavioral research. The program supports individuals at the high school, undergraduate, graduate predoctoral, postdoctoral, and investigator levels.

Special Populations Research Development Seminar Series

Established in 1986, the Special Populations Research Development Seminar Series provides technical assistance on proposal development skills in drug abuse research to scholars underrepresented in the field of drug abuse and addiction. Participants are exposed to critical information related to research design, methods, scientific writing, the peer review process and grant application preparation by experts in the field of drug abuse research and addiction. Seminar Series participants will attend two-day seminars in the Washington, DC metropolitan area.

For more information on the programs above, please contact Pamela Goodlow: pg46n@nih.gov

Minority Recruitment & Training Program (MRTP)

The MRTP program is sponsored by NIDA's Division of Intramural Research (DIR) in Baltimore, Maryland. It gives talented students—undergraduates, graduate students, medical students—and faculty an opportunity to work in a lab during the summer with leading intramural scientists.

The program, which was started in 1991, has engaged 136 undergraduate, graduate and medical students in research activities at the NIDA's Intramural Research Program. Students gain basic science and/or clinical laboratory experience, attend seminars, and participate in a summer poster presentation. Participants are competitively selected from across the country.

For more information on MRTP, please contact Dr. Jean Lud Cadet: JC271V@nih.gov

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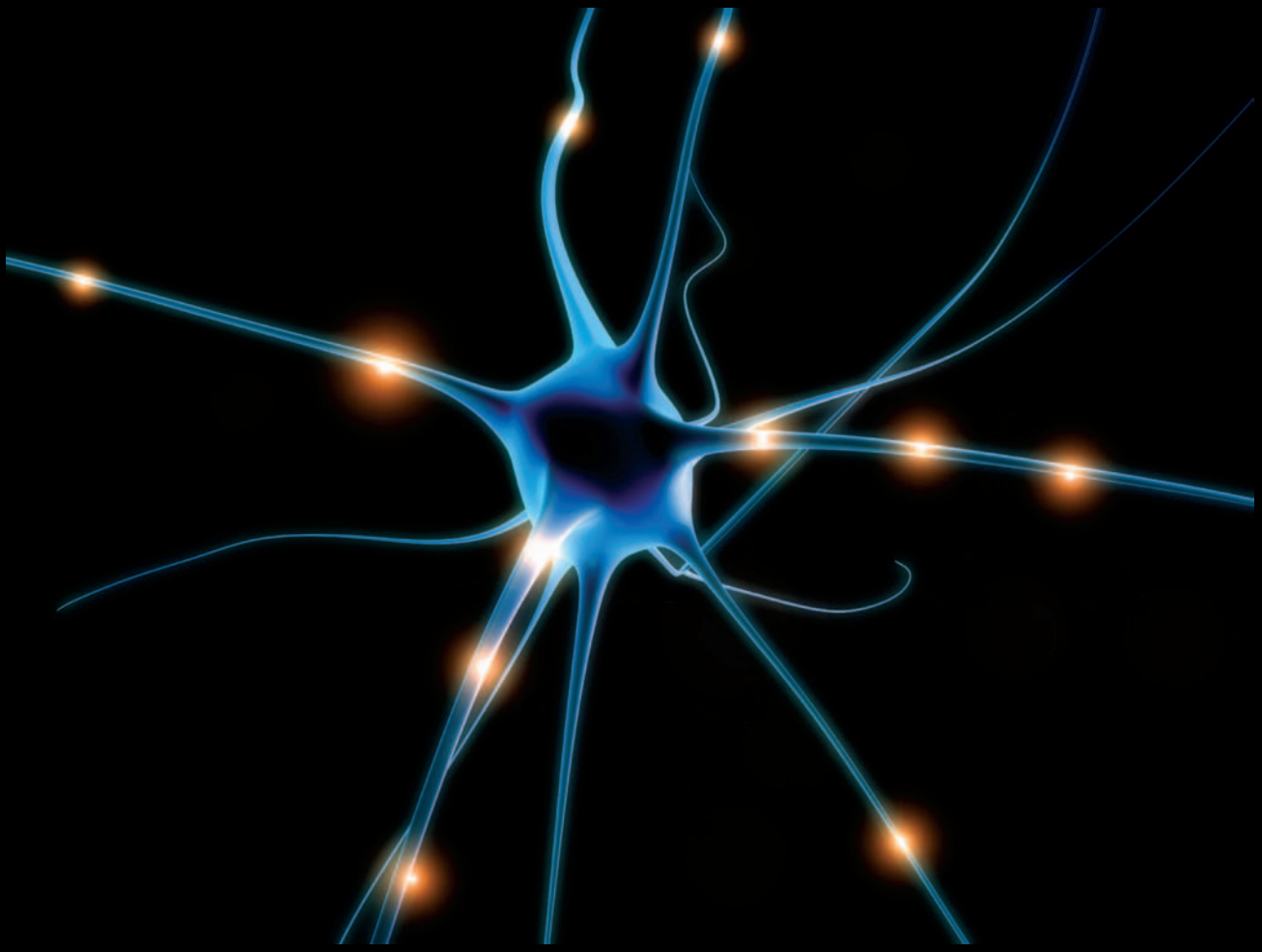

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National Institutes of Health
from the Journal for Minority Medical Students