

# Research Report

S E R I E S

from the director

*It is hard to believe that the human immunodeficiency virus (HIV)/acquired immune deficiency syndrome (AIDS) epidemic has been with us for a quarter of a century now. Today, an entire generation of young adults has never known a world without HIV/AIDS.*

*Early in the epidemic, drug abuse and HIV were typically connected in people's minds with injection drug use and needle sharing. However, this view greatly underestimates the impact that drug abuse can have on the spread of HIV and AIDS through the dangerous risk behaviors it engenders. Drug and alcohol intoxication affect judgment and can lead to risky sexual behaviors that put people in danger of contracting or transmitting HIV. In addition, substance abuse may facilitate the progression of HIV infections by further compromising the immune system.*

*Initially characterized by relatively localized outbreaks, HIV/AIDS has now become a pandemic that has literally put the world at risk, affecting diverse populations in different ways. And while all nations are affected by HIV/AIDS, each faces differing underlying causes requiring customized prevention and treatment strategies.*

*NIDA's response to the ongoing epidemic of HIV/AIDS is multifaceted. We support research to learn more about the pivotal role of drug abuse in the spread of HIV/AIDS and to develop effective strategies to prevent and treat this disease. **NIDA has established that drug abuse treatment is HIV prevention.** This Research Report is designed to highlight the state of the science and raise awareness of the linkages between drug abuse and HIV/AIDS.*

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## HIV/AIDS

### How Does Drug Abuse Impact the HIV/AIDS Epidemic?

**D**rug abuse and addiction have been inextricably linked with HIV/AIDS since the beginning of the epidemic. While intravenous drug use is well known in this regard, less recognized is the role that drug abuse plays more generally in the spread of HIV—the virus that causes AIDS—by increasing the likelihood of high-risk sex with infected partners.<sup>1</sup> This is because of the addictive and intoxicating effects of many drugs, which can alter judgment and inhibition and lead people to engage in impulsive and unsafe behaviors.

Drug abuse and addiction can also worsen the progression of HIV and its consequences, especially in the brain. In animal studies, methamphetamine increased HIV viral replication;<sup>2</sup> in human methamphetamine abusers, HIV caused greater neuronal injury and cognitive impairment compared with nondrug users.<sup>3,4</sup>

### Who Is At Risk for HIV Infection and How Does HIV Become AIDS?

**A**nyone is vulnerable to contracting HIV. And while injecting drug users (IDUs) are still at great risk of contracting HIV/AIDS, anyone



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

under the influence of drugs or alcohol is at heightened risk. This includes IDUs who share contaminated syringes or injection paraphernalia, as well as anyone who engages in unsafe sex (e.g., multiple partners, unprotected sex) or “transactional” sex (e.g., trading sex for drugs or money) that could expose them to infection.

A person infected with HIV has a virus that lives and multiplies primarily in white blood cells, which are part of the immune system. An infected person may look and feel fine for many years and may not even be aware of the infection. However, as the immune system weakens, the individual becomes more vulnerable to illnesses and common infections. Over time, the untreated HIV patient is likely to succumb to multiple, concurrent illnesses and develop

AIDS. Recent developments have led to better treatments for HIV infection, the most effective being a strategy known as highly active antiretroviral therapy (HAART).

## What Is the Scope of HIV/AIDS in the United States?

Currently, an estimated 1 million people in the United States are living with HIV/AIDS. In this country, annual reported AIDS cases peaked in 1993 at approximately 80,000. Between 1993 and 1998, the incidence of new cases declined steadily before leveling off between 1999 and 2001. However, since 2001, the number of new cases has increased slightly each year, with 43,171 new AIDS cases reported in 2003.

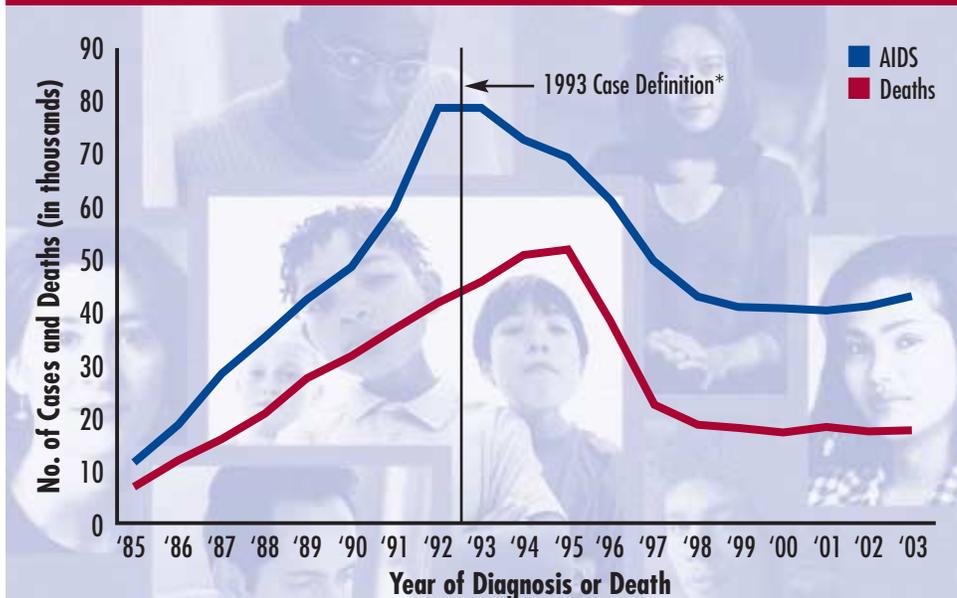
The number of HIV infections is harder to confirm given that, unlike AIDS reporting, HIV reporting is not mandatory. Currently, only about two-thirds of States report HIV infections; from these data, it is estimated that 40,000 new HIV infections have been occurring annually since the early 1990s, down from the peak of 160,000 new infections per year in the mid-1980s. Nonetheless, the persistence of this rate for more than a decade indicates that much remains to be done to improve the effectiveness of HIV prevention.

## What Is HAART?

The availability of HAART since 1996 has had a dramatic effect on the face of HIV/AIDS. HAART is a customized combination of different classes of medications that a physician prescribes based on such factors as the patient’s viral load, CD4<sup>+</sup> lymphocyte count, and clinical symptoms. CD4<sup>+</sup> lymphocytes are white blood cells that HIV infects and kills, leading to a weakened immune system and AIDS. Though not a cure, HAART controls viral load, helping to delay the onset of symptoms and achieve prolonged survival in people diagnosed with HIV/AIDS.<sup>5</sup>

With HAART, the medical consequences associated with HIV/AIDS have changed. New diagnoses of HIV-associated infections and some neurological complications, such as HIV dementia, have decreased since its introduction.<sup>5,6</sup> However, other neurological problems, such as peripheral nerve damage, have increased with the use of this

**Estimated Number of AIDS Cases and Deaths Among Adults and Adolescents with AIDS, 1985–2003—United States**



\*CDC expands AIDS case definition. Source: CDC, U.S. Department of Health and Human Services.

## Hepatitis C

**HCV** infection, the leading cause of liver disease, is highly prevalent among IDUs and often co-occurs with HIV. In fact, between 85 and 90 percent of HIV-infected IDUs may also be infected with HCV.<sup>7</sup> NIDA-funded studies have found that within 3 years of beginning injection drug use, a majority of IDUs contract HCV.

Approximately 4 million people in the United States are currently infected with HCV; of these, approximately 400,000 are co-infected with HIV, enhancing the risk of severe liver disease, especially among drug addicts.<sup>8</sup> Chronic HCV and HIV co-infection results in an accelerated progression to end-stage liver disease and death when compared with individuals infected with HCV alone.

While the treatment of co-occurring HIV and HCV presents certain challenges, treatment during the acute phase of HCV infection (i.e., within 6 to 12 months of detection) has shown promise. Treatment thereafter significantly improves infected patients' quality of life and should also be pursued.

therapy. HAART is also reported to be associated with increased lipid levels (including cholesterol) in the blood, abnormal glucose metabolism, and other clinical complications such as heart disease.

Potential interactions between HAART and medications used to treat drug addiction may decrease the effectiveness of either or both treatments. For instance, when methadone, a treatment for heroin and other opioid addictions, is administered with certain antiretroviral medications that are components of HAART therapy, the concentration of methadone in the blood is significantly decreased,<sup>9</sup> potentially compromising its effectiveness. Research is under way to determine if buprenorphine, a newer medication for the treatment of opioid addictions, has similar liabilities.

One of the challenges for patients treated with HAART is adhering to the medication routine needed for maximum benefit from this therapy. Adherence can be particularly problematic for drug abusers with chaotic lifestyles, which can interfere with their ability to follow prescribed regimens. In addition, because HAART reduces viral load, some patients mistakenly believe that they do not need to adhere to the treatment regimen or that reduced viral load means elimination of the risk of transmitting HIV.<sup>10,11,12</sup> This belief can, in turn, lead to complacency about risk behaviors and resumption of unsafe sex and injection practices.<sup>13</sup> NIDA-supported research has helped to improve HIV outcomes among injecting drug users (IDUs) and has advanced new discoveries and approaches for treating medical

consequences resulting from living longer with the disease.

## Which Populations Are Most Affected?

**W**hile all groups are affected by HIV/AIDS, not all are affected equally. The first populations to be affected by AIDS were primarily men who have sex with men (MSM) and IDUs. In fact, injection drug use has been associated directly or indirectly (e.g., through sex with IDUs, mother-child transmission) with more than one-third of AIDS cases in the United States. IDUs continue to be at increased risk of HIV and other infections associated with drug abuse, including the hepatitis C virus (HCV), hepatitis B virus (HBV), endocarditis, skin infections, and abscesses. Over the past several years, however, the proportion of AIDS cases attributable to injection drug use has declined significantly, while AIDS cases attributable to heterosexual transmission have increased. From 1999 through 2003, the annual number of AIDS diagnoses attributable to heterosexual contact increased 28 percent among women and 20 percent among men. In 2003, MSM and those exposed through heterosexual contact together accounted for 73 percent of cases, with MSM accounting for nearly 42 percent of the total cases.<sup>14</sup>

African-Americans experience striking disparities in HIV-infection rates compared with other populations, and they are at particularly high risk for developing AIDS. To illustrate, while

African-Americans make up just 12 percent of the U.S. population, they accounted for half of the total AIDS cases diagnosed in 2003. Moreover, African-American females accounted for 69 percent

of the female HIV/AIDS diagnoses from 2000 through 2003—19 times the rate for White females and 5 times the rate for Hispanic females.<sup>15</sup> And although African-Americans ages 13–19

represent only 15 percent of U.S. teenagers, they accounted for 66 percent of new AIDS cases reported among teens in 2003.<sup>16</sup>

Young people (ages 13 to 24) are also at risk for HIV/AIDS, with minority youth at particularly high risk. According to the Centers for Disease Control and Prevention (CDC), an estimated 38,490 young people in the United States had been diagnosed with AIDS, approximately 4 percent of the cumulative AIDS cases through 2003. Moreover, between 1999 and 2003, the proportion of young people diagnosed with AIDS increased from 3.9 percent to 4.7 percent. Particular HIV risk behaviors of this group, including sexual experimentation and drug abuse, are often influenced by strong peer group relationships and diminished parental involvement that can occur during adolescence.

Compounding this adolescent vulnerability today is the notion of “generational forgetting,” which is a diminished view of the dangers of HIV/AIDS among certain members of today’s generations. Studies show that today’s youth may be more likely to hold this view than older Americans who witnessed a higher AIDS mortality rate associated with the rapid progression from HIV to AIDS early in the epidemic. In addition, one study comparing youth living with HIV before and after the era of HAART found that post-HAART youth were more likely to engage in unprotected sex and substance abuse; however, whether this outcome is a direct result of the availability of HAART is not known.<sup>19</sup>

## HIV/AIDS: The Differential Experience of African-Americans

**D**isproportionate rates of HIV infection among African-Americans have increased steadily over time. By the end of 2003, an estimated 172,278 African-Americans were living with AIDS, the highest proportion of any racial/ethnic group. African-Americans also represent 42 percent of AIDS cases diagnosed since the start of the epidemic, which has disproportionately affected subgroups of African-Americans as well, including women, youth, and MSM.

HIV/AIDS is now the leading cause of death among all African-Americans ages 25–44, ahead of heart disease, accidents, cancer, and homicide.<sup>17</sup> The higher rate of HIV infection among African-Americans is not due to higher rates of injection drug use or addiction in this population. Recent research suggests, in fact, that African-Americans have lower rates of addiction than Whites (8.3 percent vs. 9.6 percent of drug or alcohol abuse or dependence),<sup>18</sup> but the two groups do not differ significantly in their rates of injection drug use. The noted disparities may in part reflect data showing that African-Americans are predominant among those who become aware of their infection at later stages in the disease process, and who therefore represent lost opportunities for treatment.

To address these disparities, NIDA is encouraging research that examines the relationship between drug abuse and prevalence of HIV- and AIDS-related morbidity and mortality among African-Americans, as well as studies that measure the effectiveness of HIV prevention and treatment programs within these populations. NIDA also is encouraging studies that focus on the nexus of drug abuse, HIV/AIDS, and criminal justice involvement among African-Americans to determine when the risk for contracting and transmitting HIV is greatest (e.g., during community-based supervision, in prison/jail, or during re-entry into society). Additional studies are needed that characterize risk and protective factors in order to develop culturally sensitive prevention interventions to reduce HIV infection and minimize associated health consequences and co-occurring conditions such as HCV.

## How Does Treating Drug Abuse Affect the HIV/AIDS Epidemic?

Since the late 1980s, research has shown that drug abuse treatment is effective HIV prevention. Drug abusers in treatment stop or reduce their drug use and related risk behaviors, including risky injection practices and unsafe sex.<sup>20</sup> Drug treatment programs also serve an important role in providing current information on HIV/AIDS and related diseases, counseling and testing services, and referrals for medical and social services.

Combined pharmacological and behavioral treatments for drug abuse have a demonstrated impact on HIV risk behaviors and incidence of HIV infection.<sup>20</sup> For example, recent research showed that when behavioral therapies were combined with methadone treatment, approximately half of study participants who reported injection drug use at intake reported no such use at study exit, and over 90 percent of all participants reported no needle sharing at study exit.<sup>21</sup> While these findings show great promise for achieving reductions in sexual and drug-related risk behaviors, studies are now needed to determine the long-term effectiveness of such interventions.

Moreover, drug treatment has also been shown to decrease cocaine use from an average of 10 days per month at baseline

to 1 day per month at 6-month followup among noninjection cocaine abusers. Reduction in cocaine use was associated with an average 40 percent decrease in HIV risk across gender and ethnic groups, mainly as a result of fewer sexual partners and less unprotected sex.<sup>5</sup> Among gay and bisexual men who abused methamphetamine, comprehensive behavioral treatment reduced sexual risk behaviors and sustained those reductions for at least 1 year following substance abuse treatment.<sup>22</sup>

Behavioral treatments have also shown promise for enhancing adherence to antiretroviral therapy. Interventions aimed at increasing HIV treatment adherence are crucial to treatment success, but usually require dramatic lifestyle changes. Effective treatment often includes providing a consistent medical regimen to counter the often irregular lifestyle created by drug abuse and addiction.

## Which HIV/AIDS Prevention Programs Work Best?

Cumulative research has shown that comprehensive HIV prevention—drug addiction treatment, community-based outreach, and testing and counseling for HIV and other infections—is the most effective way to reduce risk of blood-borne infections among drug-abusing individuals. NIDA's extensive prevention research portfolio, begun in the 1980s,



shows that comprehensive HIV prevention strategies can be cost-effective and reliable in preventing new HIV infections among diverse populations of drug abusers and their communities.<sup>23</sup> Recent research confirms these findings, demonstrating that school- and community-based prevention programs designed for inner-city African-American boys can be effective in reducing high-risk behaviors, including drug abuse and risky sexual practices that can lead to HIV infection.<sup>24</sup> This research also underscores the importance of ensuring cultural relevancy for specific populations.

Early detection of HIV is another approach for preventing HIV transmission. Research indicates that routine HIV screening in healthcare settings among populations with a prevalence rate as low as 1 percent is as cost effective as screening for other conditions such as breast cancer and high blood pressure. These findings suggest that HIV screening can lower healthcare costs by preventing high-risk practices and decreasing virus transmission.<sup>25,26</sup>

## How Has the HIV/AIDS Epidemic Changed Over the Past 25 Years?

DC surveillance data reveal a notable shift in the HIV/AIDS epidemic in the United States, with a higher proportion of new diagnoses today occurring among women, racial/ethnic minorities, low-income groups, and young MSM. Early in the HIV/AIDS epidemic, infections were mainly seen among White, urban, MSM or male IDUs. However, over the past 25 years, the boundaries between groups at greater and lesser risk for contracting the virus have been dissolving, with the diversity of those potentially at risk rapidly increasing.

Heterosexual sex has now become a major transmission route for HIV and is a leading cause of infection among women, especially within minority communities. In fact, the heterosexual transmission rate has increased sixfold since 1993, from 5 percent to 31 percent.

Emerging trends in HIV infection include an increase in new infections among MSM, after years of decline. This increase has been associated with a resurgence of risky sexual behavior linked to use of methamphetamine and other club drugs. While the link between HIV infection and methamphetamine abuse is not established for heterosexuals, data show an association between methamphetamine use and risky sexual behavior.

## How Can We Counter These Trends?

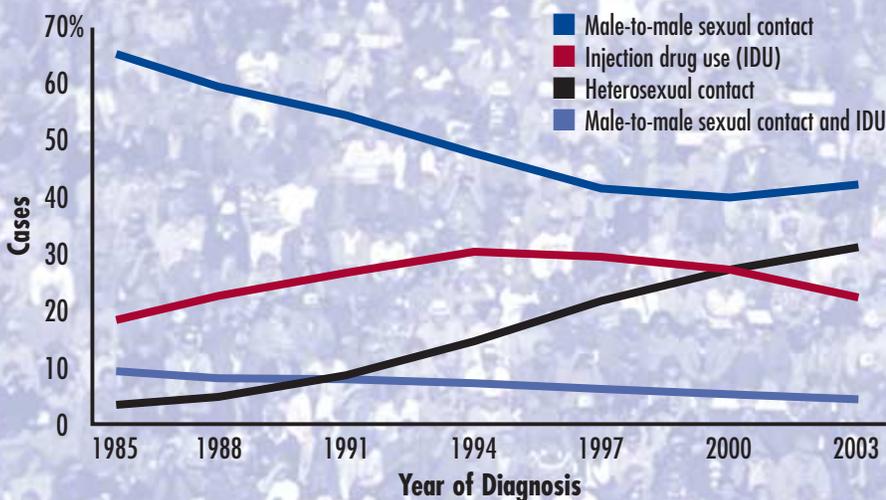
Scientific knowledge is the best tool we have to address the disease of addiction and its consequences, including HIV. Research has taught us that drug abuse is preventable and that addiction is treatable. Promising prevention and treatment strategies continue to emerge to address this devastating disease, yet much remains to be done.

The increase in HIV infections associated with heterosexual contact requires additional research to better unravel the dynamics behind how drug abuse may be contributing to these new infections. We know that substance abuse may affect judgment and decisionmaking and lead to high-risk sexual encounters and that sexually active drug abusers increase the likelihood of HIV transmission. However, we have not yet identified all of the behavioral, biological, and environmental processes involved in the sexual transmission of HIV among drug abusers. We now need to establish how an individual's peers, relationships, social networks, and environment influence both drug abuse and sexual risk taking. Linkages to drug diffusion, drug abuse practices, and HIV risk behaviors are of particular interest.

## Next Steps

Research is also needed to understand the factors leading to disparities in HIV infection and survival rates among racial and ethnic minorities, particularly among African-Americans. We can begin with

**Proportion of AIDS Cases Among Adults and Adolescents, by Transmission Category and Year of Diagnosis, 1985–2003—United States**



Note: Data adjusted for reporting delays and for estimated proportional redistribution of cases in persons initially reported without an identified risk factor.

Source: CDC, U.S. Department of Health and Human Services.

research that characterizes the extent and nature of disparities in the rates of HIV infection and the occurrence of co-infections and other conditions among drug-abusing minorities, taking into account age, gender, education, sexual identity, geographic region, and socioeconomic status. Studies are also needed to characterize risk and protective factors so as to develop culturally sensitive prevention interventions.

Research on HIV disease progression and its relationship to the use and availability of treatment services will help us develop better interventions. Finally, research is needed to investigate the transmission of treatment-resistant HIV strains among drug abusers and to explore the extent to which drug abuse may contribute to the development of resistant viral infections.

## Summary

While calls for more research continue, important discoveries made possible by NIDA and others have positioned the field to move forward in developing effective prevention and treatment approaches. Three key findings inform our approach, linking the interactions of drug abuse and HIV/AIDS in ways that extend far beyond injection drug use.

**First**, drug abuse impairs judgment and good decisionmaking, leaving people more prone to engage in HIV risk behaviors, including risky sexual behavior and nonadherence to HIV treatment. **Second**, drug abuse adversely affects health and may exacerbate disease progression. **Third, and most important, because of these linkages, we must recognize that drug abuse treatment is HIV prevention.**

## Glossary

**Acquired immune deficiency syndrome (AIDS):** The most severe manifestation of infection with HIV. An AIDS diagnosis is based on the presence of clinical symptoms, a patient's HIV viral load, and a CD4<sup>+</sup> lymphocyte count at or below 200 cells per microliter in the presence of HIV infection. Persons living with AIDS often have infections of the lungs, brain, eyes, and other organs, and frequently suffer debilitating weight loss, diarrhea, and a type of cancer called Kaposi's sarcoma.

**Addiction:** A chronic, relapsing disease characterized by compulsive drug seeking and abuse and by long-lasting changes in the brain.

**Antiretroviral drugs:** Medications used to kill or inhibit the multiplication of retroviruses such as HIV.

**Behavioral treatments:** A set of treatments that focus on modifying thinking, motivation, coping mechanisms, and choices made by individuals.

**CD4<sup>+</sup> lymphocyte:** A type of cell involved in protecting against viral, fungal, and protozoal infections. These cells normally stimulate the immune response, signaling other cells in the immune system to perform their special functions.

**Cultural relevancy:** The ability of an intended audience to view an intervention as applicable to their life circumstances.

**Generational forgetting:** Term to describe when knowledge of adverse consequences experienced by a particular generation or population is lost by a younger cohort. In this report, it refers to the diminished view of the dangers of HIV/AIDS among those 25 and younger.

**Highly active antiretroviral therapy (HAART):** A combination of three or more antiretroviral drugs used in the treatment of HIV infection and AIDS.

**Hepatitis C virus (HCV):** A virus that causes liver inflammation and disease. Hepatitis is a general term for liver damage and hepatitis C is the most common type of hepatitis found among those with HIV.

**Human immunodeficiency virus (HIV):** HIV is the virus that causes AIDS.

**Injection drug use:** Act of administering drugs using a hypodermic needle and syringe.

**Opioid:** A compound or drug that binds to receptors in the brain involved in the control of pain and other functions (e.g., morphine, heroin, oxycodone).

**Pharmacological treatment:** Treatment using medications.

**Viral load:** The quantity of HIV RNA (ribonucleic acid) in the blood. Research indicates that viral load is a better predictor of the risk of HIV disease progression than the CD4<sup>+</sup> lymphocyte count. The lower the viral load, the longer the time to AIDS diagnosis and the longer the survival time. Viral load testing for HIV infection is used to determine when to initiate or change therapy.

## Resources:

- a. Department of Health and Human Services *AIDSinfo* Web site ([www.aidsinfo.nih.gov](http://www.aidsinfo.nih.gov))
- b. Institute of Medicine Report "No Time to Lose" ([www.nap.edu](http://www.nap.edu))
- c. National Institute of Allergy and Infectious Diseases ([www.niaid.nih.gov](http://www.niaid.nih.gov))
- d. NIDA's HIV Prevention Principles ([www.drugabuse.gov/POHP/principles.html](http://www.drugabuse.gov/POHP/principles.html))
- e. The Centers for Disease Control and Prevention ([www.cdc.gov](http://www.cdc.gov))
- f. U.S. Preventive Services Task Force ([www.preventiveservices.ahrq.gov](http://www.preventiveservices.ahrq.gov))

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### Access information on the Internet

- What’s new on the NIDA Web site
- Information on drugs of abuse
- Publications and communications (including NIDA NOTES)
- Calendar of events
- Links to NIDA organizational units
- Funding information (including program announcements and deadlines)
- International activities
- Links to related Web sites (access to Web sites of many other organizations in the field)

#### NIDA Web Sites

[www.drugabuse.gov](http://www.drugabuse.gov)  
[www.marijuana-info.org](http://www.marijuana-info.org)  
[www.steroidabuse.gov](http://www.steroidabuse.gov)  
[www.clubdrugs.gov](http://www.clubdrugs.gov)  
[www.hiv.drugabuse.gov](http://www.hiv.drugabuse.gov)

#### NCADI

Web Site: [www.health.org](http://www.health.org)  
 Phone No.: 1-800-729-6686

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