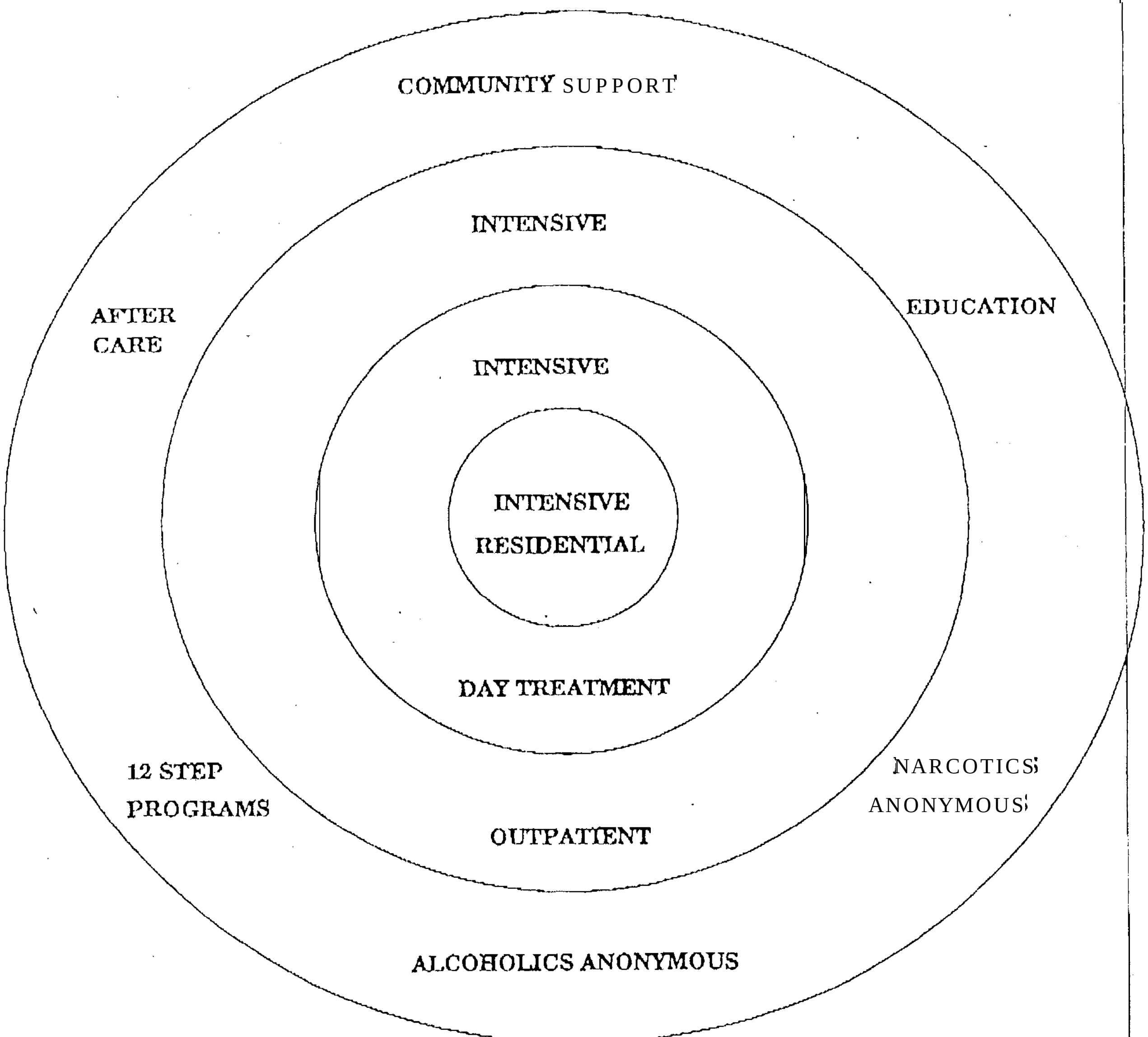
HEALTH SERVICES AGENCY
SYSTEM OF CARE CONCEPT



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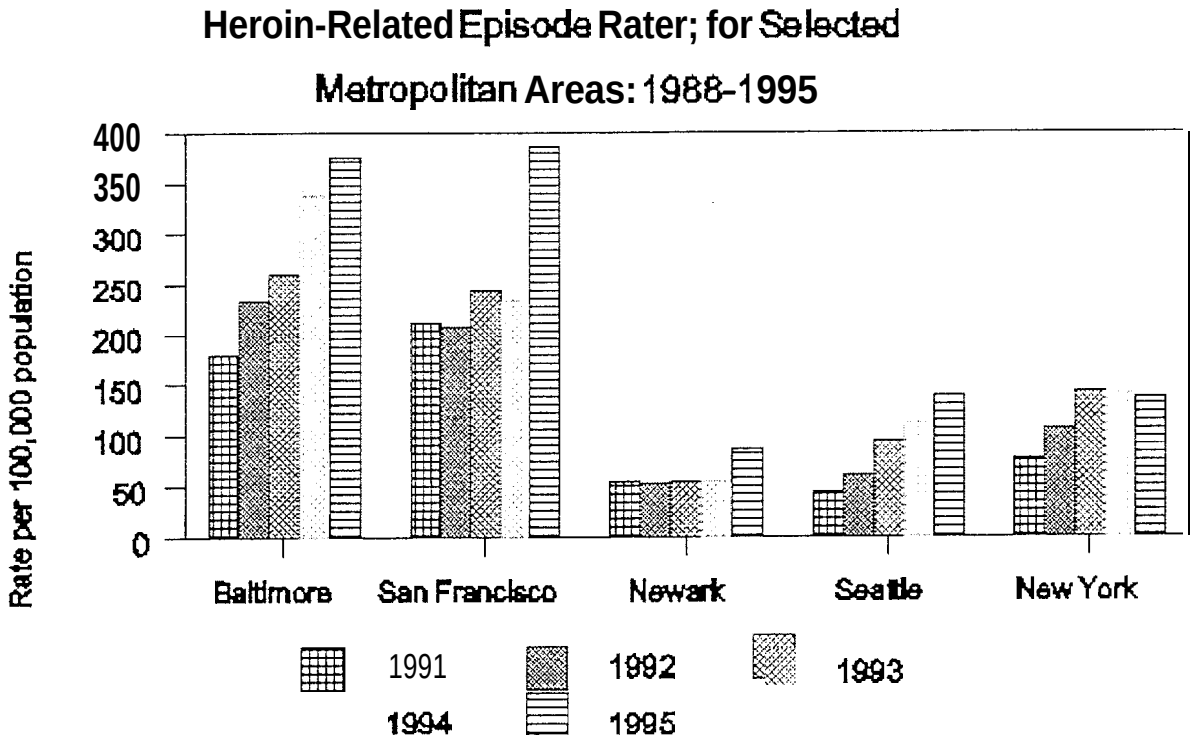
Heroin

0 Nine of the 21 metropolitan areas had statistically significant increases in the estimated number of heroin-related emergency department episodes between 1994 and 1995. The percent increases in these areas were: 67 percent San Francisco (from 3,600 to 6,000), 24 percent in Seattle (from 2,100 to 2,600). 12 percent in Baltimore (from 7,500 to 8,400), 21 percent in Boston (from 2,500 to 3,100), 21 percent in Newark (from 4,500 to 5,500), and 14 percent in Los Angeles (from 2,900 to 3,400). Statistically significant increases were also found in Dallas, Miami, and New Orleans; however, the number of episodes reported for each city was relatively small.



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o The chart presented above shows the trends in the rates of heroin-related episodes per 100,000 population for the five cities with the highest rates in 1995: San Francisco (386), Baltimore (375), Newark (315), Seattle (139), and New York (136). Between 1991 and 1995, the rates increased by 215 percent in Seattle, 126 percent in Newark, 108 percent in Baltimore, 83 percent in San Francisco, and 77 percent in New York.

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DISCUSSIONOF RESULTS

The results reported here show that the non-medical use of drugs continues to place an increasing burden on hospital emergency departments. These results provide an indication of the problem, but likely miss some of the impact because the focus of DAWN is on cases in which a person's own drug use contributes to the current reason for their visit to the emergency department. It is important to recognize that DAWN data do not measure the prevalence of drug use, but rather the health consequences of drug use expressed as emergency department visits. Many factors can influence the estimates of emergency department visits. Drug users may have visited emergency departments for a variety of reasons, some of which may have been life threatening. Others may have sought care at the emergency department for detoxification, because they were unable to gain admission to a drug treatment facility or because they needed medical certification before entering treatment. The DAWN data may reflect changes in hospital services or operations. For example, a hospital may open a new detoxification unit resulting in more drug-related emergency department visits or change to a new computer system resulting in underreporting.

The preliminary data from 1995 indicate some changes in the general trends from the 1994 DAWN data shown in Advance Report 11. That report clearly showed that since the late 1970's, there have been dramatic increases in the number of emergency department episodes which DAWN identified as drug related. During the same period, the proportion of drug-related episodes that involved cocaine and heroin increased.

Three key findings from the 1995 data deserve attention. First, cocaine-related episodes, after increasing 78 percent between 1990 and 1994, did not increase between 1994 and 1995. Second, heroin-related episodes, after showing no increase between 1993 and 1994, increased by 19 percent between 1994 and 1995. Third, methamphetamine(speed)-related episodes. after an increase of 26 1 percent between 1991 and 1994, did not increase between 1994 and 1995. As mentioned earlier, the number of episodes rose in the first 6 months of 1995 and decreased in the last 6 months of 1995. Reports from local area epidemiologists indicate that there was a shortage of methamphetamine in the last half of 1995 in some western cities such as San Diego, Los Angeles, Phoenix, and San Francisco. Other indicators have also shown a decline in the second half of 1995. For example, the percent of male arrestees in San Diego testing positive for methamphetamine dropped from 42 percent in the first half of 1995 to around 35 percent in the last half of 1995. Corresponding decreases were seen for females and for juveniles.

Since DAWN data represent visits, not individuals, the increase in drug-related episodes may reflect the same individuals making repeated emergency department visits. Demographic changes may also account for some of this increase. DAWN data have shown that the proportion of drug-related episodes among persons aged 35 years and older has been increasing. This may be the result of more older people seeking care at the emergency department for drug-related problems or of persons aged 35 years and older making more frequent visits. As drug users age, particularly injection drug users, they become more susceptible to a variety of health problems which are exacerbated by drug use, especially the cumulative effects of prolonged use. These individuals may be using emergency departments for treatment of nonurgent health problems.

The continued rise in drug-related emergencies may also be due to an increased use of drug combinations, particularly with alcohol; changes in patterns of drug use, such as route of administration; changes in the amount of drug used per administration; or changes in the drug purity or price. For example, an increase in the purity of heroin or cocaine could result in more users experiencing unexpected reactions and overdoses. The purity of an ounce of heroin purchased on the street rose from 53 percent in 1992 to 62 percent in 1995 and lower-end prices for gram, ounce, and kilogram quantities of heroin have declined between 1992 and 1995. Heroin of high purity can be snorted or smoked, and an increase in recent years has been seen in herom-related emergency department episodes where "sniffed, snorted" was recorded as the route of administration. There have also been anecdotal reports in the press regarding the association between the increasing purity of heroin and a rise in heroin addiction. The purity of an ounce of cocaine fell from 74 percent in 1992 to 65 percent in 1995. Between 1992 and 1995, the price of a kilogram of cocaine remained relatively low and stable. The tetrahydrocannibinols (THC) content of commercial grade marijuana has remained about the same (3.8 percent in 1992 and 3.3 percent in 1995 (Illegal Drug Price/Purity Report, Drug Enforcement Administration, January 1992-December 1995).

Estimates of drug-related emergency department episodes could increase or decrease over time for reasons unrelated to the size of the drug using population. It may also be due to factors that affect reporting patterns rather than actual changes in emergency department use. For example:

- o Greater awareness of these problems by hospital staff who therefore report drug use more carefully on the medical record,
- o Other data collection or sample composition changes (see Appendix 2),
- o Changing patterns of use of emergency departments by drug users, and
- o Different patterns of use of emergency departments by population subgroups.

However, our 'initial analysis of identified procedural factors which could have created spurious results suggests that they cannot account for the differences reported here (see Appendix 2 for a detailed account of known procedural anomalies). While our analysis continues, we do not expect to find circumstances that will rebut the main trends reported herein.

In the analysis reported here, we controlled for different patterns of use of the emergency department by particular population subgroups and found that differences in drug-related episodes among certain groups persisted.

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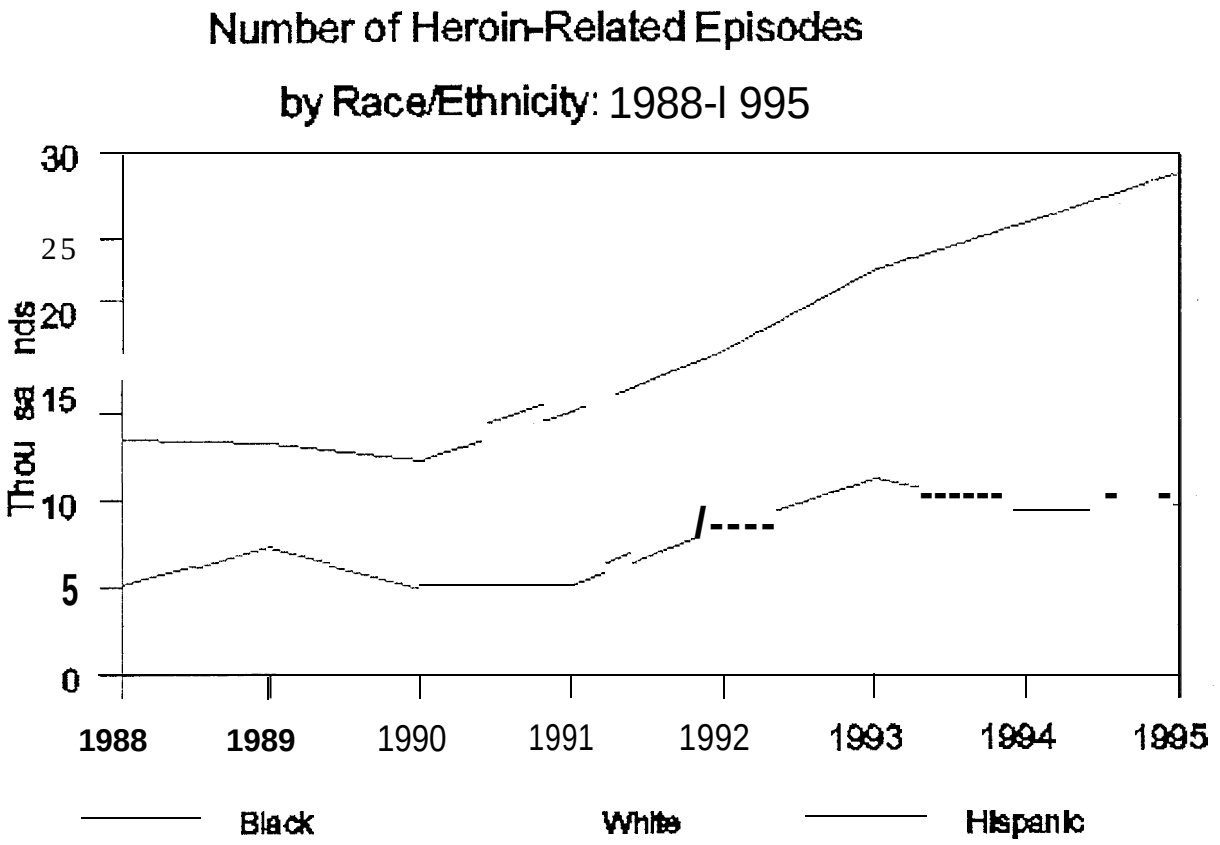

o In 1995, 39 percent of heroin-related episodes occurred among whites and 38 percent among blacks and 13 percent occurred among Hispanics. Between 1994 and 1995, the number of heroin-related episodes rose by 26 percent for whites (from 23,400 to 29,400) and 11 percent for blacks (from 26,000 to 28,800). There was no change among Hispanics between 1994 and 1995. Since 1990, heroin-related episodes have increased by 134 percent for blacks (from 12,300 to 28,800) and 115 percent for whites (from 13,700 to 29,400).

o In 1995, 70 percent of heroin-related episodes occurred among men. Between 1994 and 1995, heroin-related episodes increased by 20 percent for men (from 44,000 to 52,800) and 14 percent for women (from 19,500 to 22,300).

o The most frequently recorded reasons for an emergency department visit among heroin-related episodes in 1995, were "chronic effects" (19,900), "overdose" (17,100), and "seeking detoxification" (17,100).

o Among heroin-related episodes, "dependence" was the most commonly reported motive for drug use (59,400) in 1995.

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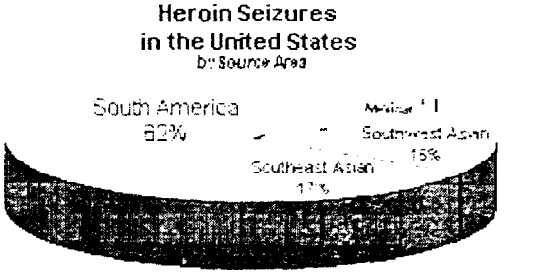
U.S. Department of Justice
Drug Enforcement Administration
Briefing Book

DEA

Heroin

Heroin reaches the United States from four major source areas: Southeast Asia (principally Burma); Southwest Asia/Middle East (Afghanistan, Turkey, Pakistan and Lebanon); Mexico; and South America. Heroin was readily available in the United States in 1995. Wholesale prices were stable, and purities were high, indicating that international supplies had increased.



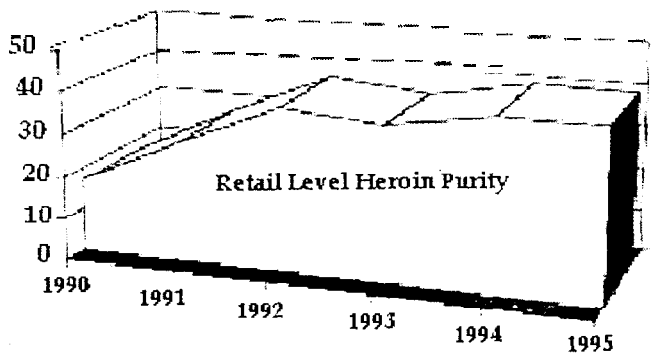
Source: Heroin Signature Program (1995)

Traditionally, ethnic Chinese and Nigerian traffickers have smuggled large amounts of high purity heroin from Southeast Asia for distribution in the northeastern United States and along the eastern coast. Mexican black tar heroin was prevalent in the West, Southwest and Midwest. Limited quantities of Southwest Asian heroin were available in the Northeast and Midwest, and to a lesser extent on the West Coast. South American heroin was principally smuggled into the U.S. East Coast. At the current time, heroin from South America (Colombia) acounts for 62% of the heroin seized in the United States. This is a major change from previous years, when Southeast Asian heroin was the predominant type of heroin found in the United States.

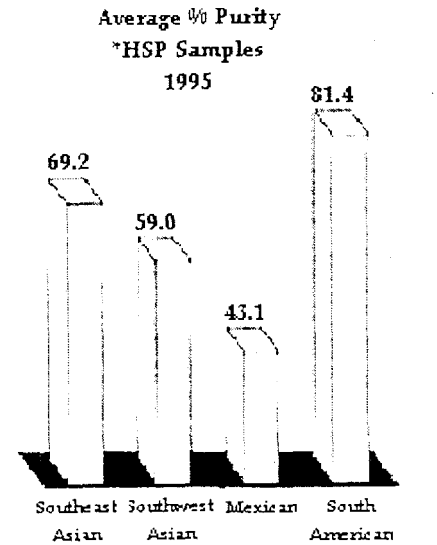
Nationally, in 1995, Southeast Asian heroin ranged in price from $70,000 to $260,000 per kilogram. Southwest Asian heroin ranged from $70,000 to $260,000 per kilogram. Wholesale-level prices for Mexican heroin at the bottom end of the range were the lowest of any type, selling for as low as $50,000. South American heroin sold for between $80,000 and $185,000. The wide range in kilogram prices reflected variables such as buyer-seller relationships, quantities purchased, purchase frequencies, and transportation costs.

On the street, heroin purity is directly related to availability. During 1995, the nationwide average purity for retail heroin from all sources was 39.7%, much higher than the average of 7% a decade ago, and considerably higher than the 26.6% recorded in 1991. The rise in average purity corresponded directly to the increase in availability of high-purity South American and Southeast Asian heroin.

Heroin Use: The 1995 National Household Survey on Drug Abuse estimated that 1.4 million people have used heroin in their lifetime. This estimate was about twice as large as the 1994 estimate. Although the change was statistically significant only for the 35 and older age group, estimates for other age groups were also higher in 1995 than in 1994, including youths age 12-17.



Source: Domestic Monitor Program



Source: Heroin Signature Program

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Heroin Abuse in the United States

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OAS Working Paper
August 1997

To view the statistical tables associated with this report click here

Numerous reports have suggested a rise in heroin use in recent years, which has been attributed to young people who are smoking or sniffing rather than injecting. The purity of heroin has increased to a level that makes smoking and sniffing feasible. The increased purity and the concern about AIDS may bc causing the shift From injecting to smoking and sniffing among heroin users. This paper examines these issues in addition to examining the prevalence of heroin use. It also describes the characteristics of heroin users and trends in heroin USC.

The data presented here come from a variety of sources. One source is the Community Epidemiology Work Group (CEWG), a network of researchers from major metropolitan areas of the United Slates and selected foreign countries who meet semiannually to discuss the current epidemiology of drug abusc.1 It provides ongoing community level surveillance of drug abuse though the collection and analysis of epidemiologic and ethnographic research data. Another source is "Pulse Check", a series of qualitative interviews with ethnographers, trcatmcnt professionals and law enforcement agencies which provide a quick and subjective picture of what is happening in drug abuse across the country.2 The heroin retail price/purity system is a statistical system using information gathered by the Drug Enforcement Administration. Purchases and seizures meeting certain retail level criteria ranges are avcragccl each quarter to produce a national retail purity figure and a retail price figurc.3 A computerized data base program is used to record, collate, and display the results of qualitative and quantitative chemical analysis of all drug evidence submitted to the Drug Enforcement Administration Lab. Purity data arc based on printouts of average purities for the l-to-10 gram, 1 -to- 10 ounce, and 1 -to- 10 kilogram ranges.[5]

The Drug Abuse Warning Network (DAWN) consists of two data collection efforts: data on drug abuse deaths reported by medical examiners in participating metropolitan areas and data collected on drug-related visits to a national probability sample of hospital emergency departments.[5,6] Data on client admissions to specialty substance abuse treatment arc obtained from the Treatment Episode Data Set (TEDS).[7] TEDS, which is compiled by SAMHSA from reports from states covers primarily publicly-funded treatment facilities and accounts for about half of all public and private admissions to treatment in the U.S. All states do not participate. The National Household Survey on Drug Abusc (NHSDA) is an ongoing national probability survey that provides information on the use of illicit drugs, alcohol, and tobacco in the civilian noninstitutionalized population of the U.S., 12 years old and oldcr.8 Monitoring the Future (MTF) is an annual survey by the University of Michigan's Institute for Social Research under a grant from the National Institute on Drug Abuse (NIDA).[9] Since 1975, it has surveyed a representative sample of all seniors in public and private schools in the coterminous 7Jnitcd States. In 1931 MTF was expanded to include annual surveys of eighth and tenth graders.

Description of Heroin and Effects of Use

A narcotic derived from the opium poppy, heroin was originally developed as a substitute for

morphine in an effort to deal with the addiction problem. However, it was quickly recognized that heroin is even more addictive than morphine. As a result the drug was made illegal. Produced in Mexico and Asia, heroin is reported to be widely available throughout the U.S. At the street level, heroin is "cut" with a variety of substances, leading to variation in purity over time and in different areas. Estimates of the purity of heroin have shown substantial increases between 1984 and 1995.[3, 4]

When injected, sniffed or smoked, heroin binds with opiate receptors found in many regions of the brain. The result is intense euphoria, often referred to as a rush. The rush lasts only briefly and is followed by a couple of hours of a relaxed, contented state. In large doses, heroin can reduce or eliminate respiration. Withdrawal symptoms include: nausea, dysphoria, tnuscle aches, lacrimation or rhinorrhea, pupillaty dilation, piloerection or sweating, diarrhea, yawning, fever, and insomnia.

Prevalence of Heroin Use

Efforts to estimate the prevalence of heroin use have a long history with precise estimates remaining difficult to determine. Standard methods of measuring prevalence such as household surveys are not adequate. Since heroin use is rare in the general population, only a stnall number of users would be included in a household survey. Survey based estimates substantially underestimate prevalence because of difficulties in locating heroin abusers (e.g. many of them are not living in stable households). In addition, because heroin use is an illegal activity, heroin users may not accurately report their use.

Various studies using different methods for estimating heroin have produced a range of estimates. Some of these studies combined data from more than one source. During the 1970s several studies combined data on heroin from admissions to federally funded drug treatment programs, hospital emergency room visits, heroin related deaths, retail price of heroin, and retail purity of heroin. These studies provided a range of estimates of the number of heroin addicts. The estimates range from 400,000 to 600,000 each year during the 1970s.[10, 11] A recent study combining household survey and arrestee data estimated that there were 229,000 "casual" users and 500,000 "heavy" users in 1993.[12]

Data from the 1996 National Household Survey on Drug Abuse (NHSDA) conservatively show that there were approximately 2.4 million persons who used heroin at least once in their lifetitne and approximately 455 thousand people who used heroin at least once in the past year.8 To partially account for underestimation by the NHSDA due to underreporting and undercoverage, an adjustment based on counts of arrests and treatment data resulted in estimates of 2.9 million lifetirme users and 663 thousand past year users. [12]

Characteristics of Heroin Users

Data from the NHSDA for the combined years of 1995 and 1996 indicated that 67% of past year heroin users were male; 22% were 12-17 years old, and 21% were 35 years and older; 69% were white, 21% were black, and 9% were Hispanic; 39% lived in a large metropolitan area; 15% were college students in the past year who were 17-22 years of age. Among adult heroin users, 41% had less than a high school education, and 33% worked full time.[13] (Table 1)

Rat-es of past year heroin use were 0.4 % for persons 12-17 years of age, 0.6 % for persons 18-25 years of age, 0.2 % for persons 26-34 years of age, and 0.1 % for persons 35 years and older. Data show heroin USC was 0.4% for blacks, 0.2% for whites, and 0.2% for Hispanics. Male use was 0.3%: three times that of female use. Use was reasonablely constant by region: 0.2% for persons living in the Northeast, 0.2 % for persons living in the North Central, 0.3% for persons living in the South, and 0.1 % for persons living in the West. USC was also similar by population density: 0.2 % for persons living in a large metropolitan area, 0.2 % for persons living in a small tmctropolitan area and 0.2 % for persons living outside a metropolitan area.

Use did vary by education: 0.4% for adults with less than a high school education, 0.1% for adult high school graduates, 0.2% for adults with some college, and 0.1 % for adult college graduates. Among persons 17-22 years of age, the rate of for college students was larger than the rate for persons who were not collcgc students: 1 .O% for persons who were college students and 0.7% for persons who were not collcgc students. USC also varied with employment: 0.1% for adults employed full time, 0.3 % for adults employed part time, 0.6 % for the unemployed .03% for homemakers, 0.8% percent for students only, 0.2% for the retired, and 0.1% for disabled adults.13 (Table 2)

Next to cocaine, heroin was the most frequently reported drug among deaths reported by medical examiners participating in DAWN. In 1995, heroin was mentioned in 4,178 deaths (45.3% of all deaths reported to DAWN in 1995).[5] Among these heroin related deaths, 84% were males, 8% were persons less than 25 years of age, and 67% were persons 3.5 years and older.[14] (Table 4)

In 1995 heroin was mcntioncd in 72,217 emergency department visits (13.9% of all drug related visits to EDs in 1995).[6] Of these heroin-related ED visits, 70% were male; 1.0% were less than 18 years of age, and 55% were 35 years of age or older; 38% were white, 39% were black and 14% were Hispanic.6 (Table 6) The most frequently reported reasons for visit were "chronic effects" (25%) seeking detoxification (23%) and overdose (23%).[6]

Among persons admitted to publicly funded treatment programs for heroin abuse in 1995, 66% were male; 9% were less than 25 years of age and 55% were 35 years of age or older; 43% were white, 26% were black, and 28% were Hispanic.7 (Table 8)

Mcthadonc programs designed to treat heroin addicts rcportcd 112,000 clients in treatment in 1993 (on a single day). About 23 percent were in New York and another 17 percent were in California.[15]

Patterns of USC

There arc some indications that a large proportion of heroin USC involves heroin in combination with other drugs, especially cocaine and alcohol. Ethnographers have reported that "criss-crossing" (lines of cocaine and heroin arc alternately inhaled) is becoming more common and is gaining in popularity among cocaine users in New York.[1] They have also reported that some users are snorting heroin and smoking crack in combination. In this combination, it is beleived that the primary drug is crack and heroin is used to ease agitation associated with crack.[2] Among heroin-related drug abuse deaths rcportcd to DAWN in 1995, most (90%) involved heroin in combination with other drugs, most often cocaine. Cocaine was reported in combination with heroin in 1,933 deaths (46% of all heroin-related deaths). Alcohol was the next most frequently reported drug in combination with heroin among drug abuse deaths reported to DAWN. In 1995, 1,854 deaths (44% of all heroin-related deaths) involved heroin in combination with alcohol.5

Among persons admitted to ED's for heroin abuse in 1995, most (54%)were admitted for heroin in combination with other drugs. Cocaine was the most frequently reported drug in combination with heroin. Cocaine was mcntioncd in combination with heroin in 28% of all heroin-related ED visits. Alcohol was the next most frequently mentioned drug in combination with heroin. Alcohol was mentioned in combination with heroin in 27% of all heroin-related ED visits.6

Among the 19 1,000 persons admitted to publicly funded treatment programs for heroin in 1995, 6 1% reported using a secondary substance. The most frequently reported secondary substance was cocaine and the next most frequently reported secondary substance was alcohol. Cocaine was reported as a secondary substance in 40% of all heroin-related admissions and alcohol was reported as a secondary substance in 24% of all heroin-related admissions.7 (Table 8)

Estimates from some data sources suggest that persons who smoke or sniff heroin are younger than persons who inject heroin. Among persons admitted to publicly-funded treatment programs and

hospital emergency departments (ED's), those admitted for injecting heroin tend to be older than those persons admitted for inhaling or smoking heroin. In 1995, 64% of treatment admissions for injecting heroin were persons age 35 or older, while only 41% of admissions for smoking or inhaling heroin were persons age 35 or older.[7] (Table 9) Tn 1995, 61% of ED visits for injecting heroin were persons age 35 or older and 33% of ED visits for sniffing or smoking heroin were persons age 35 or older.[6] (Table 10)

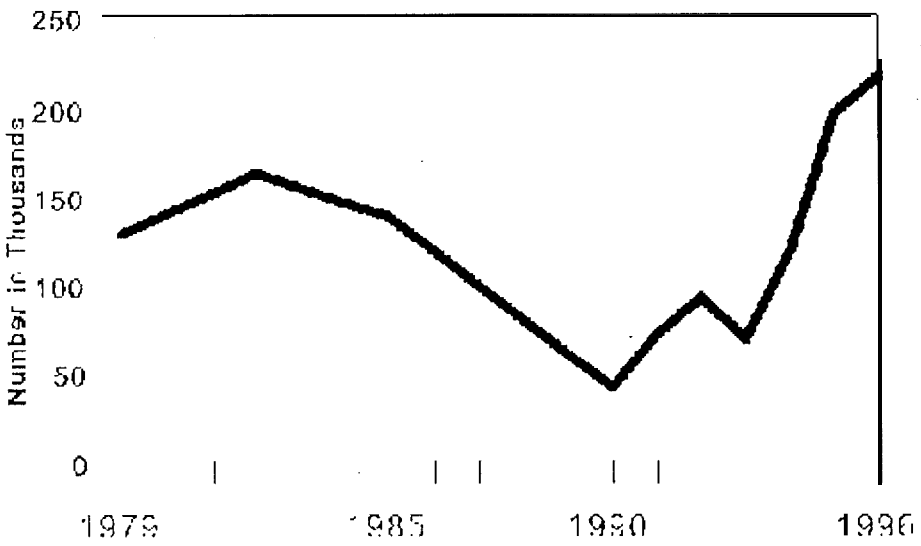
Trends in Heroin Use

Increases in use **and consequences**. Data also suggest that there has been a rise in heroin use in recent years and that this rise has occurred among younger persons who are smoking or sniffing heroin rather than injecting. Some indicators exhibit an overall rise in heroin use, some display a rise in heroin use among youth, college students, and adolescents in small metropolitan areas and others suggest that new users tend to smoke or sniff rather than inject. In addition, there is some evidence that the time between first use of marijuana and first use of heroin is decreasing.

Data from the Monitoring the Future survey show a rise in heroin use among 8th, 10th and 12th graders. According to this survey, from 199 1 to 1996 lifetime, annual and 30 day use of heroin increased among 8th, 10th and 12th graders. In 1991 annual prevalence of heroin use was 0.7% among 8th graders, 0.5% among 10th graders and 0.4% among 12th graders. Annual prevalence were 1.6%, 1.2% and 1.0%, respectively in 1996.9 The unusual pattern of younger students having a higher prevalence level may bc due to the fact that heroin users are considerably more likely to have left school by senior year. It also could be due to the fact that "noise" level is higher in the earlier grades, with slightly more false reporting either intentionally or unintentionally .[9] (Table 11)

Data from the NHSDA have not shown any statistically significant long-term trends in the rate of past year and lifetime heroin USC for persons 12 years of age and older. The lifetime rate of heroin use was 1.3% in 1979, 1.2% in 1995 and 1.2% in 1996. The annual rate of heroin use was 0.1% in 1994, 0.2% in 1995, and 0.2% in 1996. However, between 1993 and 1996 there was a significant increase in the estimated number of current (past month) heroin users. The estimated number of current heroin users was 68,000 in 1993, 117,000 in 1994, 196,000 in 1995 and 216,000 in 1996 (Figure 1). Using the ratio adjustment to partially account for underreporting

Figure 1. **Number** of **Persons Using** Heroin in the Past Month; 1979-96



and undcrcovcragc results in estimates of 144,000 in 1993 and 342,000 in 1996. From 1995 and 1996 thcrc wcrc also significant increases in both the rates and number of past year and past month heroin users, among males 15-44 years of age. From 1995 to 1996 the number of males 15-44 using heroin in the past year incrcascd from 146,000 lo 302,000 and the number of males using heroin in the past month increased from 43,000 lo 125,000.[8]

Bclwccn the 1991-92 and 1995-96 thcrc has been a significant decrease in lhc rate of past ycnr heroin use among persons in MSAs with a population grcatcr than one million and a significant increase in the rate of past year heroin usc among persons in MSAs with a population less than onc million. In 1991-92 the rate of past year heroin use among persons in MSAs with a population grcatcr than onc million was 0.3%, while the corresponding rate was 0.2% for persons in 1995-96. The rate of past year heroin usc among persons in MSAs with a population less than a million was 0.1% in 1991-92, while the corresponding rate was 0.2% for persons in 1995-96. For the same time periods, data from the NHSDA also indicate a significant increase in the rate of heroin use among collcgc students 17-22 years of age. In 1991-92 0.2% of collcgc students 17-22 years of age reported using heroin in the past year, while in 1995-96 1 .0% reported using heroin in the past year. (Table 2) Bctwecn 1991-92 and 1995-96, among past year heroin users there has been a significant increase in' the percent of heroin users with an education greater than high school. This increase was from 22.1% in 1991-92 to 33.3% in the 1995-96.[13] (Table 1) These findings described above are quite consistent with reports indicating a growing number of new young heroin users who are fairly affluent, non urban dwellers who come to the city to buy their heroin.[2]

Bclween 1991 and 1995 the annual number of heroin-related ED visits increased from 36,000 to 72,217. (Table 6) Between the first half of 1995 and the first half of 1996, there was no significant change in the number of heroin related ED visits (36,000 and 32,700, respectively).[6] Data reported by a consistent panel ofmcdical examiners participating in the DAWN show that between 1992 and 1995 heroin-rclatcd deaths increased from 2,782 to 3,809.[14] (Table 4)

Trends in heroin-related deaths and ED visits reported by DAWN don't necessarily reflect trends in the number of users. Heroin-related deaths or ED visits may increase of decrease for many reasons other than changes in the number of users. These reasons include shifts in the purity and availability of drugs, patterns of use (e.g. drug combinations or route of administration), availability of treatment programs, and patient management practices.

Increase in snorting, sniffing, and smoking. Ethnographers for "Pulse Check" continue to report that the majority of new users arc inhaling heroin rather than injecting heroin.[2] Data from other sources support their conclusion. The 1995 and 1996 NHSDA estimated that among persons who have smoked or sniffed heroin in the past three years, 57.3% had never injected heroin and 18.6% had injected heroin, but not within the past three years. Twenty-three percent had injected heroin within the past three years.[13] The NHSDA estimated that among lifetime heroin users, the proportion who had ever smoked, sniffed, or snorted heroin increased from 55 percent in 1994 to 63 percent in 1995, and 82 percent in 1996, while the proportion who ever used heroin with a needle remained unchanged (49 percent in 1994, 47 percent in 1995 and 52 percent in 1996).[9] (Figure 2) Among past year heroin users in the the 1991 and 1992 NHSDAs, 38% had injected heroin in the past year while among past year heroin users in the 1995 and 1996 NHSDAs only 25% injected heroin in the past year. (Table 1) Data from the NHSDA also indicated that among new users between 1989 and 1991, 56% had injected heroin, while among new users between 1993 and 1995 only 43% had injected heroin.[14] (Table 12)

Among persons admitted to publicly-funded treatment programs and ED's, the proportion associated with injection of heroin has dccreascd. In 1981, nearly all heroin clients (95%) admitted to publicly funded treatment programs reported "intravenous" as their route of administration.16 In 1995, 69% of heroin clients admitted to publicly funded treatment programs reported "intravenous" as their route

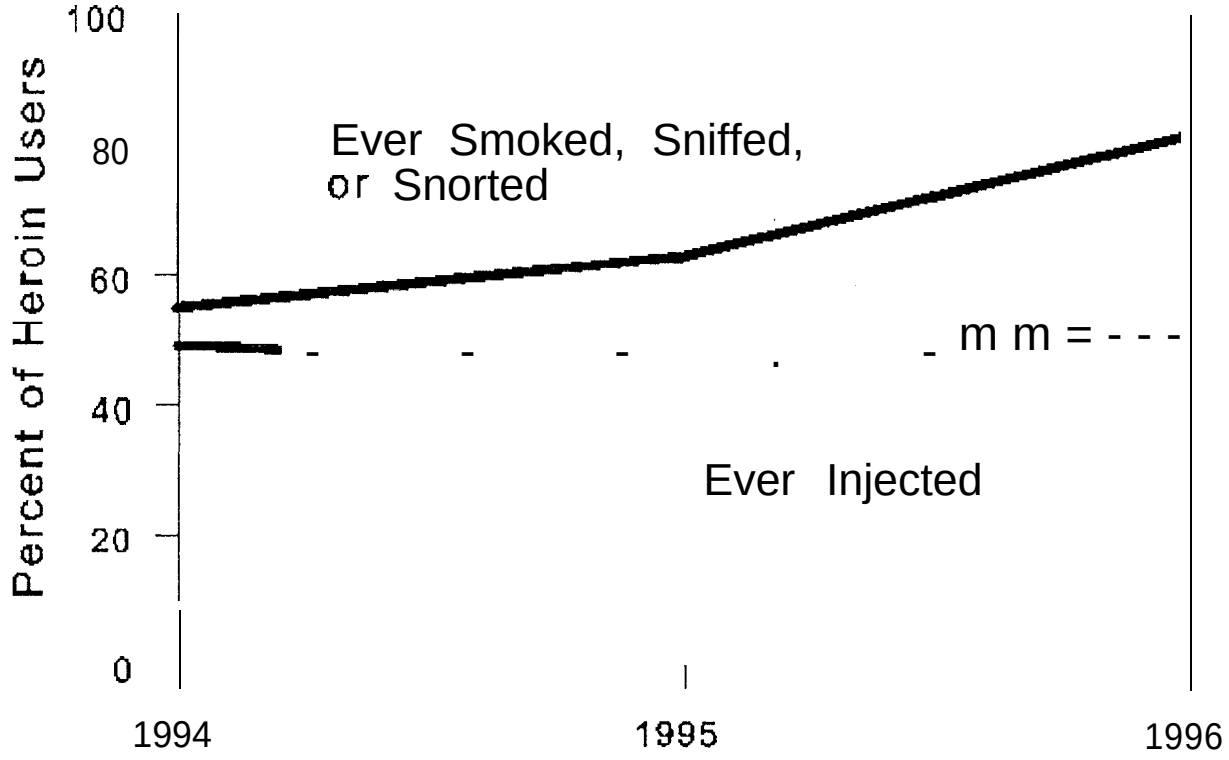
of administration.[7] In 198 l, 9 l % of persons admitted lo ED's reported "intravenous" as their route of heroin administration, while in 1995 only 53% of persons admitted lo ED's reported "intravenous" as their route of heroin administration.[15, 6] (Table 10).

The purity of heroin and the fear of AIDS may be responsible For lhc shift from injecting lo smoking or sniffing heroin. The purity of heroin is much higher than i t was 10 years ago. The National Narcotics Inlclligcnce Consumers Committee reported that the purity of heroin at the retail level was less than 5% in 1984.4 The Drug Enforcement Administration reported the average purity of small (1- 10 grams) heroin purchases was 37% in 1992 and 59% in 1995.3 This increase in the purity of heroin makes it possible to smoke or sniff heroin rather than inject it.

Since smoking or sniffing is less invasive than injecting heroin, it may be percievcd as less risky. This may bc a reason for lhc increasc in new users of heroin, especially among the young, and the dccrease in the time bclwcen first use of maruijuana and first use of heroin.

Increasing use among young people.The CEWG reported that a major trend in drug use is heroin's growing popularity among a younger cohort of users, including teenagers, who snort rather than inject the drug.[1] Among persons admitted to ED's who are 12-17 years of age, the percent associated with sniffing/inhaling or smoking was 15 in 199 1 and 41 in 1995, while the

Figure 2. Route of Administration Among Lifetime Heroin Users: 1994-96

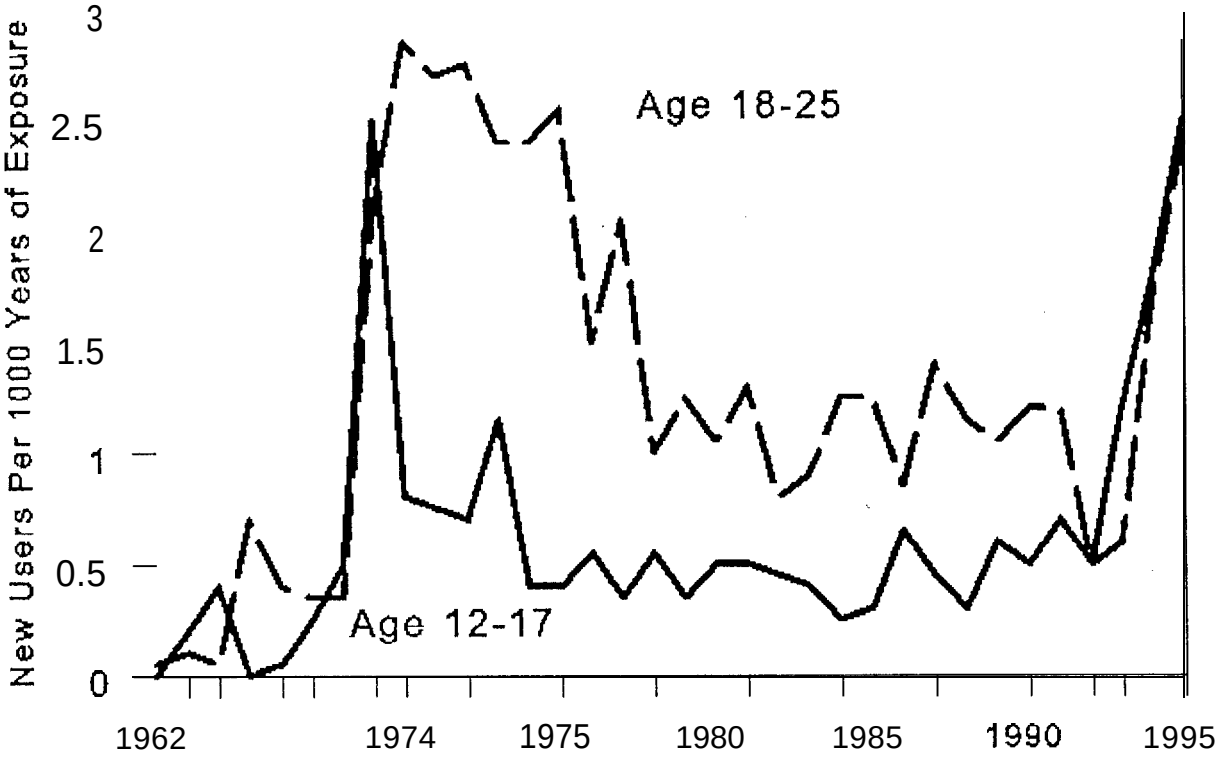


percent associated with injecting was 30 in 1991 and 22 in 1995. (Table 10). Data from the NHSDA estimated that the percent of persons 12-l 7 years of age smoking heroin in their lifetime was 0.2 in 1994, 0.5 in 1995 and .4 in 1996. The percent sniffing or snorting heroin in their lifetime was 0.1 in 1994, 0.3 in 1995 and 0.2 in 1996[8](Figure 2). Among new initiates of heroin there was a significant increase in the percent of persons 12-25 years of age between 1989 and 1995. Among new users between 1989 and 1991, 61% were 12-25 years of age while among new users between 1993 and

1995, 88% were 12-25 years of age. During 199 l-92, 9 percent of past year heroin users were 12-17, while during 1995-96, 22 percent of past year heroin users were 12-I 7.[13]

Trends in new use (incidence). Estimates of incidence or initiation of heroin use provide another measure of the Nation's drug problem. These estimates of the number of persons who first used heroin in each year can suggest emerging patterns of drug USC among the young. Some of these estimates, particularly among persons 12-l 7 years of age and 18-25 years of age suggest that recent increases in new heroin use are comparable to the increases seen in the epidemic of the late 1960s. Although estimates of heroin incidence are subject to wide variability, there has been a statistically significant increasing trend in new heroin use since 1992. There were an estimated 141,000 new heroin users in 1995, which was more than estimates for prior years, since 1969. Except for 1994, when there was a slight increase, there has been a decreasing trend in the mean age of first use since 1988. In 1988 the mean age of first USC was 27.3, while in 1995 the mean age of first use was only 19.3. The age specific rate of first use al 12-17 from the NHSDA increased from around .5 during the 1980s to 2.5 in 1995. Since 1990 there has been an increasing trend in the age specific rate of first use at 1 2-17. The age specific rate at 12-l 7 in 1990 was 0.2.

Figure 3, Age-specific Rates of First Heroin Use: 1962-I 995

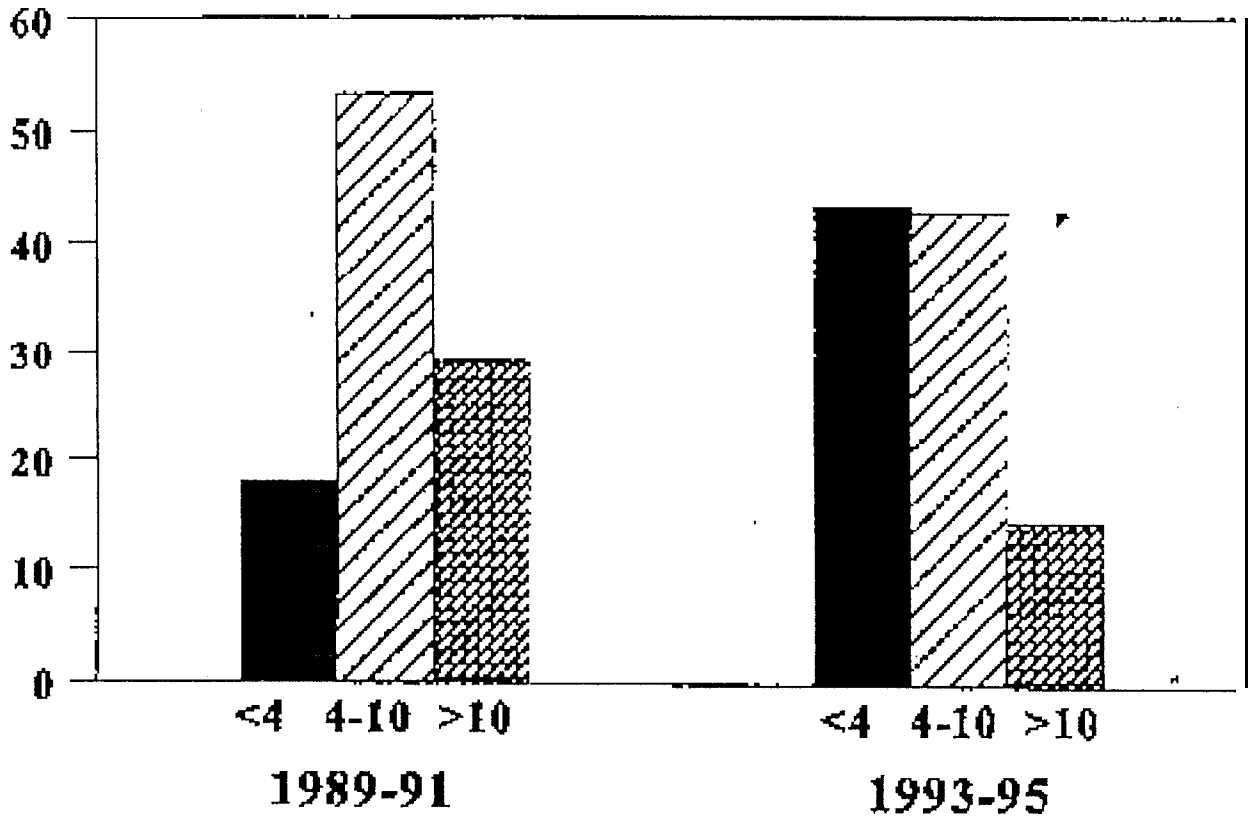


The age-specific rate of first use at 18-25 was 0.6 in 1993, 1.7 in 1994 and 2.5 in 1995. Age specific rates at 26-34 did not display any clear long or short term trends. These age-specific rates of first use were based on combining 1994-l 996 data.8 (Table 13) When the 199 l-l 996 NHSDA data were combined to provide more stable estimates for assessing long term trends, the trend in age-specific rates showed that the recent increases in new heroin use are comparable to increases seen in the epidemic of the late 1960s (Figure 3).

Data from the NHSDA suggest that the time between first USC of marijuana and first use of heroin may be decreasing. Among new users of heroin, there was a significant decrease in the mean time between first use of marijuana and first use of heroin between 1989 and 1995. This mean lag

between first USC of marijuana and first use of heroin was 8.7 among persons using heroin for the first time between 1989 and 199 1 and only 5.6 among persons using heroin for the first time between 1993 and 1995. Among persons using heroin for the first lime between 1989 and 1991, 28.9% had a lag grcatcr than 10 years, while among persons using heroin for the first time between 1993 and 1995 only 14.4% had a lag grcatcr than 10 years.[13] (Figure 4) (Table 12)

Figure 4. Years Between First Use of Marijuana and Heroin Among New Users: 1989-1995



Despite the apparent increases among the younger persons, there still is an aging cohort of heroin users that is having an impact on emergency departments and treatment facilities. The percentage of heroin-related ED visits that were for persons 35 years of age and older has increased from 19% in 1980 to 48% in 199 1 and 55% in 1995.[6,15] In 1995, 55% of admissions to publicly funded specialty substance abuse facilities were 35 years of age and older.7

To view the statistical tables associated with this report click here

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Homepage

The NCADI Reporter

Research and Science Take Center Stage at Heroin Addiction Conference

By Sharon Samber
September 29, 1997

Prevention and treatment practitioners were told today that the best way to fight the rise of heroin use and addiction is to look at the available research and scientific knowledge and apply it.

"Go back to science, not ideology," said Barry McCaffrey, director of the Office of National Drug Control Policy (ONDCP), addressing attendees at the first national research-based conference on heroin held in Washington, DC.

McCaffrey said efforts to stop heroin, the "Cadillac of drugs," must get more serious. Calling the current treatment efforts to stop heroin abuse a "failed social policy," he urged lawmakers and communities to accept both methadone and the treatment medication LAMM as part of a treatment system that should be decentralized and monitored by doctors and different government departments.

Dr. Rumi Kato Price, a professor at Washington University School of Medicine, echoed McCaffrey's sentiments. "The existent systems of care are deficient," she said. Using figures from the National Household Survey on Drug Abuse, Price says if the number of heroin users increases at the current rate, there could be an epidemic as bad as that of the late 1960's.

Heroin use has been on the rise for the past several years, with first time heroin use by teenagers increasing fourfold from the 1980's to 1995. According to Pulse Check, an ONDCP report of national trends in illicit drug use, the market for heroin is stable or growing. The most recent statistics, from the spring and fall of 1996, show the high purity and low price of heroin has tempted back old users as well as enticed new, young users, mostly inner city youth. Heroin also is being sold along with cocaine, termed "double breasted dealing," in new drug distribution networks. Street purchases are generally in 1/8th to l/lOth gram units that cost between $10 and $25.

Basic information about heroin seems to be distorted in the general public. Some people start using heroin because they think it can be used recreationally. "Many people believe snorting or smoking heroin is non-addictive," Dr.. Alan Leshner, director of the National Institute on Drug Abuse (NIDA), said. "Well, heroin is heroin. There is no safe route of administration."

Secretary of Health and Human Services Donna Shalala called for early intervention and educational programs to stop children from trying heroin or

thinking of heroin as something glamorous.

"If we want to immunize our children against the threat of heroin, we must find anti-drug messages that work, and we must send them early and often," she said. Mentioning programs like Girl Power!, Shalala said a targeted, sophisticated strategy is needed. The Substance Abuse and Mental Health Services Administration will listen to results of the conference and plans to study and implement some of the most promising new treatment approaches as part of its youth heroin initiative.

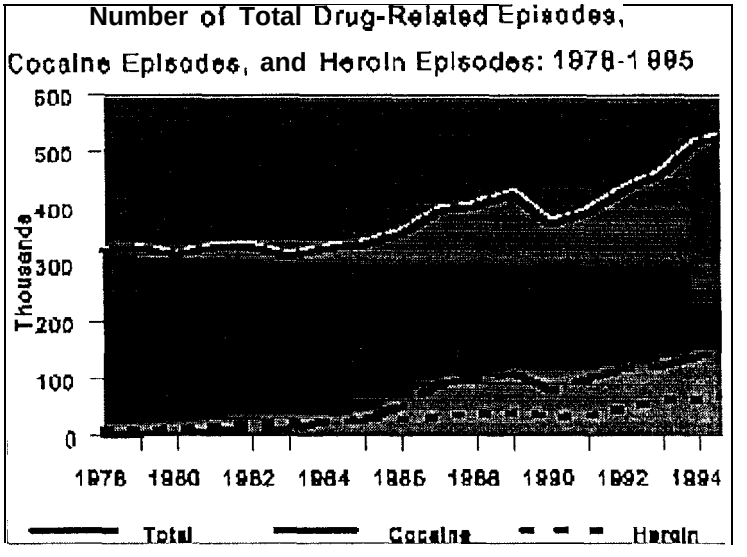
Dr. Denise Kandel of Columbia University and the New York State Psychiatric Institute, emphasized the importance of early intervention, citing early onset of drug abuse as an important risk factor. She also called attention to the issue of multiple drug users and developmental stages of drug involvement. While the use of alcohol, cigarettes, or marijuana does not invariably lead to harder drug use and so is not in itself a sufficient condition for progression, Kandel nevertheless says the link between marijuana and later heroin use is "especially strong."

Some conference participants appeared frustrated as to how to apply the scientific information being presented. But Charles Murphy, a counselor at the Maryland Rehabilitation Center, understands NIDA's focus on science. "Any treatment approach has to be research-driven," he says. "Then we ask how can we improve behaviors and get to people's attitudes."

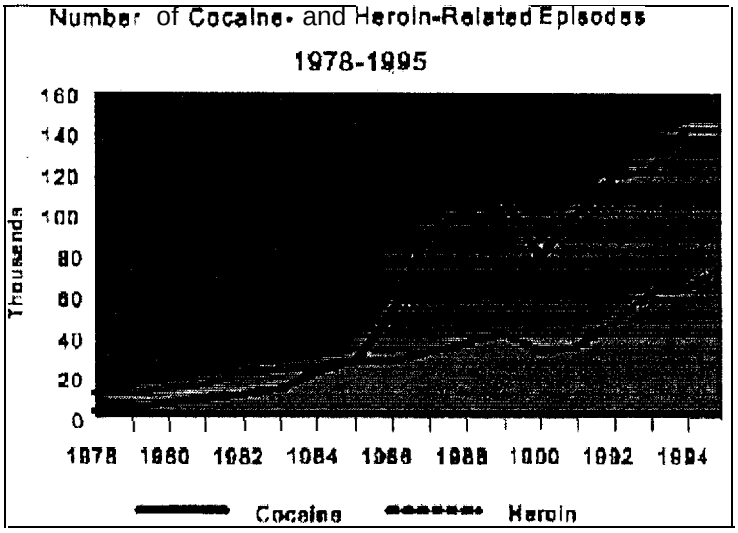
News Room Homepage

Annual Trends in Total Drug-Related Episodes

This section presents data from the DAWN survey on the estimated number of total drug-related emergency department episodes.



- Drug-related episodes rose by 65 percent (from 323,100 to 53 1,800) from 1978 to 1995, while overall emergency department visits increased by 24 percent (from 71.3 million to 88.1 million). The proportion of drug-related emergency department visits was between 0.5 and 0.6 percent during that period. The number of drug-related episodes remained stable between 1994 (5 18,500) and 1995 (53 1,800).
- The rate of drug-related episodes per 100,000 population increased 37 percent from 167 in 1990 to 229 in 1995.
- In 1995, 28 percent of total drug-related episodes occurred among persons aged 26-34 years, while 40 percent occurred among persons aged 35 years and over. Between 1994 and 1995, the number of total drug-related episodes rose by 12 percent for persons aged 35 years and over (from 190,100 to 213,000).
- In 1995, 54 percent of total drug-related episodes occurred among whites, 27 percent among blacks, and 9 percent among Hispanics; for 10 percent race was "other" or unknown. Between 1994 and 1995, total drug-related episodes decreased by 10 percent for HIspanics (from 50,400 to 45,500). There was no change among whites or blacks.
- The proportion of total drug-related episodes **among men** and women has been approximately equal since 1988. There was no change in drug-related episodes for women or men, between 1994 and 1995.
- The most commonly reported motive for taking a substance was "suicide attempt or gesture" (203,600) which comprised 38 percent of all episodes in 1995. "Dependence" (174,600) and "recreational use" (46,900) were reported as motives in 33 percent and 9 percent, respectively, of all drug-related episodes in 1995.
- The most frequently recorded reason for a drug-related emergency department visit was "overdose" (275,700) which comprised 52 percent of all episodes and increased by 23 percent since 199 1 (224,200). "Chronic effects" (66,800), "unexpected reaction" (59,000), and "seeking detoxification" (53,500) were reported as reasons for the visit in 13 percent, 11 percent, and 10 percent, respectively, of all drug-related episodes in 1995.



- Increases in cocaine-related episodes appear to have been the primary cause for the increase in total drug-rclatcd emergency department cpisodcs from 1985 through 1995. The percent of reported drug-rclatcd cpisodcs that arc cocaine-related has increased dramatically from 1 percent in 1978 (3,400 out of 323,100) to 27 percent in 1995 (142,500 out of 53 1,800). In contrast, the percent of drug-related episodes that were diazepam-related decreased from 19 pcrccnt in 1978 (60,400 out of 323,100) to 3 percent in 1995 (14,700 out of 53 1,800). During this same period, heroin-related episodes incrcascd from 4 percent of total drug-related episodes in 1978 (11,700 out of 323,100) to 14 percent in 1995 (76,000 out of 531,800). Heroin and cocaine are sometimes used in combination. Therefore one person could have a cocaine mention and a heroin mention during the same cpisodc.

- Cocaine-related episodes increased dramatically from 198.5 through 1989 (from 28,800 to 110,000). After a drop in 1990 (80,400), increases continued in 199 1 and 1992 (101,200 and 119,800, respectively), but appeared to level off in 1993 (123,400). There was no change in cocaine-related episodes between 1994 (142,900) and 1995 (142,500). Cocaine-related episodes in 1994 and 1995 were at their highest level since the DAWN survey began.

- As mentioned above, the proportion of drug-related episodes that are heroin-related has incrcascd steadily from 4 percent in 1978 to 14 percent in 1995. After a drop in 1990 (33,900), increases continued in 1991, 1992, and 1993 (35,900, 48,000, and 63,200, respectively); however, there was no change between 1993 and 1994. Between 1994 and 1995, heroin-related episodes rose by 19 pcrccnt (from 64,000 to 76,000). Heroin-related episodes were at their highest level in 1995, since the DAWN survey began.

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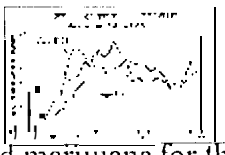
8. TRENDS IN INITIATION OF DRUG USE

Estimates of drug use incidence, or initiation, provide another measure of the Nation's drug problem. They can suggest emerging patterns of USC among young pcoplc. In the past, increases and decreases in incidcncc have usually been followed by corresponding changes in the prevalence of use. SAMHSA recently released a detailed report on incidcncc trends based on 199 1-93 data, covering the period 1919 through 1992. Updated cstimatcs and new estimates for 1993 and 1994 were included in Advance Report 18, which summarized the results of the 1995 NHSDA. Using the 1994, 1995, and 1996 NHSDA data, it is now possible to update those earlier estimates and develop estimates for 1995.

Details of the methodology are available in Trends in the Incidence of Drug Use in the United States, 19 19-l 992, released in 1996. Briefly, the estimates arc based on the NHSDA questions on age at first use. Using each rcspondcnt's rcportcd age at first USC in conjunction with his/her age and interview date, the rcspondcnt's year of first USC of each drug was dctcrmincd by subtracting their age from the interview year and then adding the age at first USC. By combining all respondents and applying sample weights, estimates of the number of new users of each drug for each year were made. These estimates include new users at any age, including under age 12. In addition, the average age of new users in each year and age-specific rates of first use were estimated. These rates arc prcscntcd in this rcport as the number of new users per 1,000 person-years of cxposurc. The numerator of each rate is the number of persons in the age group who first used the drug in the year (times 1 ,000), while the denominator is the number of persons who were exposed to the risk of first use during the year, adjusted for their estimated exposure time in years. Persons who first used the drug in a prior year have zero risk of first use in the current year, and persons who still have never used the drug by the end of the current year had 1 year of exposure to risk. Persons who first used during the year arc assumed to have a half year of cxposurc to risk.

The incidence estimates arc based on retrospective reports of age at first drug use by survey respondents interviewed during 1994-96, and may therefore be subject to several biases, including bias due to differential mortality of users and nonusers of each drug, bias due to memory errors (recall decay and tclescoping), and underreporting bias due to social acceptability and fear of disclosure. See Appendix 2, Section III for a discussion of these biases. As is explained in Appendix 2, it is possible that some of these biases, particularly telescoping and underreporting because of fear of disclosure, may be affecting estimates for the most recent years more significantly. However, analyses have not clearly shown the magnitude of these biases.

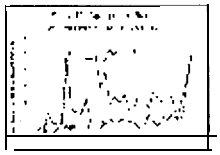
Marijuana



oAn estimated 2.4 million Atncricans used marijuana for the first time in 1995, about the same number as in 1994. The number had been increasing since 1991, after a long-term dccrcasc that had been occurring since 1975. It is interesting to note that the decrease in prevalence of marijuana USC that occurred in the 1980s did not begin to occur until several years after the peak in incidence. The rising incidcncc during the 1990s seems to have been fueled largely by the increasing rate of new USC among youths age 12-17 years (from 39 per 1,000 person years in 1991 to about 75 per 1,000 person years in 1994 and 1995). This is in contrast with the epidemic of the late 1960s and early 1970s, which involved substantial increases among young adults as well as youths. The rates of marijuana initiation for youths in 1994 and 1995 arc similar to the estimated rates in the late 1970s, the peak years for marijuana incidence and prevalence among youth (Figure 13).

Heroin

oThere were an estimated 141 ,000 new heroin users in 1995. Estimates of heroin incidcncc arc subject to wide variability and usually do not show any clear trend, although there is a statistically significant upward trend in the number of new heroin users frotn 1992 to 1995, a finding that is consistent with anecdotal reports ofincrcasing numbers of tlcw heroin users. By combining 199 1- 1996 NHSDA data (Appendix 5 incidence tables are based on 1994-95 data), a more stable estimate of the long term trend emerges, showing that the recent increases in new heroin use arc comparable to the increases seen in the epidemic of the late 1960s. The rate of heroin initiation for the age group 12- 17 increased from around 0.5 during the 1980's to 2.5 in 1995 (Figure 14).



oA large proportion of the rcccnt heroin initiates are young and are smoking, sniffing, or snorting heroin. Among recent initiates found in the 1995 and 1996 NHSDAs, 90 percent were under age 26 and 77 percent had never injected heroin. A similar analysis of new heroin users in the 1991 and 1992 NHSDAs showed that only 61 percent were younger than age 26 and only 46 percent had never injected (questions about smoking, snorting, and sniffing were not included in the NHSDA until 1993).

Cocaine and Crack Cocaine

oThe annual number of new cocaine users rose between 1992 and 1995, but was at a lower level than during the early 1980's. In 1995 there were an estimated 652,000 new users, while during 1980-l 984 there had been about 1.3 million cocaine initiates per year. The rate of initiation by different age groups, howcvcr, has been changing in rcccnt years. The rate among youths age 12-17 increased from 4.6 in 1991 to 10.6 in 1995. Historically, most initiation of cocaine use has taken place atnong young adults age 18-25. The rate for that age group fell from a high of 28.6 in 1980 to 10.2 in 1992. Since 1992 there has hcctl no significant increase in this rate, but the rate in 1995 was 13.8. With the age group 18-25 showing a decrease in the rate of first use after 1980, the rate of first use for that group is now similar to that for the 12-17 age group. For crack cocaine, the estimated annual number of new users has retnaincd stable in recent years.

Hallucinogens

oThere were an estimated 1.2 million tlcw hallucinogen users in 1995, approximately twice the average annual number during the 1980s. The rate among youths age 12-17 increased between 1991

and 1995, from 10.4 to 27.5 per 1,000 person years. Over the same period, the rate for ages 18-25 years increased from 13.1 to 24.3.

Inhalants

oThere were an estimated 676,000 new inhalant users in 1995, up from 401,000 in 1991 . The rate of first use among youths age 12-17 rose significantly from 1991 to 1995, from 10.7 to 21.8 per 1,000 person years.

Cigarettes

oAn estimated 3 million people tried t-heir first cigarette in 1994 (1995 estimate not available). The rate of initiation among youths age 12-l 7 increased from 1991 to 1994. An estimated 1.7 million people began smoking on a daily basis in 1995, and there was no statistically significant change in the rate of youth initiation of daily smoking from 1991 to 1995. The annual number of new daily smokers has remained stable since 1982.

Alcohol

oIn 1994 there were approximately 4.1 million new users of alcohol, while in 1991 there were only 3.3 million users. The rate of new usage among the 18-25 age group was flat in recent years (240 per 1000 person years in 1994), but the rate among the 12- 17 age group increased from 119 per 1000 person years in 1991 to 16 1 in 1994.

PREVENTION *Alert*

Volume 1, Number 2 September 1997

The Changing Face of Heroin: Teenagers at Increased Risk

While "heroin chic" is cultivated on high-fashion runways and in glossy magazines, the hard-hitting reality of this drug is far from glamorous. The face of heroin is changing in the 1990's: The faces are younger.

Recent years have witnessed an upward trend in heroin use across the Nation. In 1995, 141,000 people tried heroin for the first time. Many of them were teenagers: 25 percent were 12 to 17 years old. In addition, in 1995 an estimated 428,000 people took heroin at least once. Standard methods of measuring the prevalence of heroin use likely underestimate the extent of the problem.

The major shift in heroin use appears to be the increase in youth using the drug. Although not as prevalent as marijuana and alcohol, heroin experienced an upward trend for eighth, tenth, and twelfth graders from 1991 to 1996. In fact, in 1994, 57 percent of those admitted to hospital emergency rooms for heroin-related illnesses were under age 18. Prevalence among college students remained steady.

Investigators believe that the increase in young heroin users reflects general trends in how people are taking the drug. Younger users and new users alike tend to smoke or snort heroin, rather than inject it as long-time users generally have. The increased purity of heroin over the past decade and the fear of AIDS have contributed to this gradual movement away from injecting heroin.

Several other trends characterize heroin use today. Combined survey data from 1994 and 1995 suggest that the majority of users were white males over 35 years of age. Almost half of reported heroin users live in larger metropolitan areas. Nearly a third did not graduate from high school. Surveys of emergency room admissions and heroin-related deaths indicate that heroin is often used in combination with other drugs, particularly cocaine and alcohol.

Heroin is one of the top three frequently reported drugs by medical examiners in drug abuse deaths. These patterns of heroin USC, particularly its increasing popularity among youth, pose new challenges for the prevention community.

Soul-cc: Adapted from Substance Abuse and Mental Health Services Administration, Drug Abuse Warning Network Annual Medical Examiner Data 1995, DHHS Pub. No. (SMA)97-3 126 Rockville, MD: DHHS, 1997.

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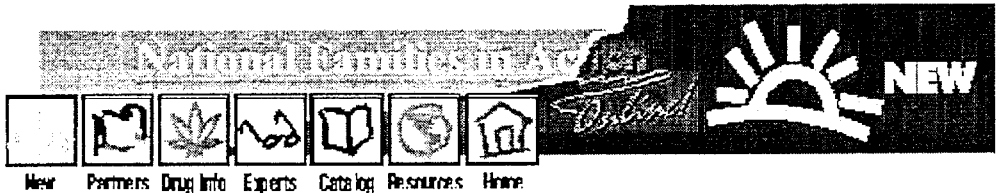

Boycott "Heroin Chic" Press Release

For Immediate Release

Drug Prevention Organizations Call For Boycott Of Calvin Klein Products

ATLANTA, GA--National Families in Action and its multicultural partner organizations call upon the nation's families to boycott Calvin Klein products. The reason for the boycott is a series of ads Calvin Klein is running in fashion magazines and on tv to promote the company's new fragrance, "cK be." The ads feature models who look like heroin addicts [see attached).

"Addiction is neither chic nor glamorous," says Sue Rusche, co-founder and executive director of National Families in Action, an organization that has helped families prevent drug abuse since 1977. "We trusted Calvin Klein products and encouraged our children to buy them. But Calvin Klein has betrayed that trust in a misguided and dangerous effort to glamorize heroin addiction to appeal to adolescents. The company has the right to market its products however it chooses. But we have the right to choose not to buy them. Until Calvin Klein stops glamorizing heroin addiction, we refuse to buy Calvin Klein products. We are asking America's families to join us."

Adds Jacqueline Butler, executive director of African American Parents for Drug Prevention, "Addiction begins as a voluntary behavior which becomes an involuntary disease of the brain and body. It is no more appropriate to glamorize addiction than it is to glamorize cancer, AIDS, or any other ravaging disease. Heroin and crack addiction have devastated the African American community and we are outraged at this blatant attempt to make addiction seem desirable."

"As a responsible adult, Calvin Klein cannot be ignorant of the consequences of drug use to young people," says Ford Kuramoto, executive director of National Asian Pacific American Families Against Substance Abuse. "Nor can the company deny that this advertising campaign, which portrays 'heroin chic', will influence their decisions."

Adds Harry Montoya, executive director of the National Hispano/Latino Community Prevention Network, "After reducing their drug use by two-thirds over 13 years, adolescents' drug use has doubled in just four years. Calvin Klein's campaign to make heroin addiction

attractive to our kids, particularly now, is obscene."

"We call upon the entire fashion industry to reject 'heroin chic'," says Paula Kemp, associate director of National Families in Action "We ask Calvin Klein's'competitors to join us in refusing to glamorize addiction in any of their ads."

"The bottom line," concludes Sue Rusche, "is that families want what's best for their children. We do not have to put up with Calvin Klein's cynical disregard for the health and well-being of our children."

For additional information call:
Jacqueline Butler, African American Parents for Drug Prevention, 513-475-5359.
Ford Kuramoto, National Asian Pacific American Families Against Substance Abuse, 213-278-0031.
Harry Montoya, National Hispano/Latino Community Prevention Network, 505-747-l 889.

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Calvin Klein's 12 Page Ad for New Fragrance in *Harper's Bazaar*

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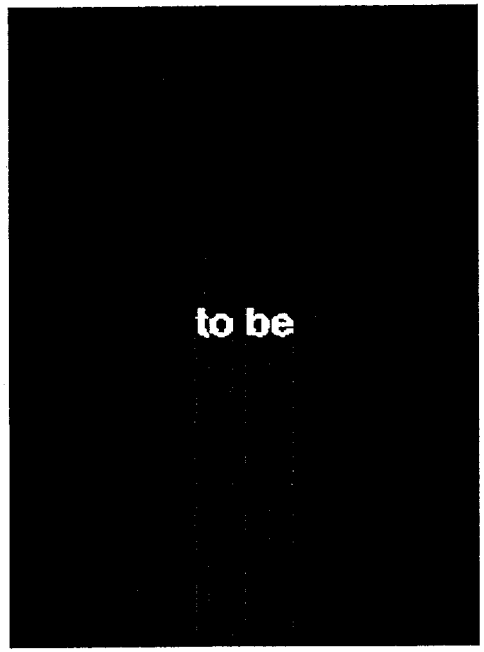

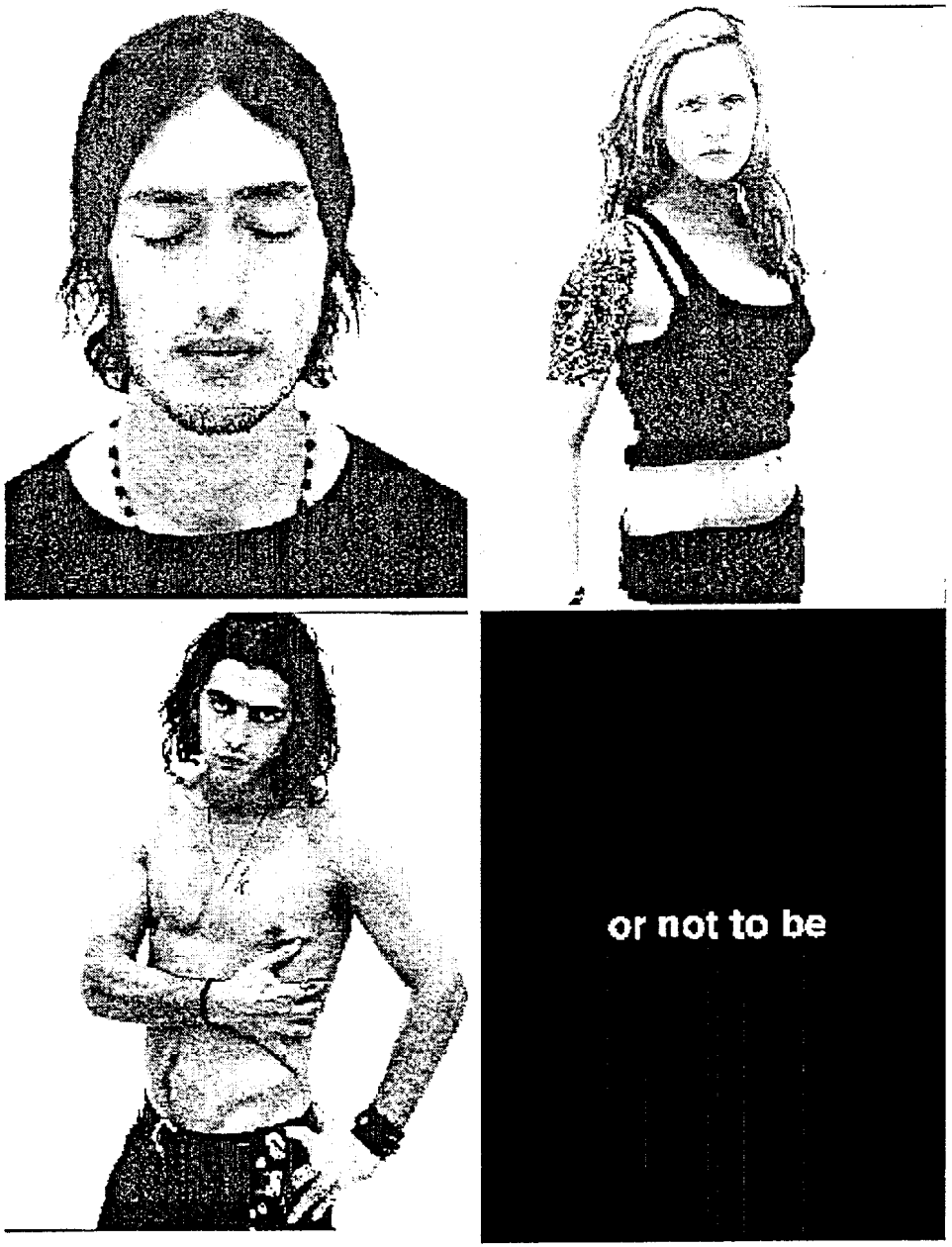
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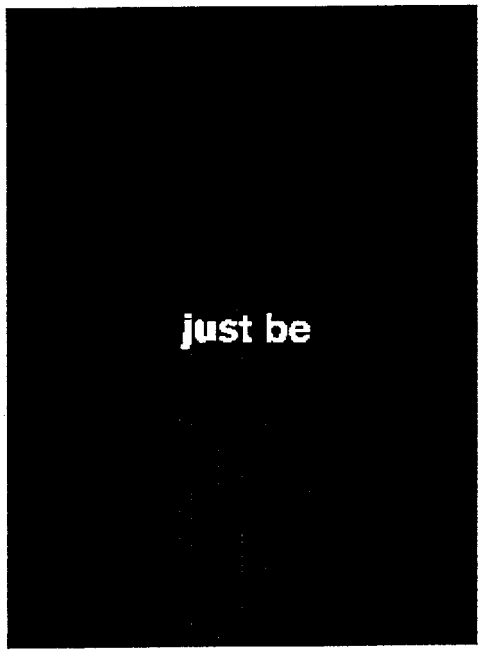
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From *Harper's Bazaar,* September 1996, issue 3418.

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Annual Trends in Selected Metropolitan Areas

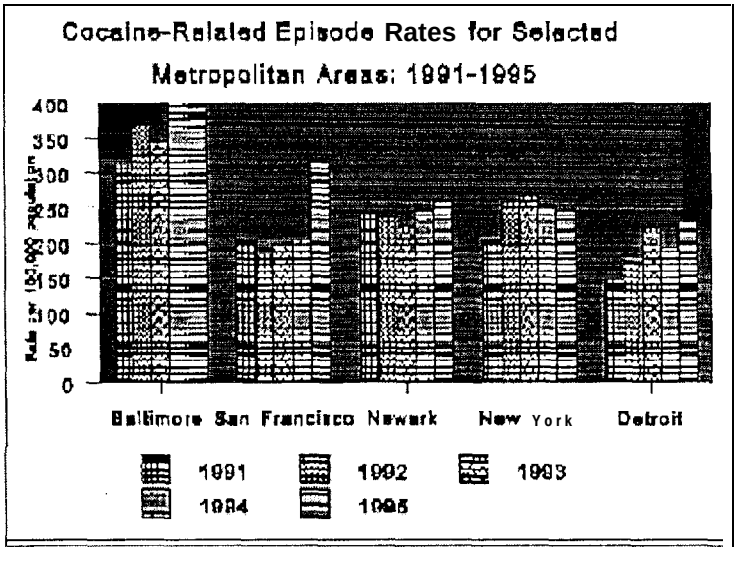
Total Drugs

- Between 1994 and 1995, 4 of the 21 metropolitan areas covered in DAWN had statistically significant increases in the estimated number of drug-rclatcd emergency department episodes. The percent increases in these areas were: 57 percent in San Francisco (from 11,800 to 18,400); 40 percent in New Orlcans (from 4,700 to 6,600); 10 percent in Los Angeles (from 19,300 to 21,200); and 7 percent in Scattle (from 10,000 to 10,700). An 16 percent decrease was observed in Washington, DC (from 14,200 to 11 ,800) and a 10 percent decrease was found in San Diego (from 5,100 to 4,500).

  Rcadcrs should notè that small changes in estimates in Baltimore, Buffalo, Denver, San Diego, and San Francisco may produce statistically significant differences, since all eligible hospitals arc selected in those cities.

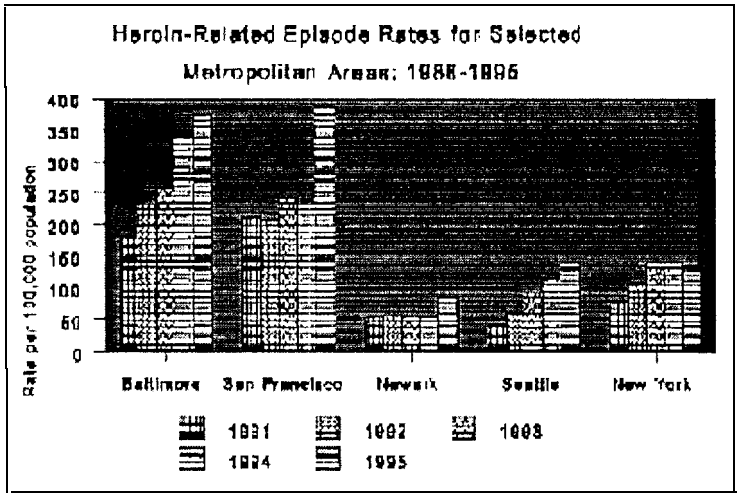
Cocaine

- During the same period, 4 of the 2 1 metropolitan areas had statistically significant increases in the estimated number of cocaine-related emergency department episodes. The percent increases in these areas were 55 percent in San Francisco (from 3,100 to 4,900), 23 percent New Orleans (from 1,900 to 2,300), 11 percent in Miami (from 2,700 to 3,100), and 8 percent in Dallas (from 1,400 to 1,500). A 26 percent decrease was observed in Washington, DC (from 4,800 to 3,600) and a 25 percent decrease was found in Minneapolis (from 580 to 430).



- The chart presented below shows the trend in the rates of cocaine-related episodes per 100,000 population for the five cities with the highest rates in 1995: Baltimore (393), San Francisco (3 15), Newark (257), New York (247), and Detroit (23 1). Between 1991 and 1995, the rates increased by 55 percent in Detroit, 53 percent in San Francisco, 27 percent in Baltimore, 20 percent in New York, and 7 percent in Newark.

Heroin



- Nine of the 21 metropolitan areas had statistically significant increases in the estimated number of heroin-related emergency department episodes between 1994 and 1995. The percent increases in these areas were: 67 percent San Francisco (from 3,600 to 6,000), 24 percent in Seattle (from 2,100 to 2,600), 12 percent in Baltimore (from 7,500 to 8,400), 21 percent in Boston (from 2,500 to 3,100) 21 percent in Newark (from 4,500 to 5,500), and 14 percent in Los Angeles (from 2,900 to 3,400). Statistically significant increases were also found in Dallas, Miami, and New Orleans; however, the number of episodes reported for each city was relatively small.

- The chart presented above shows the trends in the rates of heroin-related episodes per 100,000 population for the five cities with the highest rates in 1995: San Francisco (386), Baltimore (375), Newark (315), Seattle (139), and New York (136). Between 1991 and 1995, the rates increased by 215 percent in Seattle, 126 percent in Newark, 108 percent in Baltimore, 83 percent in San Francisco, and 77 percent in New York.

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ANNUAL TRENDS IN HEROIN-RELATED EPISODES

This section presents data from the DAWN *survey* on the estimated number of heroin-related emergency department episodes.

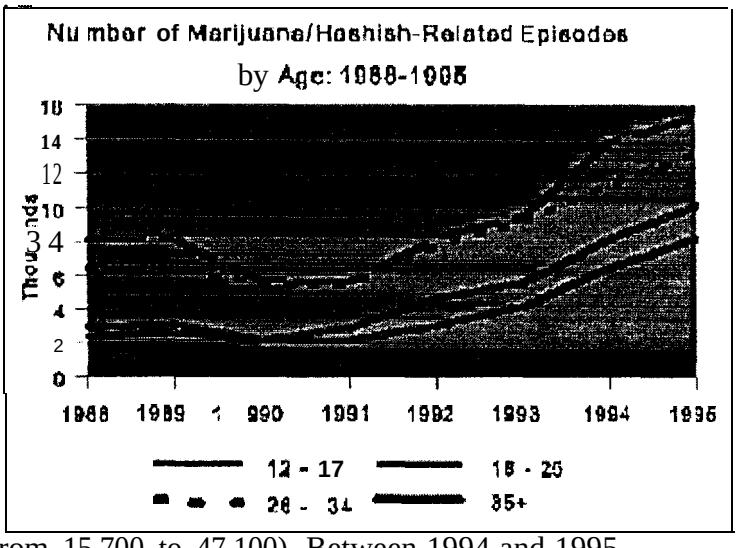
o Fourteen percent of all drug-related episodes were heroin-related in 1995. Heroin is sometimes used in combination with other drugs. Therefore one person could have a heroin mention and a mention of another drug during the same episode. From 1990 through 1995, the number of heroin-related episodes doubled (from 33,900 to 76,000) as did the rate per 100,000 population (from 15 in 1990 to 33 in 1995) Between 1994 and 1995, the-9 percent increase in heroin-related emergency department episodes (from 64,000 to *76,000):*

o In 1995, 55 percent of heroin-related episodes occurred among persons aged 35 years and over. Since 1988, heroin-related episodes have almost tripled for this age group (from 15,500 in 1988 to 42,200 in 1995).

o Between 1994 and 1995, statistically significant changes in the number of heroin-related episodes were found among persons aged 26-34 years (from 21,600 to 24,300) and 35 years and older (from 33,400 to 42,200).

Annual Trends in Other Illicit Drug-Related Episodes

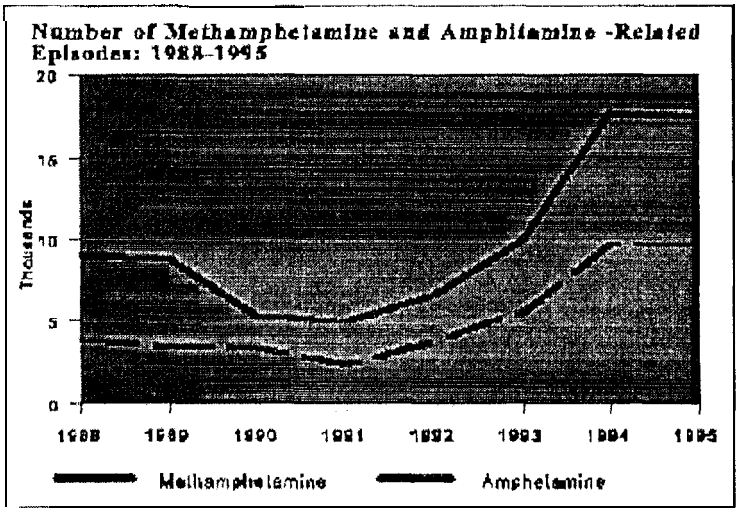
Marijuana/Hashish



- When reported in DAWN drug-rclatcd emergency department cpisodcs, marijuana is likely to be mentioned in combination with other substances, particularly alcohol and cocaine. Sixty-one percent of marijuana/hashish-rclatcd cpisodcs occurred among persons aged 18-34 years, 69 pcrccnt among men, and 46 pcrccnt among whites in 1995.

- Between 1994 and 1995, marijuana/hashish-related emergency department episodes rose from 40,200 to 47,100, an increase of 17 percent. Since 1990, marijuana/hashish-rclatccl episodes have increased 200 percent (from 15,700 to 47,100). Between 1994 and 1995, increases in marijuana/hashish-related episodes were observed among those age 12 to 17 and 35 and older with cpisodcs among persons aged 12 lo 17 years increasing by 26 pcrccnt (from 6,500 to 8,200).

Methamphetamine and Amphetamine



- Between 1988 and 1991, there was a decrease in methamphetamine-related emergency department episodes (from 9,000 to 4,900). However, from 1991 through 1994, methamphetamine-related episodes rose 261 percent to 17,600 There was a corresponding increase of 322 percent in the number of amphetamine-related episodes (from 2,300 in 1991 to 9,700 in 1994). Between 1994 and 1995, there was no change in the number of mcthamphetatnine- or amphetamine-related episodes rcportcd. However, the half-year estimates indicate that the number of episodes rose in the first half of 1995 and decreased in the last half of 1995. (See Discussion of Results section for an analysis of this finding.)

PCP

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- From 1988 through 1991, there was a dramatic decrease in episodes involving PCP and PCP combinations (from 12,300 to 3,500); however, from 1991 through 1993, there was an 91 percent increase (from 3,500 to 6,600). There was no change in PCP-related episodes between 1934 and 1995 (from 6,000 lo 6,500).

LSD

- LSD-related episodes remained relatively stable from 1988 to 1993. Between 1993 and 1995, there has been an increase of 74 percent (from 3,400 to 6,000). There was no change in the number of reported episodes between 1994 and 1995.

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Discussion of Results

The results reported here show that the non-medical use of drugs continues to place an increasing burden on hospital emergency departments. These results provide an indication of the problem, but likely miss some of the impact because the focus of DAWN is on cases in which a person's own drug use contributes to the current reason for their visit to the emergency department. It is important to recognize that DAWN data do not measure the prevalence of drug use, but rather the health consequences of drug USC expressed as emergency department visits. Many factors can influence the estimates of emergency department visits. Drug users may have visited emergency departments for a variety of reasons, some of which may have been life threatening. Others may have sought care at the emergency department for detoxification, because they were unable to gain admission to a drug treatment facility or because they needed medical certification before entering treatment. The DAWN data may reflect changes in hospital services or operations. For example, a hospital may open a new detoxification unit resulting in more drug-related emergency department visits or change to a new computer system resulting in underreporting.

The preliminary data from 1995 indicate some changes in the general trends from the 1994 DAWN data shown in Advance Report 11. That report clearly showed that since the late 1970's, there have been dramatic increases in the number of emergency department episodes which DAWN identified as drug related. During the same period, the proportion of drug-related episodes that involved cocaine and heroin increased.

Three key findings from the 1995 data deserve attention. First, cocaine-related episodes, after increasing 78 percent between 1990 and 1994, did not increase between 1994 and 1995. Second, heroin-related episodes, after showing no increase between 1993 and 1994, increased by 19 percent between 1994 and 1995. Third, methamphetamine(speed)-related episodes, after an increase of 26 1 percent between 199 1 and 1994, did not increase between 1994 and 1995. As mentioned earlier, the number of episodes rose in the first 6 months of 1995 and decreased in the last 6 months of 1995. Reports from local area epidemiologists indicate that there was a shortage of methamphetamine in the last half of 1995 in some western cities such as San Diego, Los Angeles, Phoenix, and San Francisco. Other indicators have also shown a decline in the second half of 1995. For example, the percent of male arrestees in San Diego testing positive for methamphetamine dropped from 42 percent in the first half of 1995 to around 35 percent in the last half of 1995. Corresponding decreases were seen for females and for juveniles.

Since DAWN data represent visits, not individuals, the increase in drug-related episodes may reflect the same individuals making repeated emergency department visits. Demographic changes may also account for some of this increase. DAWN data have shown that the proportion of drug-related episodes among persons aged 35 years and older has been increasing. This may be the result of more older people seeking care at the emergency department for drug-related problems or of persons aged 35 years and older making more frequent visits. As drug users age, particularly injection drug users, they become more susceptible to a variety of health problems which are exacerbated by drug USC, especially the cumulative effects of prolonged use. These individuals may be using emergency departments for treatment ofnonurgent health problems. The continued rise in drug-related emergencies may also be due to an increased USC of drug combinations, particularly with alcohol; changes in patterns of drug USC, such as route of administration; changes in the amount of drug used per administration; or changes in the drug purity or price. For example, an increase in the purity of heroin or cocaine could result in more users experiencing unexpected reactions and overdoses. The purity of an ounce of heroin purchased on the street rose from 53 percent in 1992 to 62 percent in 1995 and lower-end prices for gram, ounce, and kilogram quantities of heroin have declined between 1992 and 1995. Heroin of high purity can be snorted or smoked, and an increase in recent years has been seen in heroin-related emergency department episodes where "sniffed, snorted" was recorded as

the route of administration. There have also been anecdotal reports in the press regarding the association between the increasing purity of heroin and a rise in heroin addiction. The purity of an ounce of cocaine fell from 74 percent in 1992 to 65 percent in 1995. Between 1992 and 1995, the price of a kilogram of cocaine remained relatively low and stable. The tetrahydrocannibinols (THC) content of commercial grade marijuana has remained about the same (3.8 percent in 1992 and 3.3 percent in 1995 (Illegal Drug Price/Purity Report, Drug Enforcement Administration, January 1992-December 1995).

Estimates of drug-related emergency department episodes could increase or decrease over time for reasons unrelated to the size of the drug using population. It may also be due to factors that affect reporting patterns rather than actual changes in emergency department use. For example:

- Greater awareness of these problems by hospital staff who therefore report drug use more carefully on the medical record,
- Other data collection or sample composition changes (see Appendix 2),
- Changing patterns of use of emergency departments by drug users, and
- Different patterns of use of emergency departments by population subgroups.

However, our initial analysis of identified procedural factors which could have created spurious results suggests that they cannot account for the differences reported here (see Appendix 2 for a detailed account of known procedural anomalies). While our analysis continues, we do not expect to find circumstances that will rebut the main trends reported herein.

In the analysis reported here, we controlled for different patterns of use of the emergency department by particular population subgroups and found that differences in drug-related episodes among certain groups persisted.

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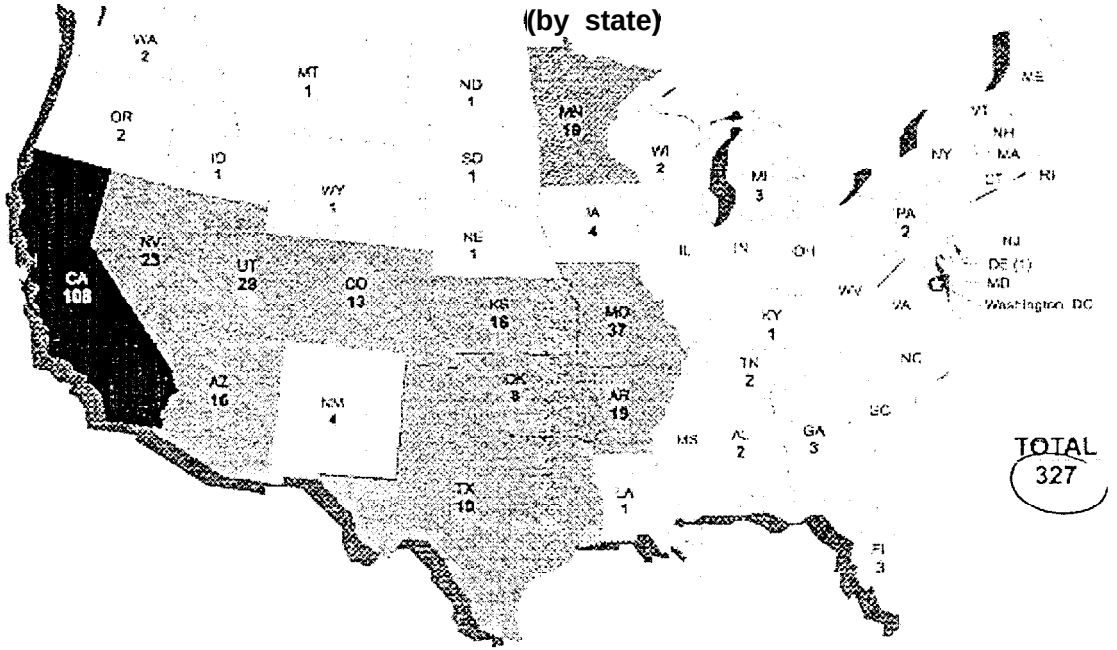
U.S. Department of Justice
Drug Enforcement Administration
Briefing Book

DEA

Methamphetamine

Trafficking and abuse of methamphetamine in the United States have been on the rise over the past few years, as indicated by investigative, seizure, price, purity, and abuse data. As a result, this drug has had a devastating impact in an increasing number of communities across the nation in 1995. Although more common in western areas of the country, this impact was felt in areas not previously familiar with the harmful effects of this powerful stimulant, such as the Midwest and Southeast.

Methamphetamine Laboratory Seizures Reported to DEA in 1995 (by state)



Almost all of the methamphetamine trafficked and abused in the United States is produced in clandestine laboratories. Essential in manufacturing the drug is ephedrine/ pseudoephedrine. The international law enforcement community has taken action to prevent ephedrine diversion, and there are tight controls on ephedrine in the United States.

Traditionally, the suppliers of methamphetamine in the United States have been outlaw motorcycle gangs and independent traffickers. Although these groups are still involved in the trade, Mexican drug trafficking organizations have come to dominate the methamphetamine market in the United States. Their ascendancy in the methamphetamine trade is due to their access to wholesale ephedrine sources of supply on the international market, their ability to produce large quantities of high-purity methamphetamine on a regular basis, and their well established cocaine, marijuana and heroin distribution networks in the United States.

According to the *1995 National Household Survey* on *Drug* Abuse, the estimated number of persons who have tried methamphetamine in their lifetime was 4.7 million, or 2.2 percent of the population in 1995. In 1994, the estimate had been 3.8 million. In the West, the statistics are alarming. The latest *Drug* Abuse *Warning Network* figures indicate that methamphetamine related episodes tripled in Phoenix between 1992 and 1994, and the number of deaths related to this drug increased five fold. Los Angeles has had a 71 percent increase in emergency room visits due to methamphetamine abuse, and a 222 percent increase in meth-related deaths.

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NIDA Capsules
NATIONAL INSTITUTE ON DRUG ABUSE

Methamphetamine Abuse

Methamphetamine is a drug that strongly activates certain systems in the brain. Methamphetamine is closely related chemically to amphetamine, but the central nervous system effects of methamphetamine are greater. Both drugs have some medical uses, 'primarily in the treatment of obesity, but their therapeutic use is limited.

Methamphetamine is made in illegal laboratories and has a high potential for abuse and dependence. Street methamphetamine is referred to by many names, such as "speed," "meth," and "chalk." Methamphetamine hydrochloride, clear chunky crystals resembling ice, which can be inhaled by smoking, is referred to as "ice," "crystal," and "glass."

Extent of Abuse

The Monitoring the Future Study assesses the extent of drug use among adolescents (8th-, 10th-, and 12th-graders) and young adults across the country. Recent data from the survey:

- In 1996, 4.4 percent of high school seniors had used crystal methamphetamine at least once in their lifetimes, an increase from 2.7 percent in 1990.
- Data show that 2.8 percent of seniors had used crystal methamphetamine in 1996, more than doubling the 1.3 percent reported in 1990.

Methods of Abuse

Methamphetamine is taken orally or intranasally (snorting the powder), by intravenous injection, and by smoking. Immediately after inhalation or intravenous injection, the methamphetamine user experiences an intense sensation, called a "rush" or "flash," that lasts only a few minutes and is described as extremely pleasurable. Oral or intranasal use produces euphoria - a high, but not a rush.

Because methamphetamine elevates mood, people who experiment with it tend to use it with increasing frequency and in increasing doses, although this was not their original intent.

Health Effects and Hazards

The central nervous system (CNS) actions that result from taking even small amounts of methamphetamine include increased wakefulness, increased physical activity, decreased appetite, increased respiration, hyperthermia, and euphoria. Other CNS effects include irritability, insomnia, confusion, tremors, convulsions, anxiety, paranoia, and aggressiveness. Hyperthermia and convulsions can result in death. Cardiovascular side effects, which include chest pain and hypertension, also can result in cardiovascular collapse and death. In addition, methamphetamine causes increased heart rate and blood pressure and can cause irreversible damage to blood vessels in the brain, producing strokes. Other effects of methamphetamine include respiratory problems, irregular heartbeat, and extreme anorexia.

Supply

Methamphetamine is a Schedule II drug under Federal regulations, meaning it has a high potential for abuse with severe liability to cause dependence. During World War IT, methamphetamine was used by soldiers as an aid lo fight fatigue and enhance performance. In Japan, intravenous methamphetamine abuse reached epidemic proportions immediately after World War II, when supplies stored for military use became available to the public.

In the United States in the 1950s, legally manufactured tablets of methamphetamine were used nonmedically by college students, truck drivers, and athletes, who usually did not becotne severely addicted. This pattern changed drastically in the 1960s with the increased availability of injectable methamphetamine. The 1970 Controlled Substances Act severely restricted the legal production of injectable methamphetamine, causing its USC to decrease greatly.

According to the Drug Enforcement Administration, methamphetamine has been the most prevalent clandestinely produced controlled substance in the United States since 1979. The clandestine manufacture of methamphetamine was based primarily in the West and Southwest. Since the 1980s, ice has been smuggled from Taiwan and South Korea into Hawaii. However, it was not until the summer of 1988 that its use became relatively widespread in that State. By 1990, distribution of ice had spread to the U.S. mainland, although distribution remained limited.

Part of the NIDA Capsule Series - (C-89-06) [Revised September, 1997]

NIDA Capsule Index

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PREVLINE Prevention Online

Methamphetamine QUICK DOCS

The potent central nervous stimulant methamphetamine, or meth, can have dramatic physical and psychological effects. Meth is not physically addictive but it is psychologically addictive.

The drug appeals to the abuser because it increases the body's metabolism and produces euphoria, alertness, and gives the abuser a sense of increased energy. But high doses or chronic use of meth, also known as "speed," "crank," and "ice," increases nervousness, irritability, and paranoia.

Effects on the cardiovascular system include:

- Increased pulse
- Increased blood pressure
- Cardiac arrhythmia
- Stroke

Other long-term effects include:

- Insomnia
- Hyperactive behavior
- Severe depression
- Aggressiveness
- [illegible] disorders
- Weight loss
- Paranoid psychosis
- Hallucinations

Patterns Of Abuse

Methamphetamine abuse has three patterns: low intensity (does not involve psychological addiction), binge, and high intensity. The binge and high-intensity abusers smoke or inject meth to achieve a faster and stronger high; the patterns of abuse differ in the frequency in which the drug is abused and the stages within their cycles.

The binge abuse cycle is made up of these stages: rush, high, binge, tweaking, crash, normal, and withdrawal.

Rush (5-30 minutes)--The abuser's heartbeat races and metabolism, blood pressure, and pulse soar. Feelings of pleasure.

High (4-16 hours)--The abuser often feels aggressively smarter and becomes argumentative.

Binge (3- 15 days)-The abuser maintains the high for as long as possible and becomes hyperactive, both mentally and physically.

Tweaking-The most dangerous stage of the cycle. See section below.

Crash (1-3 days)-The abuser does not pose a threat to anyone. He becomes almost lifeless and sleeps.

Normal (2-14 days)-The abuser returns to a state that is slightly deteriorated from the normal state before the abuse.

Withdrawal (30-90 days)-No immediate symptoms are evident but the abuser first

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Hallucinations (auditory and visual)	becomes depressed and then lethargic. The craving for meth hits and the abuser becomes suicidal. Taking meth at any time during

withdrawal can stop the unpleasant feelings so, consequently, a high percentage of addicts in treatment return to abuse.

High-intensity abusers, often called "speed freaks," focus on preventing the crash. But each successive rush becomes less euphoric and it takes more meth to achieve it. The pattern does not usually include a state of normalcy or withdrawal. High-intensity abusers experience extreme weight loss, very pale facial skin, sweating, body odor, discolored teeth and scars or open sores on their bodies. The scars are the results of the abusers' hallucinations of bugs on his skin, often referred to as "crank bugs," and attempts to scratch the bugs off.

Tweaking

The most dangerous stage of meth abuse for abusers, medical personnel, and law enforcement officers is called "tweaking." A tweaker is an abuser who probably has not slept in 3-15 days and is irritable and paranoid. Tweakers often behave or react violently and if a tweaker is using alcohol or another depressant, his negative feelings and associated dangers intensify. The tweaker craves more meth, but no dosage will help re-create the euphoric high, which causes frustration, and leads to unpredictability and potential for violence.

A tweaker can appear normal: eyes can be clear, speech concise, and movements brisk. But a closer look will reveal the person's eyes are moving ten times faster than normal, the voice has a slight quiver, and movements are quick and jerky. These physical signs are more difficult to identify if the tweaker is using a depressant.

Tweakers are often involved in domestic disputes and motor vehicle accidents. They may also be present at "raves" or parties and they may participate in spur-of-the-moment crimes, such as purse snatchings or assaults, to support their habit.

Detaining a tweaker alone is not recommended and law enforcement officers should call for backup.

6 Safety Tips for Approaching a Tweaker

1. **Keep a 7-10 ft. distance.** Coming too close can be perceived as threatening.
2. **Do not shine bright lights at him.** The tweaker is already paranoid and if blinded by a bright light he is likely to run or become violent.
3. **Slow your speech and lower the pitch of your voice.** A tweaker already hears sounds at a fast pace and in a high pitch.
4. **Slow your movements.** This will decrease the odds that the tweaker will misinterpret your physical actions.
5. **Keep your hands visible.** If you place your hands where the tweaker cannot see them, he might feel threatened and could become violent.
6. **Keep the tweaker talking.** A tweaker who falls silent can be extremely dangerous. Silence often means that his paranoid thoughts have taken over reality, and anyone present can become part of the tweaker's paranoid delusions.

About Methamphetamine

Methamphetamine is a stimulant drug chemically related to amphetamine but with stronger effects on the central nervous system. Street names for the drug include "speed," "meth," and "crank." Methamphetamine is used in pill form, or in powdered form by snorting or injecting. Crystallized methamphetamine known as "ice," "crystal," or "glass," is a smokable and more powerful form of the drug.

The effects of methamphetamine use include:

- increased heart rate and blood pressure
- increased wakefulness; insomnia
- increased physical activity
- decreased appetite
- respiratory problems
- extreme anorexia
- hyperthermia, convulsions, and cardiovascular problems, which can lead to death
- euphoria
- irritability, confusion, tremors
- anxiety, paranoia, or violent behavior.

Methamphetamine use also can cause irreversible damage to blood vessels in the brain, producing strokes.

Methamphetamine users who inject the drug and share needles are at risk for acquiring HIV/AIDS.

Methamphetamine is an increasingly popular drug at raves (all night dancing parties), and as part of a number of drugs used by college-aged students. Marijuana and alcohol are commonly listed as additional drugs of abuse among methamphetamine treatment admissions. Most of the methamphetamine-related deaths (92%) reported in 1994 involved methamphetamine in combination with at least one other drug, most often alcohol (30%), heroin (23%), or cocaine (21%). Researchers continue to study the long-term effects of methamphetamine use.

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PROCEEDINGS OF THE

NATIONAL CONSENSUS MEETING

ON THE USE, ABUSE

AND SEQUELAE OF ABUSE OF

METHAMPHETAMINE WITH

IMPLICATIONS FOR PREVENTION,

TREATMENT AND RESEARCH

U.S. Department of Health and Human Services
Substance Abuse and Mental Health Services Administration
Center for Substance Abuse Treatment

Rockwall II, 5600 Fishers Lane
Rockville, Maryland 20857

ACKNOWLEDGEMENTS

This activity was sponsored by a SAMHSA/CSAT contract with the College on Problems Dependence. The meeting was held at the Caribe Hilton Hotel, San Juan, Puerto Ric and 28, 1996. Martin Adler, Ph.D., Executive Officer with the College on Problems Dependence, Temple University served as the Project Director and Scott E. Lukas, P Professor of Psychiatry, Harvard Medical School, wrote the report. Charlene Lewis served as the Government Project Officer.

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BACKGROUND

In 1.990, the American Society for Pharmacology and Experimental Therapeutics and the Committee on Problems of Drug Dependence (now the College on Problems of Drug Dependence) held a joint meeting under the aegis of the National Institute on Drug Abuse to review the problem of methamphetamine abuse. Although the focus at that time was on a smoked form (so-called ICE), the symposium, Anticipating a new ICE Age: The Pharmacology and Abuse Implications of Methamphetamine, resulted in a consensus paper summarizing **what was** then known about the epidemiology, patterns of use, subjective effects, and toxicity associated with methamphetamine abuse. However, the anticipated and feared epidemic never materialized and cocaine and crack cocaine abuse continued to be the predominant stimulant of abuse.

Renewed interest in methamphetamine abuse is now warranted because of recent reports of increased use. These include: mentions in the Drug Abuse Warning Network and Household Survey reports, identification of regional "pockets" of use in the west, Pacific northwest, Hawaii, U.S.-affiliated territories along the Paci rim (e.g., Guam and the Northern Marianas) and the emergence of significant methamphetamine abuse in midwestern and southern states. Clandestine laboratory seizures have also increased and changes in illicit methods of making methamphetamine now produce more active drug per batch. Although significant increases in methamphetamine use seem to be limited to a few areas on the west coast, the proliferation of illegal laboratories, especially in the rural midwest, raised concern that use may also be spreading eastward. Methamphetamine's popularity among gay men who inject it intravenously has also raised concern that such use may accelerate the spread of the AIDS virus.

In the spring of 1996, Dr. Nelba Chavez, Administrator of SAMHSA, asked the Center for Substance Abuse Treatment and the Center for Substance Abuse Prevention (CSAT and CSAP) to organize a scientific symposium to again review methamphetamine abuse. Because of its earlier role, the College on Problems of Drug Dependence (CPDD) was selected to run this meeting. It was then scheduled as a satellite symposium of CPDD's annual meeting. The symposium was held on June 27-28, 1996 in San Juan, Puerto Rico and included 18 scientific presentations on epidemiology, mechanisms of action, toxicity, prevention and treatment strategies. Issues concerning illicit trafficking and drug policy were also discus by government representatives in those areas. Both government and non-government scientists contributed to the sessions. After the formal presentations, three work groups of the participants developed a consensus on present gaps and what is needed to better address the methamphetamine problem from basic

pharmacological, toxic, treatment and prevention perspectives. The three work groups also discussed methods for more rapidly disseminating new and important information to treatment staffs to improve their prevention and treatment methods This report represents a summary of the presentations and discussion by the participants in the San Juan symposium and provides a bird's eye view of the knowledge and opinions of informed professionals whose interests include: developing a national drug policy, drug use epidemiology, problems of law enforcement, scientific issues relevant to methamphetamine abuse, the drug's behavioral, developmental and physical toxicity, and the prevention and treatment of its abuse. In addition to briefly summarizing our present knowledge, these proceedings also underscore the multiple areas in which knowledge is lacking.

METHAMPHETAMINE---THE DRUG AND ITS USE

D-methamphetamine hydrochloride is known by many street names such as speed, crank, go, crystal, crystal meth and the "poor man's cocaine." It can be used by a of the common routes of illicit drug administration (inhalation, intranasal "snorting", intravenous injection or orally), but it must be purified before it ca smoked. ICE is one purified form of the d- isomer that is frequently sold as lar crystals which are smoked. Pharmacologically, methamphetamine is a potent central nervous system (CNS) stimulant that produces many effects indistinguishable from those of cocaine although they typically last for hours ins of minutes.

Methamphetamine hydrochloride (hereafter referred to as methamphetamine) is sold on the street in either the crystal form or as rocks. Contrary to popular belief,

rocks are not freebase methamphetamine. Instead, the freebase form of methamphetamine is a liquid at room temperature and so its abuse is very limited. Rocks are made by melting crystals using a variety of techniques, but "the turkey bag method" appears to be the most popular. Dry methamphetamine crystals are placed in an aluminum turkey roasting bag which is then closed and dipped into boiling water until. the methamphetamine melts. The melted material is then placed in cool water or in the refrigerator until it solidifies as a large crystal. The c then cut into rocks that fit the various glass pipes that are used for smoking methamphetamine.

Methamphetamine is usually smoked by inhaling it from a sheet of aluminum foil or through a glass pipe. When foil is used, the drug is heated in a crease of the fo until it vaporizes and is then inhaled via a straw. Pipes for smoking methamphetamine differ from those used for smoking crack cocaine. Because methamphetamine vaporizes at a much lower temperature than crack, smoking it in a crack pipe at high heat would destroy it. Methamphetamine pipes have a large glass ball at the end for holding the methamphetamine and a lighter is held under ball to vaporize the drug. Air flow is regulated by a finger placed over a hole on top of the pipe. Some users reportedly prefer glass pipes for smoking methamphetamine because they fear developing Alzheimer's disease from using aluminum foil.

There are anecdotal reports of individuals making a developmental progression from ice smoking to injection of methamphetamine. This has serious implications, not only for increased toxicity associated with methamphetamine per se (e.g., toxic psychoses described later in this report), but also in relation to HIV and other infections secondary to injection practices, with resulting serious medical complications such as AIDS.

THE NATIONAL DRUG CONTROL STRATEGY

With the appointment of a new "drug czar", General Barry McCaffrey, in the spring of 1996, the Office of National Drug Control Policy (ONDCP) became involved in Attorney General Janet Reno's effort to develop a new national methamphetamine strategy, thus incorporating the Department of Justice's methamphetamine initiativ into the national drug control strategy. The Department of Justice published a document outlining this strategy in April 1996. The biggest challenge will be to integrate the specific programs so that focusing on a single emerging drug problem does not overshadow the need to attend to the others. Because the White House does not usually concentrate efforts on a single drug, doing so within the context of a larger drug control plan will be a difficult task. For example, heroin abuse has b waning for some time, but there now seems to be a slight return to higher use patterns and it remains a primary drug abuse problem in many eastern States where methamphetamine abuse is rare. Thus, the recent increase in methamphetamine abuse must be placed in context with the general drug abuse problem. A major change in the methamphetamine policy is a shift in the focus of concern from hard-core users alone to American youth more generally. This was prompted by the changing trends in the geographical "pockets" of methamphetamine abuse from the west coast to a number of locations in the midwest, south and southwest.

While current law requires developing a drug strategy on an annual basis, General McCaffrey supports a longer term strategy based on planning in 5- and lo-year increments. By adopting this approach, time spent in preparing an annual request for Congressional approval would be better spent implementing the long range plan. The General plans to debate this year's strategy during the coming months and the adopt a final plan that Congress can approve. Subsequent years will no

longer be wasted in debates over developing new strategies, but instead will invol reporting on progress made on the long term drug strategy. If accepted, this approach will be very different from prior years.

Two aspects of methamphetamine abuse that have received little scientific attentio are: the long term potential psychotic effects of methamphetamine use, and its impact on infants and children. This meeting was regarded as an opportunity to demonstrate how science can respond to health crises. While a national methamphetamine strategy is now in place, it will continue to evolve as new information, including that presented at this meeting, is incorporated into the national drug control strategy.

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EPIDEMIOLOGY AND PATTERNS OF USE

National Scale Surveys

The National Household Study on Drug Abuse (NHSDA), Monitoring the Future (MTF), (also called the National High School Survey), Treatment Episodes Data Set (TEDS), Drug Abuse Warning Network (DAWN), and Drug Use Forecasting System (DUF) are the most important instruments available for gauging trends in drug use across the United States. While each of these has its advantages and disadvantages, used collectively, they provide a reasonably accurate "snapshot" of drug abuse trends.

The NHSDA samples the civilian, non institutionalized population of the United States age 12 and older and is primarily used to monitor drug abuse trends in the general population. The survey excludes some populations such as the homeless outside of shelters, prisoners, institutionalized populations, military personnel on bases, and those who are currently in residential treatment programs. It can no provide accurate estimates for drug use that is rare in the general populations (e heroin abuse). The surveys are conducted in the home by trained interviewers using confidential answer sheets to ensure that the respondents cannot be later identifi Names are never associated with these answer sheets; the results are credible gene population estimates of drug use.

In 1994, the NHSDA found there were about 4 million people who reported ever having used methamphetamine with the highest rate of use by 26 -34 year old males living in the western United States. For the nation as a whole, lifetime rates ro slowly between 1994 and 1995--from 1.8 percent in 1994 to 2.2 percent in 1995-- not a statistically significant increase. The rate for the 26-34 year old age grou about double that of younger, 18-25 and older, 35+ age groups (3.8%, 1.9% and 2.1%, respectively). Three percent of the lifetime users were male compared to 2 percent female. Finally, use in 1995 in the Northeast region continued to be the lowest at 1 percent with higher rates in the South (2%), North Central (2%) and t West (4%).

The Monitoring the Future program is supported by NIDA and conducted by the University of Michigan on an annual basis. These surveys are conducted in the classroom and are aimed at 8th, 10th and 12th graders. Because the questioning occurs outside the home, use reports are generally slightly higher than the NHSDA survey data. Questions about crystal methamphetamine were added in 1990; prior to that time, methamphetamine was included with other stimulant use. An estimated four percent of students surveyed for the MTF study now report having smoked "ice" and there is a general trend toward increasing prevalence since 1992, except among graduating seniors who show a fluctuating trend. The number of participants in the survey allows for regional analyses (east, west, north and south), but does permit finer geographic analysis.

The Treatment Episode Data Set (TEDS) has been collected by SAMHSA's Office of Applied Studies for the past three years and includes drug use profiles from clients who enter a treatment facility that receives public funding. Thus, about 6 percent of all treatment facilities are included in the survey and represent betwe half and two-thirds of the nation's treatment admissions to publicly funded programs. Information is gathered from 45 states, the District of Columbia and Puerto Rico. Each state sends its data to SAMHSA where it is compiled into a single data set. Arkansas, Connecticut, Oregon and Texas do not report amphetamine and methamphetamine use separately and five states do not participate at all (Arizona, Kansas, Kentucky, Mississippi and Nebraska). Other indicators show that methamphetamine use has been rising rapidly in Arizona, but the lack of TEDS data in this and other non participating states limits tracking of treatment admissions in those states.

As in the other surveys, the number of methamphetamine treatment facility admissions is highest in the western states. In the far west the rate per 100,000 persons admitted for primary methamphetamine abuse in 1994 is now double that reported in 1992. In California, primary methamphetamine admissions to treatment rates rose from 36/100,000 in 1992 to 73/100,000 in 1994. By contrast the admission rates in all the northeastern states are less than 2/100,000. Primary methamphetamine admission rates are, however, beginning to rise in some southern

and midwestern states such as Iowa (34/100,000) and Oklahoma (10/100,000). Among major cities, San Diego has the highest rate of methamphetamine admissions at 143/100,000. San Francisco is second at 53/100,000; other high rate cities in decreasing order include: Los Angeles (24/100,000), Denver (22/100,000), Seattle (17/100,000), Minneapolis (13/100,000) and Dallas (10/100,000).

In 1994, admissions for cocaine abuse/dependence exceeded admissions for methamphetamine use in Denver, Los Angeles, Minneapolis, San Francisco and Seattle. However, methamphetamine treatment admissions now surpass cocaine admissions in San Diego; cocaine remains second to heroin in Los Angeles, San Francisco and Seattle. However, to keep these data in perspective, methamphetamine users account for only 1 percent of the treatment population in the nation as a whole. The largest reported reason for seeking treatment is still alcohol abuse, accounting for 58 percent of all admissions.

The Drug Abuse Warning Network (DAWN) provides information from a different perspective, with a focus on individuals who are treated in hospital emergency departments (ED) or who die from a drug-related cause. ED data are collected in a random sample of EDs nationwide in 21 mid-to-large size cities. The information from emergency departments is obtained from abstracts of medical records by trained personnel. The data reflect the contribution that the non-medical use of a drug (either legal or illegal) had on the patient's presenting problem.

Compared to cocaine and heroin, methamphetamine accounts for a very small, but growing, percentage of the nation's drug-related ED visits. However, between 1991 and 1994, there was a dramatic increase in methamphetamine-related ED episodes--from about 5,000 to nearly 18,000--a profile similar to that charted for cocaine i the early 1980's. Again, the highest rates of DAWN episodes are on the west coast, with San Francisco reporting 75/100,000 population; San Diego and Phoenix each reported 40/100,000. The rates of these episodes have been increasing steadily sin 1992. However, except for San Diego, the rates for cocaine- and heroin-related ED episodes still exceed those of methamphetamine. Caucasian patients account for the majority of the episodes, but the rate for Hispanic patients is increasing and may related to the increased production of illicit methamphetamine in Mexico and to increased marketing of the drug to the Hispanic community.

DAWN medical examiner data are reported by 138 medical examiners in 42 metropolitan areas. Although the absolute numbers of methamphetamine-related deaths are small compared to heroin- and cocaine-related deaths, there has been a 200 percent increase in the number associated with methamphetamine (from 155 in 1991 to 433 in 1994). Data from 1995 are not yet available. In 1994, 80 percent deaths were among whites and 5 percent among blacks, 12 percent among Hispanics. The cities with the highest number of deaths parallel the DAWN ED data and include Los Angeles, San Diego, Phoenix and San Francisco. Rates are highest in San Diego followed by San Francisco, Phoenix and Los Angeles. Phoenix has witnessed a six fold increase in methamphetamine-related deaths from 20 in 1992 to 122 in 1994.

Drug Use Forecasting (DUF) is a 24-site program in the U.S. that involves giving those who are arrested the opportunity to report their recent drug use and then to provide a urine specimen to verify their actual use. About 90 percent of arrestees agree to participate and about 80 percent of their urinalysis results match their reports. These data provide some indication of drug use patterns of individuals wh are involved in criminal behavior and for whom drug use may play some role in that behavior.

The rate of arrestees admitting to methamphetamine abuse (and confirmed by urinalysis) was highest in the west with San Diego, Phoenix, San Jose, Portland an Los Angeles comprising the top five cities Surprisingly, a number of sites in the midwest showed up (Omaha, Dallas and Denver) with rates in the 2.6 to 6.1 percent range. Notable mentions in a number of other cities further east such as Birmingham, Houston, St. Louis, Atlanta, Philadelphia and San Antonio indicate that use is spreading eastward.

Supply Side – Abuse and Trafficking Patterns and Indicators of Use

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Strict regulatory controls on lawfully manufactured methamphetamine limit its diversion from licit to illicit channels. Therefore, the vast bulk of methampheta

currently on the streets has been illegally manufactured. Recipes for manufacturi methamphetamine are widely available through pamphlets and the Internet. The clandestine manufacturing process has undergone substantial changes over the years. Phenyl-2-propanone (P2P) which was originally used in illegal manufacturing, is now seldom used since becoming controlled by the Drug Enforcement Administration as a bulk "immediate precursor" of methamphetamine. Lab operators then shifted first to ephedrine and after that was regulated, to ephedrine in single-ingredient tablets. Subsequent regulatory efforts have led manufacturers to switch to the use of pseudoephedrine tablets, and most recently even to phenylpropanolamine. The ephedrine/ pseudoephedrine reduction method yields a higher percentage of the more active d-isomer while the P2P method result in equal amounts of the d- and l- isomers. The yield from both methods is typical1 70 percent of the precursor. Thus one kilogram of ephedrine yields 700 grams of methamphetamine. The higher purity of present street methamphetamine may have offset the reduced availability of the precursors. Nevertheless, the purity of purchases seized by the DEA remains in the 50-70 percent range with only occasional batches exceeding 87 percent purity.

Methamphetamine trafficking was once dominated by outlaw motorcycle gangs, but in the last three years criminal drug trafficking organizations comprised of Mexic nationals, with ties to criminal organizations in both Mexico and the United State have usurped their position. With assistance from organization members who specialize in obtaining chemical precursors, the Mexican organizations have been able to set up very large laboratories and to make primarily d-methamphetamine. Involvement of Mexicans also has been reported in the Pacific region (e.g., in Guam), where supply lines previously conveyed the drug product from the Philippines, Japan, or the Asian mainland. The Mexican involvement may also have contributed to the rapid spread of the drug because the distribution networks originally developed for transporting cocaine, heroin and marihuana from Mexico have been in place for years and are now being used for methamphetamine.

Methamphetamine seizures are one measure of the increased size of the problem. In 1995, both the number and weight of methamphetamine seizures were the highest in over a decade. The numbers rose most substantially along the southwest border-- from 6.5 kg in 1992 to 616 kg in the first nine months of 1995. In California alo the California Bureau of Narcotics Enforcement (BNE) reported an increase in seizures from 1,400 lbs (636 kg) in 1991 to over 18,000 lbs (8,182 kg) in 1995. Although there has been an increase in the number of very large, "superlabs," they are not the only source of the problem. There is also an increasing number of smal scale labs being set up in rural areas of midwestern states such as Missouri, Kans and Iowa.

As the report Amphetamine Trafficking Situations in the U.S. emphasizes, methamphetamine trafficking patterns were very different before 1991. These differences are highlighted in Table 1 (page 9).

Table 1. Methamphetamine trafficking patterns and clandestine laboratory factors prior to 1991 and in 1995.

Category	Prior to 1991	
Geographic location:	Western States	Midwest/Southeast us
		Mexico
Lab organization:	Independents	Large scale smuggling
		from Mexi
and		
		smaller s
in		
		the midwe
Lab size:	Small & crude	Large

Production quota: lbs/month	40lbs/month	1000
Precursor chemicals:	P2P	Ephedrine, pseudoephedrine phenylpropanolamine
Access to chemicals:	Local	Internatio China & Europe
Trafficker Characteristics	Users first, then traffickers	Trafficker only

Chemists can determine the chemical process used to make the methamphetamine by examining the by-products and chemicals discarded at the lab site. Since 1992, pseudoephedrine has increasingly been used. The ephedrine/pseudoephedrine reduction method is preferred for three reasons: it is similar to the P2P method, chemicals are less strictly controlled than P2P and it produces a higher proportio the active d-isomer per unit of weight. However, for every pound of finished product, 5 or 6 pounds of chemical waste is left at the illicit lab site. In cont result of using phenylpropanolamine (ppa) as a precursor is amphetamine, which is often sold as methamphetamine.

The clandestine methamphetamine laboratory presents a chemical hazard both to law enforcement personnel and to the environment. Some precursors are toxic, caustic and highly flammable, and the useless by-products (which are also toxic) a discarded. The special problem these materials pose to the officers who raid these labs have required they have special hazardous materials (HAZMAT) handling training. Special HAZMAT removal companies are also needed to remove these toxic chemicals at a cost often exceeding $5,000 per laboratory. In 1988, the BNE spent $147,000 in cleanup costs; that figure rose to $2.4 million in 1995.

Strategies, Legislation, Penalties and Regulation

In February 1996, in cooperation with the California Bureau of Narcotic Enforcement, the DEA conducted a national conference on Federal, State and local law enforcement issues surrounding the methamphetamine problem. The' proceedings and recommendations of that conference are published in the document Methamphetamine: National Conference of Federal, State and Local Law Enforcement, by the U.S. Department of Justice, February 1996. Subsequently, the Department of Justice spearheaded an inter-agency process, in which ONDCP played a coordinating role, which resulted in the April 1996 release of the Nation Methamphetamine Strategy. That strategy includes a threat assessment and action-oriented plan that incorporates many of the law enforcement recommendations from the DEA conference, but also includes broader initiatives in other disciplines, su as education, prevention, treatment and research. The key features of this action oriented strategy include: tighter regulation of precursor chemicals; increased international cooperation, with a special emphasis on Mexico; increased criminal penalties for trafficking in methamphetamine and its precursors; new civil money penalties, injunction authority and administrative powers to stop suspect chemical transactions; improved use of technology to track illegal operations; identifying environmental risks associated with labs; safety and h'ealth training for officers; training officers to deal with methamphetamine users during an arrest; training prosecutors; and a range of other education, prevention, treatment and research initiatives.

Federal drug penalties are based primarily on the type and quantity of drugs involved, although other factors, such as the use of firearms, violence, or a pers role in the offense are also considered. In order to set fair and appropriate sentencing levels, the legal/law enforcement community seeks input from the scientific community on the quantity of methamphetamine that is "equivalent" to other illicit drugs, such as crack or powder cocaine. (Note that for most drug sentences, methamphetamine, is an exception to this rule). The consensus was that

fairness in sentencing for drug offenses should be based as much as possible on scientific information. Information an abuse patterns and the quantities typical1 consumed by users would better enable policy makers and legislators to decide what drug quantities are likely to be associated with drug trafficking versus personal

Participants agreed that additional scientific information is needed by the legal/ enforcement community. Details of effective prevention and treatment programs are needed in order to make intelligent decisions regarding the disposition of cases. Law enforcement officers have noted that abusers of methamphetamine are a particularly violent population. They need information and advice on how to protect themselves from arrestees, as well as how best to ensure the safety of arrestees. For example, it is not clear whether these individuals should be restr using different techniques from other arrestees, taken immediately to a hospital, locked in a holding cell.

Regulatory measures have had some success; the cost of ephedrine on the black market has risen to $55,000 or more for a 25 kg container. Although declared imports of ephedrine (even from legitimate sources) have increased dramatically over the past few years, strict U.S. controls on ephedrine have driven clandestine operators to alternative sources for this precursor and to seek substitutes such a pseudoephedrine and, most recently, phenylpropanolamine (which results in amphetamine) or to synthesize their own ephedrine. A proactive approach is highly desirable as the best drug "seized" is the one that is never made in the first pla

It was reported that a methamphetamine bill would probably emerge from Congress (starting in the Senate Judiciary Committee) that would include civil, criminal an administrative features. Under the then-current, preliminary draft, penalties for trafficking in methamphetamine and its precursor chemicals would increase and "long arm" jurisdiction would be created to reach those persons who manufacture and distribute these chemicals from abroad with the intention of illegally importi them into the United States. The bill also proposed that environmental damage caused by clandestine methamphetamine laboratories result in separate and additional penalties. On the regulatory side, Drug Enforcement Administration would be granted the power to suspend suspicious domestic precursor chemical shipments.

Postscript: On October 3, 1996, President Clinton signed into law "The Comprehensive Methamphetamine Control Act of 1996," most of which became effective immediately. This law:

increases penalties for specified crimes, such as knowingly supplying precursor (list I) chemicals and other equipment to methamphetamine manufacturers:

without explicitly raising penalties, it directs the Sentencing Commission increase penalties for unlawful trafficking in methamphetamine;

extends Federal "long arm" jurisdiction to the manufacture and distributio of listed chemicals abroad with intent to import them into the United States;

- authorizes civil penalties of up to $250,000 for firms that recklessly sel "laboratory supply" to an operator of or procurer for a clandestine drug laboratory;

grants the Attorney General authority to commence civil actions, including injunctive proceedings, to stop the suspect activities of "rogue chemical firms" and others who supply materials to clandestine lab operators;

imposes regulatory requirements (effective in one year) that will induce firms to sell certain FDA-approved over-the-counter drug products containing ephedrine, pseudoephedrine or phenylpropanolamine at retail in "blister packs" or in relatively small transactions (under 24 grams of base chemical);

requires that mail order firms engaging in retail sales of key methamphetamine precursors submit monthly transaction reports to DEA; and

establishes several other programs and task forces, including a "Methamphetamine Interagency Task Force" under the Attorney General.

PREVENTION STRATEGIES

Given the speed and localized nature of methamphetamine outbreaks in the United States, no comprehensive or national prevention programs have been developed, although some local health departments have created brochures and video and videotapes for use in efforts to curtail these outbreaks. Whereas there is evidenc that methamphetamine use is spreading to new areas of the country, there are still many areas of the country where methamphetamine use has not been observed. For this reason, the question of mounting a national prevention campaign faces a challenge. Namely, a national program to warn our population about the dangers of methamphetamine use actually might draw attention to the allure of this drug, introducing a large segment of the population to methamphetamine for the first time. Such adverse consequences must be avoided by ensuring that any national prevention strategy is extremely well-conceived and evaluated.

One of the major weaknesses of current prevention strategies is that they focus on one main approach with the hope that it is going to be the "magic bullet." Unfortunately, a single strategy for preventing drug abuse does not exist and it i now recognized that it may be better to combine methods that can reinforce and support each other.

It is also important to recognize that drug abuse does not occur in a vacuum, but typically occurs with other social and or behavioral problems. Current convention wisdom holds that drug abuse prevention programs work best when it is possible to coordinate community and media campaigns with school and family-oriented efforts, and new evidence to support this position has been accumulating over the past decade of prevention research funded by NIDA and private foundations. Knowledge about the specific form of classroom programs that can help prevent tobacco smoking, drinking, and illicit drug use has advanced faster than knowledge about the effects of specific community and media campaigns. There was also a tendency for informational skills to be provided within a didactic framework al-though they are better learned through a dialectical or a Socratic approach. Fo example, there now is good evidence that peer leaders (e.g., students) trained to group exercises in social skills, decision-making, and peer resistance can have a greater beneficial impact than either outside experts (e.g., police volunteers) or teachers who use standard classroom lecture approaches to deliver prevention messages. Nonetheless, the evidence on prevention programming too often has come from evaluation research designs with inadequate experimental control. This has been especially true in the evaluation of specific community and media campaigns. The result has been major gaps in the knowledge needed to guide prevention programming, and these gaps ultimately can be filled only by taking advantage of the most powerful research designs at our disposal, namely, randomized controlled trials.

It also is important to pay attention to the experience of Japan and Sweden, where amphetamine epidemics *were* faced after World War II. In addition, the highly localized character of recent methamphetamine outbreaks in the U.S. and its territories, indicate it might be valuable to study the experience of relatively i communities (i.e., isolated by ocean or land mass from other communities). As has been true in epidemiological research on communicable diseases such as measles, experiences of this type might provide key insights into the nature and dynamics o the spread of methamphetamine use throughout the population, indicating not only how ice smoking can spread rapidly but also the boundaries of vulnerability across which it does not spread. Experiences in the Pacific region and in the Hispanic communities of the United States and Mexico might be especially informative, given the relatively greater family cohesion in these populations, which creates special opportunities for the study of familial aggregation and spread within extended families (e.g., via estimation of secondary attack rates after a family h experienced its first index case)

With a better understanding of the nature and diffusion of methamphetamine use through special populations or population sub-groups, it may be most useful to cra specific prevention strategi.es for these groups, focusing precisely upon methamphetamine. For example, there are some local areas where the methamphetamine problem already has been publicized widely, and young people

already seem very knowledgeable (e.g., Hawaii, Guam). In these areas, this familiarity reduces the potential for adverse consequences otherwise associated wi methamphetamine-specific programming. In other parts of the U.S., available evidence suggests that young adult gay men and lesbians are disproportionately affected by methamphetamine problems. Here, the experience with prevention of HIV infection and AIDS in this population can help guide methamphetamine-specific programming for these groups. In this manner, effective prevention campaigns can be directed at those who need them, and introducing information about the drug to vulnerable population groups or in areas where methamphetamine still remains essentially unknown can be avoided.

METHAMPHETAMINE EFFECTS ON BEHAVIOR

There is limited data on the effects of methamphetamine on human behavior. Much of the available information has been surmised from the cocaine literature. In addition to the physiological effects (e.g., rapid heart rate, elevated blood pres increased body temperature and respiratory rate, pupillary dilation) there is a heightened sense of well-being or euphoria, increased alertness and increased vigo reduced food intake and decreased sleep time. Higher doses result in stereotypic behavior (repetitive and automatic acts in both animals and humans). Acute administration of amphetamines has been shown to increase socialization among humans. Thus, it is valuable to quantify the effects of acute doses of methamphetamine in volunteers who do not use drugs to provide a framework with which the effects in dependent individuals can be compared. These data also provide insights into how experimental use of a drug may lead to more frequent use and ultimately dependence.

Tolerance develops to many of the behavioral effects of amphetamines, so that increasing doses are required to achieve the same effect. The reverse of toleranc sensitization, which appears to be unique to the psychomotor stimulants. Sensitization is a reaction to multiple exposures of a drug that lead to the development of new effects. For example, in animals, seizure activity or convulsions do not typically occur after the first series of exposures to low-to-moderate doses of methamphetamine. However, with repeated exposures the animal can become sensitized to methamphetamine and have a seizure after receiving a single dose that previously did no harm.

Like other abused drugs, methamphetamine may have a malleable effect on subjective responses. Recent studies suggest that the setting in which it is used affects the nature and degree of subjective effects of methamphetamine. This has implications for the treatment community because clients who seek treatment may describe their methamphetamine experiences differently under different environmental conditions. Ethanol is often consumed along with methamphetamine because the stimulant can reverse the effects of ethanol-induced drowsiness. This process of attempting to "fine tune" or titrate a particular mood state may be one the contributing factors to polydrug abuse.

Research has shown that most psychomotor stimulants are very similar in their effects on the brain and, by analogy, in their subjective effects. It is the prof these subjective effects that allows an individual to identify a drug as "stimulan like" and to discriminate it from another drug that may be "opiate-" or "depressan like." Thus,, this feature may be exploited in medication development programs because not all of the psychomotor stimulants are equally reinforcing and therefor have different potentials for abuse. An optimal medication might be one that is "perceived" as being methamphetamine-like, but is not likely to be self-administered. This characteristic may also increase treatment compliance. Individuals who need treatment frequently avoid medications devoid of any desired pharmacologic activity; thus a small amount of pharmacologic stimulation may be necessary to treat the individual.

Stimulants enhance performance of certain types of psychomotor tasks and also contribute to continued use. For example, cocaine enhances and ethanol detracts from many types of performance, but performance may be restored to normal when the two are combined. A similar effect occurs for sleepiness which may contribute to the development of abuse in certain populations. Finally, psychomotor stimulants, like other abused drugs, can augment the conditioned reinforcing effec of other associated stimuli. Because of the stimulant's reinforcing effects, other stimuli (inanimate objects and people) also acquire reinforcing effects thus

promoting a cycle of conditioned reinforcers which contributes to relapse when clients are returned too quickly to their old drug-using environment after being detoxified. Such information may be integrated into treatment programs and desensitization techniques used to break the associations between methamphetamine use and other cues.

Animal models of psychostimulant self-administration are very predictive of human behavior. Under conditions of unlimited access (i.e., continuous 24-hour availabil of methamphetamine), animals will self-administer in cyclic patterns, just like humans. In addition, given an unlimited supply of drug, the animals will self-administer methamphetamine until its toxic effects cause death. Use of progressiv ratios in animal studies is analogous to increasing the cost of a drug for human abusers and provides information on the drug's reinforcing efficacy. Using this procedure, the number of responses required to obtain an injection (i.e., drug reinforcement) is progressively increased following each injection. The "breakpoint" is the ratio at which the animal will no longer respond to obtain the drug. Drugs that maintain very high breakpoints are considered to have higher reinforcing efficacy than those with lower breakpoints. Using this paradigm, cocaine maintained higher breakpoints than methamphetamine, but because methamphetamine has a longer duration of action, the animals may not need to take as many injections over the same time period.

Genetic factors may also affect an individual's predisposition to abuse methamphetamine. The speed of acquiring self administration behavior and the magnitude of the response is higher in rats that, by nature, are more sensitive to methamphetamine's acute effects than in other groups of less reactive rats. These same animals were very responsive and reactive to a novel environment. The level of reactivity to the novel situation is predictive of whether or these animals wil administer amphetamine.

MECHANISM OF ACTION/REINFORCING EFFECTS

Methamphetamine is structurally similar to amphetamine but quite different from cocaine and although these psychostimulants have similar behavioral and physiological effects, there are differences in the ways in which they affect nerv terminals. Methamphetamine enhances monoaminergic neurotransmission by causing a release of monoamines from storage sites within the axon terminal. While cocaine is rapidly metabolized by plasma and tissue esterases, methamphetamine is much more slowly metabolized, resulting in a longer duration of action and a half life of about 10-11 hours compared to about 50 minutes for cocaine.

The neurotransmitter transporters (which have been recently discovered and characterized for dopamine terminals) are the sites where neurotransmitters are taken back up into the nerve terminal following their release by a nerve signal or drug. The transporter is made up of 12 protein chains that can bundle together to form a channel through which neurotransmitters can pass. There are also storage sites for neurotransmitters (vesicles) in the neuron and there are different trans proteins present in these synaptic vesicles. These are the transporters that concentrate neurotransmitters from cytoplasm of the neuron into the storage vesicles. The interior of the vesicle is acidic and reducing; in this environment monoamines are "chemically comfortable" and remain stable. The cytoplasm, in contrast, is not as acidic as inside the vesicles, and is more oxidizing and thus hospitable for monoamines such as dopamine, norepinephrine, and serotonin.

Although the precise mechanisms of action are not fully understood, recent information indicates that methamphetamine-induced toxicity may occur as follows. Amphetamines block the exchange through both the nerve membrane (synaptic membrane) and the storage vesicle. Thus, methamphetamine actually enters into the nerve terminal cytoplasm and then into the storage vesicles. Cocaine does not cross these membranes; it only blocks the synaptic transporters so that dopamine once released into the synapse cannot pass back into the axon terminal. When methamphetamine enters the nerve terminal via the synaptic or membrane transporter, it then enters the storage vesicles inside the neuron through the ves transporters and forces neurotransmitters such as dopamine and norepinephrine to leak out of the terminal and into the synaptic cleft. It is this action that incre neurotransmission resulting in an over stimulation of the post-synaptic membrane.

The mechanism of methamphetamine's toxic effects on nerve terminals also focuses

on these transporters, especially the transporters on the storage vesicles. The mechanism by which dopamine gets inside a vesicle is actually proton-dependent. This means that for dopamine to move inside the vesicle two hydrogen atoms have to move outside the vesicle. This difference in proton concentration ensures that inside of the vesicles is acidic. If protons are unavailable, dopamine cannot ente vesicle and it remains in the cytoplasm. Because methamphetamine is a basic compound, it will disrupt the acidic interior of synaptic vesicles by a process ca alkalization. The protein pump is inactivated, and the dopamine that remains in th cytoplasm undergoes a process of auto-oxidation that results in the production of number of highly toxic and reactive chemicals called oxygen radicals, peroxides an hydroxylquinones. Thus, it appears that methamphetamine itself is not toxic, but rather it is the accumulated dopamine that is toxic to the nerve terminal. The up of methamphetamine and the oxidative stress it produces occurs primarily in the ventral tegmental area of the brain where there are many dopamine cells. Using special techniques, this process can be directly observed and the toxicity is evidenced by the swelling and blebbing of neurons. Radiotracer techniques reveal that hydrogen peroxide and free radicals are present in these areas of swelling.

Finally, methamphetamine can cause neurotoxicity indirectly by mobilizing the dopamine out of the safe storage vesicles within neurons and into the cytoplasm of the neuron where it is converted to toxic and reactive chemicals. Thus, the neurotransmitter dopamine itself is the neurotoxin.

In summary, there is a paucity of information on methamphetamine with respect to the conditions under which it acts as a reinforcer. Many facets of chronic use including tolerance, dependence and sensitization are not well understood and so i is difficult to determine if strategies for developing treatments for methamphetam abuse will be the same as those developed for cocaine.

NERVOUS SYSTEM TOXICITY

To date, most of our information on methamphetamine neurotoxicity has been obtained from animal studies. Methamphetamine CNS toxicity is produced by one of two mechanisms: stress on the vasculature and a direct toxic effect on neurons. Long term toxicity to the central nervous system may occur via hemorrhagic or ischemic strokes. Such lesions can be seen using high technology neuroimaging techniques such as computed tomography (CT) and magnetic resonance imaging (MRI).

The direct toxic effects on neurons must meet two criteria: chemical (alterations the transmitter function of a neuron) and anatomical. Thus, if methamphetamine damages a serotonin or a dopamine neuron then the typical intracellular contents o that particular neuron might be expected to be reduced on a long-term basis; this reaction should also be visible as structural damage.

Methamphetamine produces a dose-related depletion of dopamine and serotonin levels that is evident as long as 2 weeks after the drug is discontinued. This pro suggests that this is long term toxicity and not due to the acute pharmacologic effects of dopamine release that are caused by the drug, as has been previously discussed. In addition, methamphetamine not only depletes dopamine and serotonin, but also their unique biosynthetic enzymes, tyrosine hydroxylase and tryptophan hydroxylase. It follows that the major metabolites of these transmitters may also depleted. In addition, the density or the number of transporters (uptake sites) lo on the nerve endings of dopamine and serotonin neurons may also be reduced.

These biochemical/neurochemical deficits within the dopamine and serotonin systems have been verified via anatomic or structural measures. The substantia nigra, located in the brainstem just above where the spinal cord attaches to the b contains cell bodies that project through the base of the brain via a group of ner fibers called the medial forebrain bundle. They terminate in the center of the bra an area called the striatum which serves as a command center for incoming and outgoing information. In rats, two weeks after dosing with methamphetamine the once profuse innervation from the substantia nigra to the striatum is reduced to a smattering of fibers. Similar fiber loss is evident in serotonin innervated brain regions. Thus, methamphetamine can damage both axons and axon terminals. This effect is not limited to rodents; it occurs in primates as well. The available dat animals suggests that the cell bodies are actually spared, and it is not known if damage to the fibers is a long term or permanent effect.

To summarize the animal studies, both biochemical and anatomical data demonstrate that methamphetamine damages dopamine and serotonin systems. Methamphetamine toxicity occurs after repeated high dose administration and it is selective for certain neuronal systems. Surprisingly, it spares the noradrenergic system. The damaging effects of methamphetamine are not restricted to rats; they occur in mice, guinea pigs, cats, rhesus monkeys and baboons. However, one interesting difference is that methamphetamine toxicity in mice affects dopaminergic systems, but leaves the serotonergic system intact. Finally, methamphetamine toxicity is highly dependent on: dose, route of administration, frequency with which the drug is given, the ambient temperature, and species.

As there is a paucity of human data, Positron Emission Tomography (PET) imaging studies in baboons are being conducted in an effort to develop and validat a method for evaluating human methamphetamine users. Using specially labeled cocaine analogues, the dopamine terminals in the striatum of a baboon can be easil visualized. A profound reduction in the density of dopamine terminals (transporter in the striatum occurs after a one day treatment with 8 mg/kg/day of methamphetamine. This reduced number of dopamine transporters corresponds well with the reduction in dopamine measured directly in the striatum of the same animal. Loss of serotonin, particularly in the cerebral cortex, is quite severe an could be better visualized with more specific compounds (ligands) that attach to serotonin transporter sites. Such compounds are currently being developed and are in the early stages of testing. Future studies will involve imaging both dopamine serotonin transporters in individuals previously exposed to high doses of methamphetamine, as well as studying individuals in the drug-free condition. Because these chemical probes image the transporter, inferences about whether or not there are long-term changes following methamphetamine exposure can be made.

While the demonstration of neuronal toxicity in specific brain regions is of great academic importance, the functional consequences of such damage need to be kept in perspective. Examples of extreme depletion of dopamine (on the order of 90-95 percent) include Parkinson's Disease. The clinical consequences of this disease a well known, but it is clear that greater than 80 percent depletion of dopamine lev is needed to result in such a severe clinical condition. It is currently not kno dopamine neurons are damaged in chronic methamphetamine users. If the mechanisms of neurotoxicity from methamphetamine and Parkinson's Disease prove to be the same, our understanding of disorders such as Parkinson's Disease and the basic neurobiology of many systems in brain may improve. It is also possible that methamphetamine-induced deficits in dopamine and serotonin may not result in any obvious changes in the individual's brain function or behavior. In the animals that receive high doses of methamphetamine do not exhibit any obvious functional consequences after detoxification is complete. However, such neurotoxicity at a relatively early age may not be reversible and thus may predisp to development of movement disorders and other problems in later life.

In summary, although there is good evidence in the animal literature demonstrating neuronal toxicity, the issue of whether methamphetamine damages dopamine or serotonin neurons in humans remains very much an unanswered question. Because of the inherent dangers associated with this type of research, the information wil have to come from postmortem studies, advanced neuroimaging studies, and the development of new strategies for detecting toxicity-possibly through the use of operant behavioral pharmacology. Finally, the degree of neurotoxicity must be placed in perspective and the functional consequences require further scrutiny to determine the impact of chronic methamphetamine abuse on brain function.

OTHER ORGAN TOXICITY

Apart from the nervous system, methamphetamine affects multiple other organ systems including the heart, lungs, kidneys and liver. Methamphetamine-induced cardiotoxicity is sometimes manifested as arrhythmic sudden death. In such cases, subendocardial hemorrhages are often present. Considering the large number of individuals who use and abuse methamphetamine, the rate of methamphetamine-induced sudden death is remarkably low. Possibly this is due to the rapid development of tolerance, which offers some protection against cardiotoxicity, or the predominantly oral route of administration, which results in a more gradual ri and lower peak blood levels. Recent increases in the number of reported methamphetamine-related sudden deaths with the shift to smoking and intravenous

abuse suggest that rapid delivery of a bolus drug dose is more likely to precipita severe reaction that can lead to death.

A less common consequence of methamphetamine cardiotoxicity is myocardial infarction, which has been reported primarily after "snorting" or intravenous injection of methamphetamine, or after oral use of amphetamine analogues, such as fenfluramine and pseudoephedrine. Although the underlying mechanism for methamphetamine-related myocardial infarction is not yet know, coronary spasm appears to be a significant contributing factor.

Cardiomyopathy, characterized by acute onset of heart failure, can also result fro methamphetamine-related cardiotoxicity. Because most of these patients recover with treatment, the underlying morphologic changes have not been well described.

The cardiotoxicity of methamphetamine, like that of cocaine, is related to catecho excess. However, the cardiotoxic effects of methamphetamine are more profound because, unlike cocaine which remains extracellular, methamphetamine is transported into the presynaptic terminal where it interferes with further storage catecholamines and inhibits monoamine oxidase, resulting, in turn, in further elevation of catecholamines, which are cardiotoxic.

Pulmonary edema can accompany cases of acute fatality from methamphetamine abuse. This finding is not unique to methamphetamine abuse and is probably a reaction to adulterants present in illicit drugs. The more serious pulmonary complications of methamphetamine abuse arise insidiously from thrombosis of the small pulmonary vessels with a gradual reduction of the pulmonary vascular bed and increase in vascular resistance, leading in time to chronic obstructive lung disease from pulmonary fibrosis and granuloma formation.

Rhabdomyolysis which can also cause a reversible form of renal failure among cocaine abusers, has also been attributed to methamphetamine abuse. Renal toxicit can occur directly from release of myoglobin and degradation products, producing tubular obstruction, or indirectly from hypotension and ischemia. While the exact mechanism by which methamphetamine causes this syndrome is not known, hyperthermia and free radical formation are believed to be significant contributor

Hepatic damage, while rare, has been reported in association with two amphetamine analogues, pemoline and methylphenidate (Ritalin?) used therapeutically and illicitly. The condition likely occurs as a result of idiosyncratic reactions lead liver cell necrosis. Methamphetamine-induced hepatotoxicity has also been attributed to lead poisoning from the by products of poorly controlled drug manufacturing.

In summary, methamphetamine affects a number of organ systems, however, organ toxicity, with its inherent potential for medical complications, is apparently not common enough to deter users. The recent increase in methamphetamine-related deaths may be related to changes in routes of administration, to the increased potency of the drug, or to the increased number of methamphetamine abusers. As with many other drugs of abuse, some of the medical complications associated with methamphetamine appear to develop over time and may not be readily apparent to the user.

TOXIC PSYCHOSIS

The incidence and severity of methamphetamine-induced side effects and toxic reactions is dose-related. As the dose is increased the profile of side effects progresses from mild excitement to nervousness, irritability, anxiety, tremors, aggressiveness, paranoia and, often, auditory hallucinations. The resultant psycho reaction is indistinguishable from schizophrenia except on some subtle dimensions. There is a paucity of information on drug-induced psychosis, in part because it ca no longer ethically be induced in the laboratory setting. Thus, amphetamine psychosis can be studied only on an opportunistic basis when affected individuals seek treatment. At such times, treatment concerns must prevail and there is little time to devote to exploring the underlying progression of the disorder. In additio little is known about the withdrawal syndrome after chronic, high dose methamphetamine use under conditions permitting careful observation. Older studies report that major depression frequently appears after multiple doses of methamphetamine.

Animal models have been used to explore the behavioral effects of chronic high dose methamphetamine exposure, and there is also an abundance of clinical information derived from case reports. Such case reports have obvious weaknesses, the most obvious are the premorbid psychiatric status is generally not known nor i the actual content of the drug consumed and its percentage of adulterants. Doses a time course of use are also not usually known with precision. The few experimentally-induced cases, from studies conducted in the 1970s, also have their strengths and weaknesses. Their major strength is that the premorbid psychiatric status of subjects participating in the experiments was known. Their main weakness is that, for ethical reasons, these studies were only done with drug abusers. Thus issues of tolerance and sensitization were not studied empirically although the subjects had probably developed some degree of both.

Results from these limited experimental studies have led to some understanding of the dose/time function. The administration of very low oral doses over time faile to precipitate any reaction until a cumulative dose of 50 mg had been attained at which time the subjects became depressed, withdrawn and developed a negative attitude. Accumulation after intravenous dosing resulted in a somewhat different pattern in that there was no change in affect, only a rapid progression to psychot reactions. The administration of an intermediate dose results in both patterns. Th the way in which the drug is administered can determine its effects on affect.

Connell's now classic 1958 description of amphetamine psychosis symptomatology observed in users who self-administered amphetamines is still apt. A paranoid psychosis ensues characterized by ideas of reference, delusions of persecution, or auditory or visual hallucinations in a setting of clear consciousness. The intensi usually severe and is typically seen only in chronic abusers after a run of high d administration. The incidence of thought disorder is controversial in amphetamine psychosis, but if thought disorder is present, it is usually very mild. The sympto usually abate within a week, although there are exceptions.

The results of the two largest case report studies (42 and 94 cases, respectively) indicate a remarkable degree of agreement. Paranoid delusions occur in well over 8 percent of the cases, hallucinations appeared in 60 - 70 percent of the cases and disorientation was an uncommon feature in each independent study. Thus, the profile of amphetamine psychosis (in late stages) is well delineated and usually results in a fairly distinct syndrome, although there is still considerable indivi variability with respect to the specific manifestations of the disorder. This may to do with the potent lability of affect that occurs and because the amphetamine u actively interacts with his/her environment. Differences in that environment may precipitate these modified reactive states and behaviors.

There is considerable animal evidence suggesting a connection between sensitization and psychosis, and sensitization has been observed in every mammalian species that has been studied. The clinical data on the role of sensitization is much weaker for amphetamine, but the evidence for cocaine is strong. Sensitization manifests itself with the appearance of psychotic reactions a shorter "run" of drug use. Frequently, paranoia does not begin during the first months of high dose i.v. use, but as the individual continues to use, paranoid symptoms may begin sooner after the re-initiation of use. Once paranoia has occurred, it. will readily return even after a long period of absence often at repo low doses. This profile is very consistent with the animal descriptions of sensitization. The weakness of these clinical data is that it is not easy to deter the individual took higher doses over time. Although the development of psychosis may occur at some "threshold" dose, it is nearly impossible to verify this in the clinical case reports. The best clinical example of sensitization is an older "ind study in which chronic users were given intravenous doses of methamphetamine. Nearly half of these subjects became psychotic at less than their usual dose, but more than half took more than their usual dose. Another study of abstinent methamphetamine addicts who relapsed and immediately became psychotic is often cited as an example of sensitization. Ten of the 16 subjects had taken their usual dose (no sensitization) but 4 of the subjects became psychotic after taking only 2 50 percent of their usual dose (sensitization). Such clinical case reports cannot provide definitive proof that toxic psychosis is related to sensitization because dose and content of the illicit material is generally unknown, and the rate of pri episodes of psychosis is extremely difficult to document.

The fact that the incidence of psychosis among psychostimulant users is much higher than in the general population is circumstantial evidence that sensitizatio does occur in spite of the weaknesses in these studies. The percent of subjects w become psychotic after methamphetamine is quite consistent across studies as is t percentage experiencing either more paranoia over time or developing paranoia earlier in the drug use run. The issue of whether methamphetamine psychosis persists when the drug is no longer present in the body has been debated as well. Many studies are flawed because urine drug screens were not obtained and so the possibility that the patient was still taking the drug or it was still in the body be ruled out. One well controlled hospital study found that out of 104 cases of psychosis, 27 remained psychotic for over a month. All the patients had negative urine screens suggesting that persistent psychosis may be a complication in some individuals after methamphetamine abuse.

In summary, there is no doubt that a psychotic reaction can develop in individuals who use methamphetamine. There remain some unanswered questions about whether drug-induced psychosis is a psychotic reaction or "releases" a latent psychosis. However, prospective studies done in the 1970s found that after exposur to the drug more than 80 percent of subjects without pre-existing psychosis developed psychotic symptoms. It appears, therefore, that having a latent psychosi is not necessary in order to develop these symptoms. Other remaining questions are whether some minimum dose and some minimum duration of use are required to precipitate a psychosis. The 50 mg dose appears to be around the threshold require to precipitate psychotic reactions in sensitive individuals. The evidence is overwhelming that toxic psychosis develops over time and that the rare cases of psychotic reactions after a single dose may have occurred in individuals already predisposed to such a reaction. However, the development of sensitization predict that psychotic reactions would occur very soon after drug use begins, but in gener this does not occur with the very first exposure to a psychostimulant. Finally, th is still no good model to predict who will develop toxic psychosis.

DEVELOPMENTAL TOXICITY

NIDA recently published a pregnancy and health survey that evaluated the incidence of illicit drug use during pregnancy and found that about 5.5 percent of pregnant women across the country were using an illicit drug. Unfortunately, the report was not divided by drug class and there was no indication of the prevalence of methamphetamine abuse during pregnancy. A series of studies that evaluated the effects of amphetamine use during pregnancy (particularly using prevalence strategies) found that amphetamine use was most common on the west coast, particularly in California and Oregon. However, in 1990, the prevalence of methamphetamine use among pregnant women studied was zero.

A 1995 study included a stratified sample of pregnant Iowa women studied in 7 substance abuse health planning regions. These women who were receiving prenatal care from both private and public centers received urine screens at vario times during their pregnancy. The rate of positive urine findings for amphetamines in these women was 0.27 percent compared to 0.28 percent for cocaine and 3.0 percent for marihuana. These figures are consistent with the cocaine and marihuana national data reported in the NIDA study cited above. Analysis of urban and rural samples revealed that the urban areas had higher rates of cocaine use while rural areas had higher rates of amphetamine use. Also, every woman who had a positive urine test for amphetamine also had a positive urine for either marihuana or cocai there were no women who used only amphetamines.

The literature on amphetamine use in pregnancy comes primarily from three different research groups in San Diego, Dallas, and Sweden. The frequency of placental abruptions, premature birth, low birth weight, small head circumference, cerebral infarctions, and congenital anomalies after maternal amphetamine use was similar among the populations studied. They were virtually identical to those that have been reported to occur after cocaine use. There are two possible mechanisms by which cocaine or amphetamine may affect pregnancy outcome. The first is vascular, which leads to reduced blood flow to the fetus. The second is a direct t effect on the developing fetal brain.

The impact of reduced blood flow in a developing fetus can be manifested by significant limb reduction deformities. Cocaine and methamphetamine rapidly cross the placenta where they can induce vasoconstriction in the fetus. Because of the

great difference in weight between the mother and child, the dose that the fetus receives is significantly greater. Thus, limb reductions and myelomeningoceles can occur secondary to pronounced and prolonged ischemia. Reduced blood flow may also be implicated in the observed incidence of low birth weight among cocaine and methamphetamine-exposed fetuses. The average birth weight for the amphetamine-exposed children is about 300 gm lower than controls. However, just as has been observed in cocaine-exposed children, the single most common drug leading to low birth weight is not cocaine or amphetamine, but tobacco.

The direct effects of psychostimulants on the developing brain have been studied most extensively during long term outcome studies. The Swedish group is now in its 16th year of prospective follow ups of a group of children whose mothers used amphetamines during pregnancy. Although lacking a control group, children exposed prenatally to amphetamines scored in the normal range on standardized IQ tests, but by age 7 or 8 they began to have higher levels of aggressive behavior, more problems with adjusting to environments and higher rates of school failure. Unfortunately, fetal alcohol exposed children were not separated from the group, nor were there any controls for the frequencies of the observed behaviors in the parents of these children, again emphasizing the difficulties of conducting this t of research.

Because of the lack of data with methamphetamine, some of the potential consequences of its use during pregnancy must be surmised from the cocaine literature. Even this is flawed because there are no "pure" cocaine users-virtual all are polydrug abusers, a factor that complicates the interpretation of the developmental data. When measuring long-term growth, IQ (cognitive development), home environment and behavior, a number of different instruments must be used. The Home Screening Questionnaire provides a measure of developmental support within the home and correlates with whether the mother is continuing to use drugs after pregnancy. Other indices of drug effects include biological measurements such as birth weight and head growth after birth and child behavior such as externalization (hyperactivity and aggressiveness) and internalization (distractibility and thought disorders). For comparison purposes, very important to obtain and follow an appropriate control group that is selected from a similar social, economic and geographic area.

In studies conducted in Chicago, the typical pattern of drug use among the study populations was the combined use of cocaine, alcohol, marihuana and tobacco. There is a significant impact of prenatal drug exposure on IQ at 3 years of age. However, this impact is ameliorated by a favorable home environment which also affects IQ. Because of the nature of the polydrug abusing population, the impact o cocaine, amphetamine or alcohol use cannot be separated. The worse combination is alcohol and cocaine. Prenatal exposure and a small head size coupled with a poor home environment, especially if the mother continues to use drugs, together with high levels of distractibility are most predictive of a low IQ at 3 years of age. same model has been applied to the same children who are now six years old.

Attempts to attribute variations in IQ to prenatal drug exposure alone fail becaus home environment is the single most important factor predicting IQ. This is indicated by studies in which prenatally exposed infants were adopted at 2 to 3 da of age and tested at ages three and six. A recent cohort of such children at 6 yea age had a mean IQ of 115 as compared to an IQ of 89 in the prenatally exposed group who were not adopted but raised by their birth mothers.

In order to fully evaluate the multiple factors that can affect long term outcome prenatally exposed children, a broad range of measures is necessary. Using the Achenbach Child Behavior Checklist and teacher report form and a continuous performance task collectively, the study in Chicago demonstrated that, regardless environment, children prenatally exposed to cocaine (data on amphetamines are unavailable) have increased rates of impulsive and aggressive behavior, thought disorders (the mind wandering) and difficulty in maintaining attention at age six. The children's behavior can be divided it into two categories: 1) internalizing an externalizing behaviors. Contrary to popular belief, the prenatally exposed childr have higher rates of internalizing behaviors manifested by difficulty in concentrating, thought disorders and higher levels of frustration which then spill over and are often manifested as externalizing behaviors.

Exposure to methamphetamine via side stream smoke inhalation can result in

detectable levels in the child's urine. Also, as a result of the emergence of smal rural labs making illegal methamphetamine, the incidence of children appearing in emergency rooms with seizures, tachycardia, cardiac arrhythmias, and other medical complications resulting from drug exposure may increase, especially in areas that may not be adequately equipped to handle such emergencies.

In summary, to evaluate possible effects of maternal drug abuse on human development, a more global view of drug abuse is needed. Factors which are sometimes viewed as confounding by the researcher, such as the mother's use of other drugs, her nutritional status, socioeconomic level and other environmental variables, must all be considered relevant in dealing with the realities of drug a Because of these complexities, it is unlikely that any adverse effect can be attri to a single drug. Moreover, it may not be cost effective or realistic to try to id the effects of methamphetamine abuse alone since it is so rarely the only factor adversely affecting the infant or child's development. Fortunately, children have remarkable resiliency and capabilities for recovery. If a behavioral or developmental problem is detected early and efforts are made to provide maternal treatment and to foster parenting skills, or the child is removed from the environment, the prospects for a more normal developmental pathway are often good.

TREATMENT OUTCOME IN COMMUNITY PROGRAMS

The concept of interlocking ecologies or networks helps put treatment outcome data in perspective. Treatment does not occur in a vacuum, but in dynamic interaction with other relevant factors. These include: user characteristics, support networks role of law enforcement agencies, consequences of use, other social services available, as well as the treatment system itself. All of these have different boundaries, levels of permeation, and interaction with the other networks. There i also a link between epidemiology and
treatment that results in three categories for classifying drug users:

1. Casual users (usually identified in the National Household Survey and other broad population studies) do not, as a rule, need treatment.

2. Currently, high severity users such as the convicted criminals, homeless and mentally ill generally do not get treatment either because they are either in prison, unable to negotiate access to the resources or they are prematurely released because the treatment service cannot meet their complex needs.

3. Moderately severe cases constitute the majority of those who curre receive treatment. However, not all of those assigned to treatment programs may actually need treatment (some casual users, as well as persons more seriously involved with drugs, are directed to such programs simply because of having been arrested for drug possession).

Because California is one of the few states in which there is a widespread regiona epidemic of methamphetamine use, the California Alcohol and Drug (CAD) Data System provides one of the most comprehensive sources of information on methamphetamine treatment outcome. Among arrestees identified in the California DUF project, most users, regardless of their primary drug of choice, have had no prior treatment. Of the treatments available, the most commonly received was pharmacotherapy which was most common for heroin and speedball abuse (simultaneous use of heroin and a stimulant drug). In general, it is not easy to into treatment. One must have a need for treatment, and frequently the individual does not recognize her/his own need. More commonly, the courts or the individual's family will recognize the need and strongly urge or judicially coerce the individu into treatment. Acknowledging a need for treatment,.gaining access to a program and getting into it are all major obstacles that drug users have to overcome. A bi and selective sample of users needing treatment eventually gets into treatment and treatment attrition is common. As a general rule for all substance abuse treatment short-term treatment is delivered, the individual experiences good short-term and long-term outcomes, but improved functioning is most likely when the client remains in treatment for longer periods.

Excluding clients who are in methadone programs or who are primarily alcohol abusers (because they skew the data), the number of drug treatment admissions for methamphetamine abuse in California from July 1, 1994 to June 30, 1995 was 22,644, accounting for a third of admissions and the most common reason for seeking treatment. Use of heroin/opiates and of cocaine/crack, at 18,101 and 15,98 admissions, respectively, were the next most common reasons for seeking treatment. If all secondary drug use is considered, the percentage of methamphetamine-related drug treatment admissions jumps to nearly 40 percent. Demographically, those seeking treatment for methamphetamine abuse are predominantly white (76.5%), equally male or female, and between 25 and 35 years old (51.5%).

The distribution of admissions to treatment in California parallels trends in nati epidemiology data in that the prevalence of methamphetamine abuse as a reason for seeking treatment in urban areas is less than that in rural counties. In large cit such as Los Angeles, methamphetamine abuse accounts for about 13 percent of admissions, but many rural counties have admission rates in the 50-80 percent range. The rates of admission with amphetamine as the major problem in these rural areas even exceed the 45 percent rates for methamphetamine treatment admissions in San Diego. An interesting pattern is that while the DUF data identified Sacramento as having a very large number of methamphetamine users, the treatment system was not treating them. This degree of variation in California is important because it is unclear what accounts for the large disparities within this single s

Of the available treatment programs, the outpatient drug-free type is currently th most popular, followed by residential non-detoxification, residential detoxificati and day care treatment. In California, hospital inpatient treatment is virtually nonexistent. The mean length of stay in each of the above programs differed somewhat by the substance used, but in general, methamphetamine users were similar to other primary drug users. Compared to those who abuse only opiates, they stayed a little longer in outpatient programs. The higher incidence of day treatment is likely due to the high proportion of women because California has a system of day care treatment programs for women.

The CALDATA study was commissioned by the State Department of Alcohol and Drug Programs and collected field data during 1991-1992. The intake characteristics of this sample do not show the same proportion of women as the CAD data. The percentage of whites is a little lower and the percentage of Hispani higher than in other databases. The 25-35 year age group still predominates and they are a relatively well educated group. Other characteristics of methamphetamine abusers who received treatment in this study include a high frequency of having been arrested (83 percent), incarcerated (38 percent) and havi shared needles (57 percent). Methamphetamine users did not differ from other drug users with respect to their reasons for entering treatment. Among methamphetamine users, personal motivation was highest at 69 percent, followed by pressure from th criminal justice system and from a relationship at 31 and 22 percent, respectively Reasons for leaving treatment were not significantly different from other drug abusers; having "completed treatment" was the most frequent reason at 41 percent, followed by unsuccessful treatment at 20 percent.

Many different treatment services were actually received, including education classes, residential detoxification, ambulatory detoxification, activity groups, 1 step activities, day treatment, case management and sober living. The highest completion rate was observed in the 12 step program in which 53 percent were classified as completers. The services received by methamphetamine users are characteristic of the treatment modalities they are able to access. Reported reductions in drug consumption after treatment across all drug classes was about t same for all treatment groups. Thus, based on the self-reports used by CALDATA, methamphetamine users are neither more nor less successful than heroin, crack/cocaine, speedball or marihuana users in quitting drug use. There continues be slightly higher rates of polydrug abuse among the methamphetamine group even after treatment. In general, the data on methamphetamine abusers from Los Angeles County reflect statewide data with respect to ethnic profile, age range, sex distribution, education level, program type, completion rates, arrest rates.

As the types of treatment available in the state are delivered at many different s direct comparisons to determine the relative success of methamphetamine abusers compared to other types of drug abusers is not possible using the CALDATA data set. For such comparisons to be meaningful, a controlled study performed at the

same site is needed to directly compare the outcomes of groups of cocaine and methamphetamine dependent patients. The Matrix program treatment protocol was developed with NIDA funding and uses a combination of group and individual methods that draw from the cognitive-behavioral literature. Relapse prevention an psychoeducation are presented via a manualized method and the treatment is delivered in a highly structured manner. Three different populations of methamphetamine and cocaine abusers were studied: those entering an outpatient treatment program, those entering an outpatient demonstration program, and non treatment- and treatment-seeking gay/bisexual men.

The demographics of the outpatient treatment population mirror the state populations and except for ethnic distribution there were no large differences between the cocaine- and methamphetamine-abusing groups. The routes of administration did differ in that methamphetamine users preferred the intranasal route while cocaine abusers preferred smoking. However, methamphetamine users tended to use multiple routes of administration because the drug causes significan irritation to the nasal mucosa or lungs. Methamphetamine is typically used on a regular daily basis while crack smokers tend to "binge" on large amounts, interspersed with periods of non-use. Methamphetamine users integrate their drug use into many of their daily activities. In contrast, cocaine use tends to be limi binges or specific situations. Compared to the crack users, there appears to be le alcohol use among methamphetamine users although there is still a significant amount of alcohol use. However, there is a high rate of marihuana use among methamphetamine users. Methamphetamine users spend much less on drugs than cocaine users primarily because methamphetamine is much less expensive.

The incidence of side effects such as chest pain, seizures, loss of consciousness, suicidal thoughts are approximately equal in the two groups. Some notable differences include a higher incidence of headaches, severe depression and hallucinations among methamphetamine users. The incidence of paranoia was similar for both groups.

The conditions of treatment delivery and patient compliance were exactly the same for both groups, including treatment duration, number of sessions attended, treatment hours, urinalyses collected and the percentage of clean urine samples. T discharge status was also very similar for methamphetamine and cocaine users. The treatment responses between methamphetamine and cocaine users did not differ and in the placebo controlled desipramine trial there were no statistically significan differences for any variable. The responses on all eight Addiction Severity Index domains (medical, employment, alcohol, drug, family, social, legal and psychiatric were similar for cocaine and methamphetamine users.

A non-treatment-seeking sample was described that included 1,400 individuals randomly interviewed on the street by a Street Outreach Worker in Hollywood. Of the gay and bisexual male injection drug users, 07 percent reported using methamphetamine in the last 30 days. This frequency is higher than any other drug reported. Of the gay and bisexual male injection methamphetamine users, 54 percent reported sharing needles in the last 30 days, 74 percent reported providin sex for money or drugs. Of the gay and bisexual male non-IDU methamphetamine users, 58 percent reported providing sex for money or drugs.

In this sample of 1,400 subjects, the methamphetamine users were less educated, more likely to be unemployed, had begun drug use at an earlier age, had more daily use patterns, spent less time abstinent, spent less money on drugs, had more drug using friends, more depression, headaches and hallucinations and needed more medical treatment than cocaine abusers. In spite of these numerous minor differences in demographics, the participation in treatment was similar among a group of methamphetamine and cocaine abusers and the outcome was the same. Nevertheless, this data from a controlled treatment study might be interpreted to mean that methamphetamine abusers are a sicker group but have an equally good response to treatment as their cocaine-dependent counterparts.

Washington State has witnessed a six-fold increase in methamphetamine admissions to treatment programs since 1992. Of these, 38 percent inject methamphetamine; other characteristics such as being primarily Caucasian and under the age of 25 parallel those of other regions in the United States. In this State, there is a 1 gay/bisexual population with a high prevalence of HIV infection. Perhaps as a result, the first needle exchange program targeted towards methamphetamine users

was established in King County, Seattle. The results of treatment studies in such well circumscribed populations are needed to understand the unique dynamics of methamphetamine abuse and how it spreads throughout a community.

In summary, a comprehensive evaluation of the statewide treatment services provided by California revealed that methamphetamine users do not differ from other drug abusing populations with respect to treatment types and outcome. Some differences in ethnic distribution, age and male/female ratios were evident, prima between opiate and crack/cocaine users. Statewide, the 12 step program had the greatest success among methamphetamine users, but activity groups were a close second. Ambulatory detoxification was least effective. In a NIDA-supported program (Matrix) that used a manualized treatment protocol, methamphetamine users did as well as cocaine users with respect to treatment outcome. Thus the symposium presenters concluded that there is no reason to believe that special programs need to be developed to treat methamphetamine abusers.

MEDICATION DEVELOPMENT EFFORTS AT NIDA

It is well accepted that no single program is effective for treating all drug abus The current strategy is to have a variety of tools at one's disposal to offer to a particular patient in order to optimize treatment to meet his or her particular ne Pharmacotherapy represents a major effort in this area. Currently, there are no programs developing medications to treat methamphetamine abusers per se although NIDA currently funds individual grants for this purpose. However, it remains to be seen whether a special program is needed or, alternatively, whether the existing cocaine medication program at NIDA can meet the needs of methamphetamine abusers in treatment. The budget for the NIDA Medications Development Program is currently $58 million a year. The division dispenses $20 million dollars of that to clinical studies and $20 million to preclinical (animal studies; the money is split about evenly between grants and contracts. In addition formal drug testing, NIDA supports chemists who are engaged in structure-activity studies and synthesizing compounds for subsequent testing.

The scope of the medication development program ranges from in vitro assays of promising compounds to multicentered clinical trials. The screening program for cocaine medications begins with very basic pharmacological testing and progresses to behavioral tests, motor activity, drug discrimination and then self-administrat studies. The strategy is currently aimed at identifying two types of medications: cocaine-like agents and cocaine antagonists. As there are two main families of dopamine receptors (D1 and D2/D3/D4), an important aspect of this program is that the antagonists are not limited to receptor antagonists, but include any compound that can reverse the physiological and/or behavioral effects of cocaine. In addit the rationale for studying a particular compound can be receptor-based or what is termed "rationale of CNS activity" based. The latter refers to pursuits based on knowledge of a drug's effects on a particular area of the brain known to be affect by cocaine.

The next step in the screening process is to test whether the new drug increases locomotor activity and whether the magnitude of effect is greater or less than tha cocaine. If s drug does not have locomotor stimulating activity, then it is tested its ability to block cocaine's locomotor stimulating activity. Behavioral testing follows using a drug discrimination procedure. The drug is tested to determine if blocks cocaine discrimination. Finally, the drug is tested to see if it is self-administered or if it blocks cocaine self-administration in rats.

This strategy of evaluating antagonism and substitution serves as the basis for exploring new medications to treat cocaine dependence. The second major principle that is followed relates to detecting specificity of effect. Ideally, a drug that cocaine self-administration should not also reduce all other behaviors. Converse1 a medication that reduces self-administration of a number of different drugs belonging to different pharmacologic classes (i.e.,. lacks specificity) would be of tremendous value in treating polydrug abuse.

Other strategies currently being pursued include evaluating compounds that bind to the dopamine transporter and determining whether this results in an increase in dopamine transmission. Immunologic approaches are also a high priority with an emphasis on developing antibodies to cocaine in order to inactivate it soon after administration. Other approaches might be to increase the amount of catabolic

enzymes responsible for metabolizing cocaine. Because of the many similarities between cocaine's and methamphetamine's effects, many of the above strategies could be easily applied to develop medications for methamphetamine abuse. However, some of the techniques, especially those that depend on structure-activit relationships and immunology, will not work directly as the physical properties of the two drugs are too different.

GAPS IN OUR KNOWLEDGE ABOUT METHAMPHETAMINE

The consensus of the three work groups identified the following key gaps in our knowledge about the basic pharmacology, toxicity and treatment of methamphetamine abuse:

Basic Pharmacology:

1. What neurobiological and behavioral mechanisms of action of methamphetamine can be exploited to develop a more effective treatment program?

2. To what extent can cocaine-related basic research programs be used to stud methamphetamine-related treatments?

3. Using laboratory models, to what degree does acute and chronic methamphetamine increase aggressive, impulsive, risk-taking, hyperactivity, hyper-reactive and hypersexual behaviors?

4. How does sensitization affect the development of dependence on methamphetamine?

5. Do sensitization and dependence develop at the same rate?

6. What are the biological and behavioral mechanisms of methamphetamine that determine an individual's vulnerability to toxicity and dependence?

Toxic Complications:

1. What pharmacological and environmental conditions predict the onset and the severity of toxic psychosis?

2. What role does sensitization play in the development of toxic psychosis?

3. Does CNS toxicity occur in humans? The use of post-mortem studies and PET scans may be useful to more fully understand the real clinical consequences of CNS toxicity.

4. In addition to methamphetamine use, what is the role of environment and other drug use on the developing fetus?

5. To what extent does vasculitis and pulmonary and hypertension contribute to methamphetamine's toxic profile?

6. What is the natural history of withdrawal from chronic methamphetamine use?

Treatment/Prevention:

1. What are the specific psychosocial and pharmacotherapy treatment strategie that are effective in addressing the outreach, treatment engagement, and treatment retention and relapse prevention issues of methamphetamine users?

2. Can standard chemical dependency treatment programs (and pharmacotherapies) be used to treat methamphetamine abusers, or do the programs need to be modified to address special needs/conditions?

3. What is the impact of alternative media and community level interventions and what are the mechanisms by which they act (using randomized field trials)?

4. Which forms of personal and social harm are associated with methamphetamine abuse and how can strategies to eliminate them be identified (i.e., to reduce their social cost)?

5. To what extent can the study of island community outbreaks of methamphetamine abuse be applied to study the spread of the problem through larger populations?

6. To what extent do the outbreaks of methamphetamine abuse in Japan and Sweden resemble those here in the U.S. and can we apply the knowledge gained from their experience to help prevent/treat the problem here?

7. What role does methamphetamine play in the transmission of HIV?

RECOMMENDATIONS

1. Evaluate current research/contract programs at NIDA and determine how the above gaps can be filled by supplementing existing research endeavors rather than relying on new initiatives because the research grant avenue is too slow to respond to rapid developments of this nature.

2. Encourage comparative studies between cocaine and methamphetamine with the aim of determining if there are enough similarities to warrant using treatment strategies that have been developed for cocaine to combat methamphetamine.

3: Place an emphasis on studying the methods and rate at which methamphetamine abuse spreads through a micropopulation. This information could very well hold the key for curtailing the spread through larger populations.

4. Develop a method of communicating new information from the researchers to the clinicians who are treating the methamphetamine abusers. Standard methods of communication via scientific publications are too slow to keep up with rapidly emerging trends. Possible vehicles include teleconferences, cable TV stations, videotapes and technical reports.