U.S. Department of Justice
National Institute of Justice

National Institute of Justice **TAP Alert**

June 1986 Vol. 1 No. 3 TECHNOLOGY ASSESSMENT PROGRAM

Testing to Detect Drug Use

Drug Testing Becoming Commonplace

Testing employees for drugs of abuse has gone beyond the discussion stage. A quarter of the Fortune 500 companies now routinely require job applicants to be tested for drug use.

Drug testing is also increasingly common in correctional facilities and methadone maintenance clinics. Due to pilot programs in New York City and Washington, D.C., drug testing may also become commonplace during the pretrial stage of court procedures.

This issue of the TAP Alert briefly describes a few of the methods being used to detect drug use.

Drugs and Crime

Law enforcement professionals know that criminals who use drugs commit predatory crime, and that arrestees who use drugs near the time of arrest are likely to violate bail, to have multiple rearrests, and to have potential for committing violent acts.[1]

Because of the demonstrated link between drugs and crime, the Washington, D.C., Superior Court introduced a program to routinely test criminal defendants. With support from the National Institute of Justice, the D.C. Pretrial Services Agency is now using a quick, simple, and cost-effective procedure to monitor drug use during the pretrial stage of prosecution.

How Drug Screening Works

There are several basic methods for testing blood and urine to detect the presence of drugs.[2] The optimum method varies considerably depending on the volume of samples to be tested, the degree of sensitivity required, how quickly and accurately the tests are needed and, of course, the cost.

TLC. Thin Layer Chromatography (TLC) is frequently used for low cost, high volume drug screening. Separation and identification of drugs usually take place on a glass plate coated with a very thin layer of silica gel or alumina. TLC is not as sensitive as other techniques, but it is suitable for methadone maintenance programs, drug detoxification clinics, and some correctional agencies. TLC is often followed by a second method to confirm results.

GLC. Gas-Liquid Chromatography (GLC) is commonly used to confirm results found in other drug testing methods. It works on much the same principle as TLC. The purified sample is injected into a gas chromatograph that separates out the drug. GLC is more expensive but also more specific than TLC. The gas chromatograph can be modified depending on the purpose; for example, an instrument that is used to screen professional athletes will be more sophisticated than one used to confirm TLC results.

Mass Spectrometry. One of the most sophisticated tests for drugs is Gas Chromatography coupled with Mass Spectrometry (GC/MS). A mass spectrometer can determine the molecular weight of the unknown compound and allows the analyst to obtain excellent accuracy, reliability, and sensitivity. The machines can be quite expensive, and well-trained technicians are needed to operate them. GC/MS is the method of choice for forensic toxicologists and for the International Olympic Committee.

Emit®. The method used in the D.C. Superior Court is Emit, a system developed by the Syva Corporation. Emit uses the enzyme immunoassay technique rather than chemical reactions. In general, immunoassay testing is more sensitive than TLC and GLC. Accurate test results are available within minutes and the cost is moderate.

The D.C. Drug Screening Program

Before the preliminary hearing, arrestees are required to submit a urine sample that is immediately processed by the Pretrial Services Agency.

The drug screening program has given the judge an additional release option at the prelimi-

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nary hearing: the defendant can be ordered to remain drug free while awaiting trial, and his drug activity will be monitored by the Pretrial Services Agency. If the defendant is found to be using drugs against the court order, he is technically in contempt of court, and the judge can revoke release, order the treatment program, or put the defendant in jail.

How the Emit Technology Works

Emit is a semiautomated system with three components3:

o A carousel automatically measures the reagents--the chemicals that are added to the sample to perform the test. It also measures the proper amounts of the sample. It then pumps the combined reagent/urine sample to the second component, the spectrophotometer.

o The spectrophotometer reads the absorption of light waves through a standard amount of reagent/urine sample. A numerical value thus is generated that represents the presence or absence of the illegal substance in each sample. If the number on a given sample is significantly higher than a control number, the sample is determined to be positive for that drug. The test does not measure the amount of the substance in the urine, only the presence or absence.

o The third component is a computer that prints out a hard copy of the test results.

The instruments are calibrated several times throughout the day. They automatically measure the proper amount of urine and reagents for each test, and clean themselves between each test.

An Emit instrument can process up to 65 tests per hour. The D.C. Pretrial Services Agency processes over 3,000 urine samples per month, and has five drug testing machines--one machine for each drug tested (heroin, PCP, cocaine, amphetamines, and methadone). In smaller jurisdictions, one machine may be sufficient, in which case, a technician would manually administer the reagent for each drug to be tested.

The Syva Corporation trains technicians to operate the Emit system. Training takes 2 days and does not require any previous knowledge of the laboratory procedures.

Costs

The drug testing program in D.C. has 15 paid positions and costs about $600,000 a year, about half of which is spent on chemicals. The reagents for the test cost about $7.00 per sample.

Jay Carver, the Director of the D.C. Pretrial Services Agency, stated that the cost of the drug screening program is much less than treatment or detainment. Despite the cost, the D.C. government demonstrated its endorsement of the program by agreeing to support the program after NIJ funding of the demonstration project ended last November.

Constitutionality

The use of drug tests is relatively new in the criminal justice field, and there are only a few reported court decisions addressing the legality issues. However, those few decisions clearly show that the results from Emit tests present sufficiently strong evidence to revoke probation or parole or to take prison disciplinary action. The Syva Corporation claims the tests are 97 percent accurate. In the D.C. program, the remaining 3 percent are "false negatives"; i.e., persons who have been using drugs, but whose test results do not reveal the presence of drugs.

Future Developments

Research is now underway that may make urine screening obsolete. A method of testing hair samples is being developed that is expected to be highly accurate and cost effective. It is anticipated that hair sample testing will be further refined within the next several years.

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1 Testimony of Eric Wish, Ph.D., before the Subcommittee on Crime, U.S. House of Representatives, 1981.

2 For more details about various drug testing methods, see PharmChem Newsletter, vol. 12, no. 5, September-October 1983.

3 TAP does not endorse particular commercial products. Emit is discussed in detail because in the D.C. program, it has given very accurate results for a relatively low price and therefore seems well-suited for court settings.

For more information on this topic or the Technology Assessment Program, call the TAP Information Center at 800-24-TAPIC.

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The Washington, D.C., Urine Testing Program for Arrestees and Defendants Awaiting Trial:

A Summary of Interim Findings

June 5, 1986

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Summary

For each month since March 1984, when the D.C. Pretrial Services Agency (PSA) began urine testing of arrestees, **more than half** the defendants tested were found to have used drugs shortly before their arrest. In April 1986, 67 percent of the arrestees tested had used drugs recently, and 32 percent of the tested arrestees had used **more than one** drug.

Cocaine use has increased dramatically since March 1984, when 15 precent of the tested arrestees were cocaine users. In April 1986, 37 percent of the tested arrestees were cocaine users. (See Exhibit 1.) Cocaine in combination with heroin was commonly found among tested arrestees.

PCP and opiates are also major drug abuse problems among arrestees in the District of Columbia. In a typical month, about one-third of the tested arrestees are PCP users, and about one-fifth are heroin users. (See Exhibit 1.) PCP in combination with cocaine was commonly found among tested arrestees.

Urine test results showed much higher rates of drug use than defendants' self-reports indicated. Only about one-half of the drug users identified by urine tests stated to PSA that they were using drugs. PCP users were especially unlikely to report that they were using drugs--only 36 percent did so. (See Exhibit 2.)

Patterns of drug use are sharply different for defendants of different ages. **Rates of PCP use are highest for the youngest defendants** (ages 18-21). **Rates of opiate and cocaine use increase until age 31-35** and then decline. (See Exhibits 3 and 4.)

Women, who comprised 18 percent of all arrestees, had the same overall rate of drug use (52 percent) as men. In comparison with men in the same age group, **women arrestees were more likely to use opiates and cocaine and less likely to use PCP.** (See Exhibit 4.)

A substantial percentage of defendants in all major charge categories were using drugs. For example, approximately half the arrestees charged with robbery were drug users as were two-fifths of those charged with burglary and about one-third of those charged with assault. (See Exhibit 5.)

Summary (continued)

Pretrial rearrest rates were 50 percent higher for drug users than for nonusers. Also, users of two or more drugs were more likely to be rearrested before trial than users of only one drug. (See Exhibit 6.)

Defendants who had used drugs shortly before arrest, were placed in the pretrial urine testing program, and complied with the program's requirements by reappearing for periodic urine tests had lower rates of pretrial rearrest than defendants referred to drug abuse treatment or released without special conditions regarding drug abuse. When a defendant did not follow the urine testing program's rules, this was reported to the court, which could then impose sanctions on the defendant for failure to comply with the court's orders.

The results of the Washington, D.C., pretrial urine testing program strongly suggest that urine testing of arrestees can be an effective way of identifying defendants who pose high risks of pretrial rearrest and that a program of urine testing before trial can substantially reduce those risks for many defendants.

Background

The Urine Testing Program conducted by the D.C. Pretrial Services Agency (PSA)

- Virtually all adult arrestees in the District of Columbia, except those with relatively minor charges or facing Federal charges, are tested by PSA for the presence of 5 drugs: opiates, cocaine, phencyclidine (PCP), methadone, and amphetamines.
- PSA provides information on defendant's drug abuse to the court for its use in setting conditions of pretrial release.
- For selected defendants, PSA conducts urine testing throughout the pretrial release period.
- PSA's urinalysis program began in March 1984; currently, more than 1,000 newly arrested criminal defendants are being tested for drugs each month.

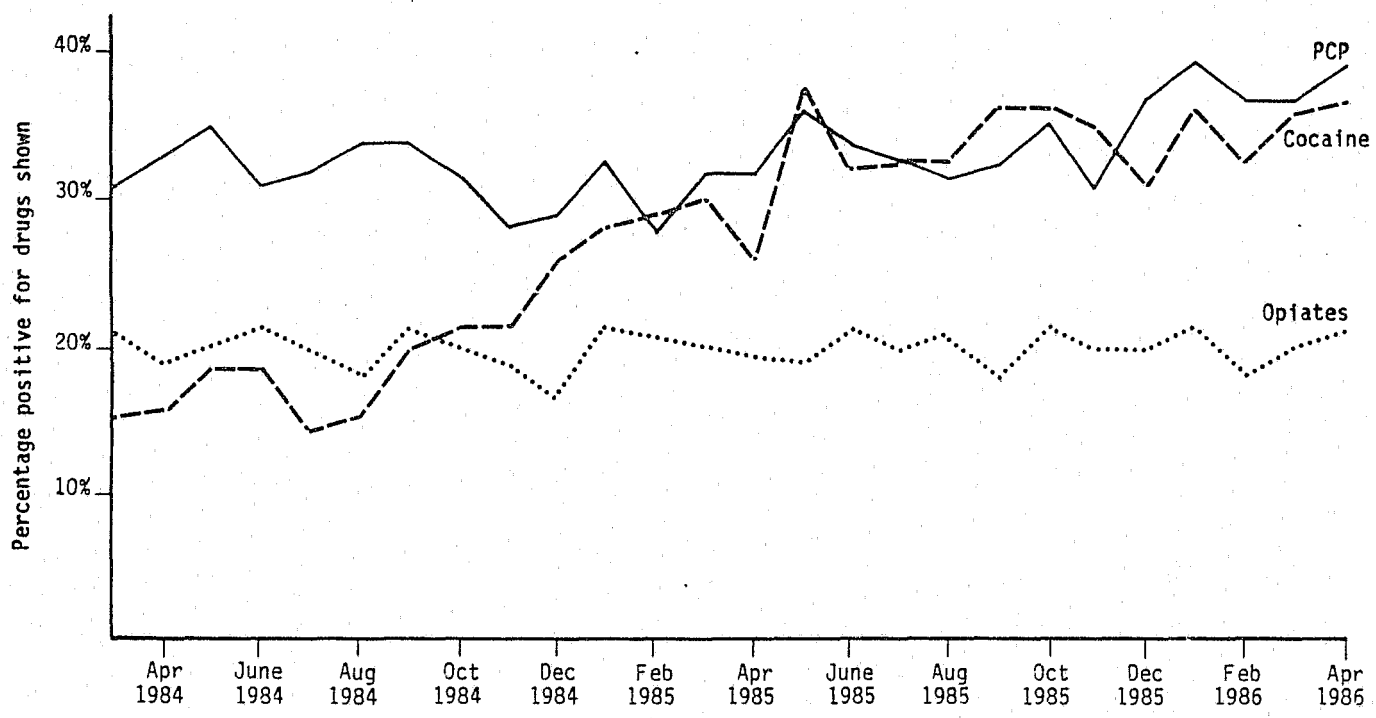
The research and evaluation program conducted by Toborg Associates

- Assesses whether current drug use at time of arrest as determined by urine testing is a good indicator of pretrial misconduct (e.g., pretrial rearrests and failure-to-appear for court).
- Evaluates effectiveness of urine testing before trial in reducing pretrial misconduct.
- Assesses relationships between drug abuse and criminality for Washington, D.C., arrestees.
- Focuses on approximately 6,000 defendants tested for drug use between June 1984 and January 1985 (the "study period").

Exhibit 1

Arrestees in Washington, D.C., Who Tested Positive for Opiates, Cocaine, or PCP* (Based on 31,189 total tests)

- Cocaine use increased dramatically over the period: from 15 percent to 37 percent.
- PCP use averaged 33 percent.
- Opiate use averaged 20 percent.

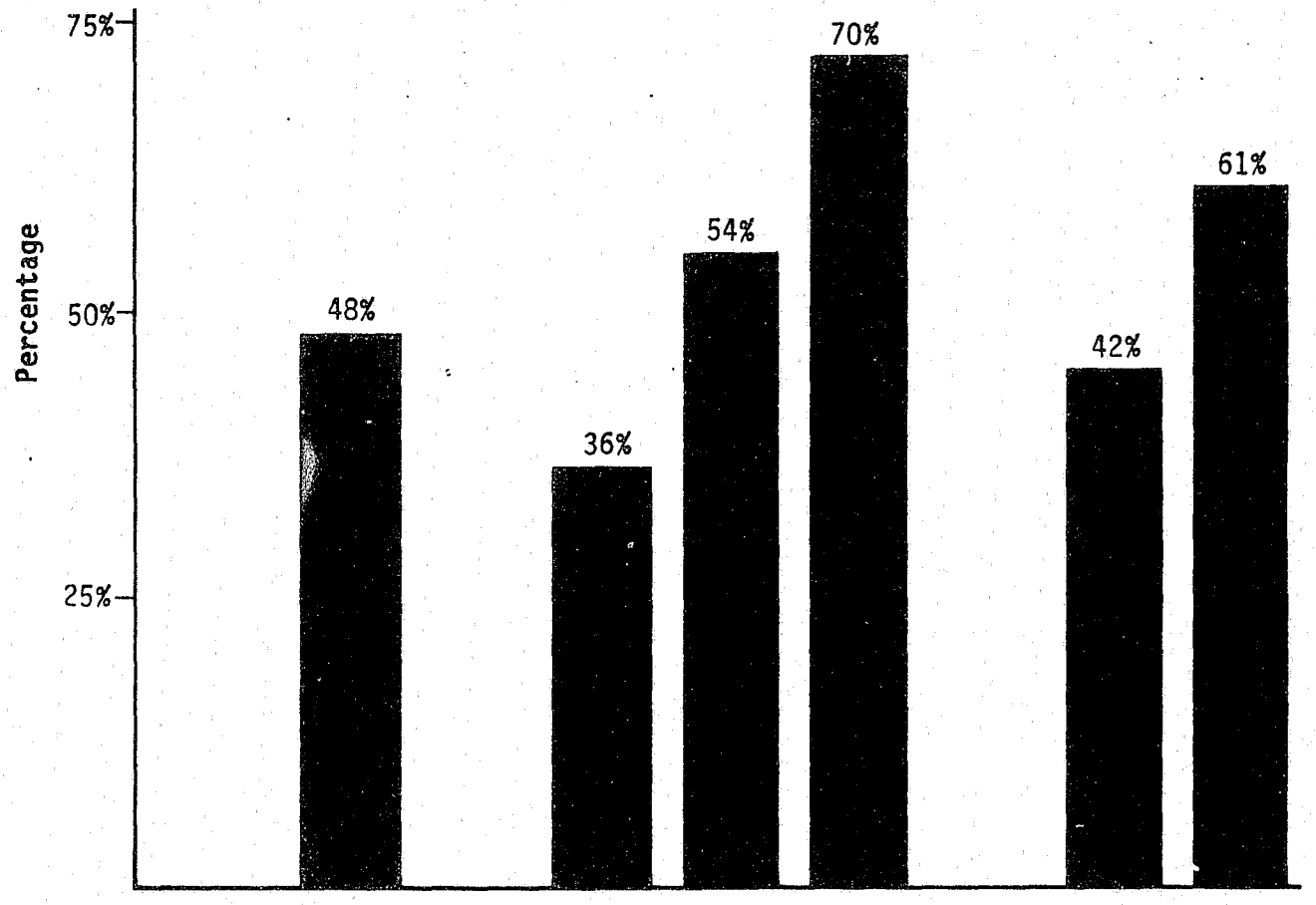


*Shown positive by Emit test. Urine tests are also conducted for amphetamines and methadone; the rates of use of those drugs have been quite low since the urine testing program began.

Exhibit 2

Drug Users Identified by Urine Tests Who Self-Reported Drug Use (June 1984–January 1985)

- Overall, only about half the drug users identified by the urine tests had self-reported that they were drug users.
- Only 36 percent of the PCP users identified by the urine tests admitted drug use.



Test Results	Used any drug	Used PCP	Used cocaine	Used opiates	Used only 1 drug	Used 2 or more drugs
Number of Defendants	2,938	1,653	1,078	1,069	1,978	960

Exhibit 3

Male Arrestees With Positive Urine Tests, by Age and Drug (June 1984–January 1985)

- For male arrestees, rates of PCP use are highest for the youngest age groups.
- Rates of opiate and cocaine use among male arrestees increase until age 31-35 and then decline.

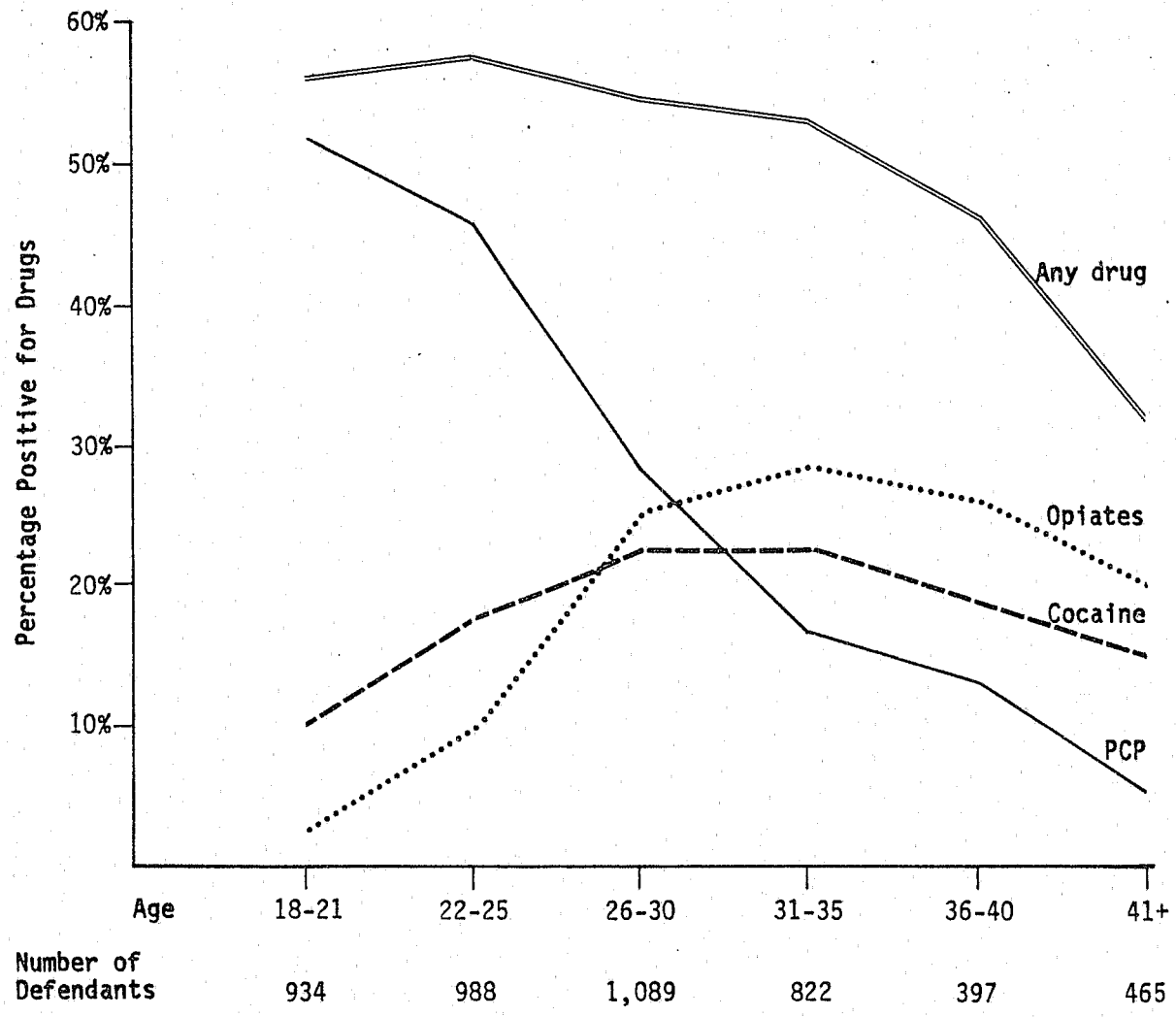
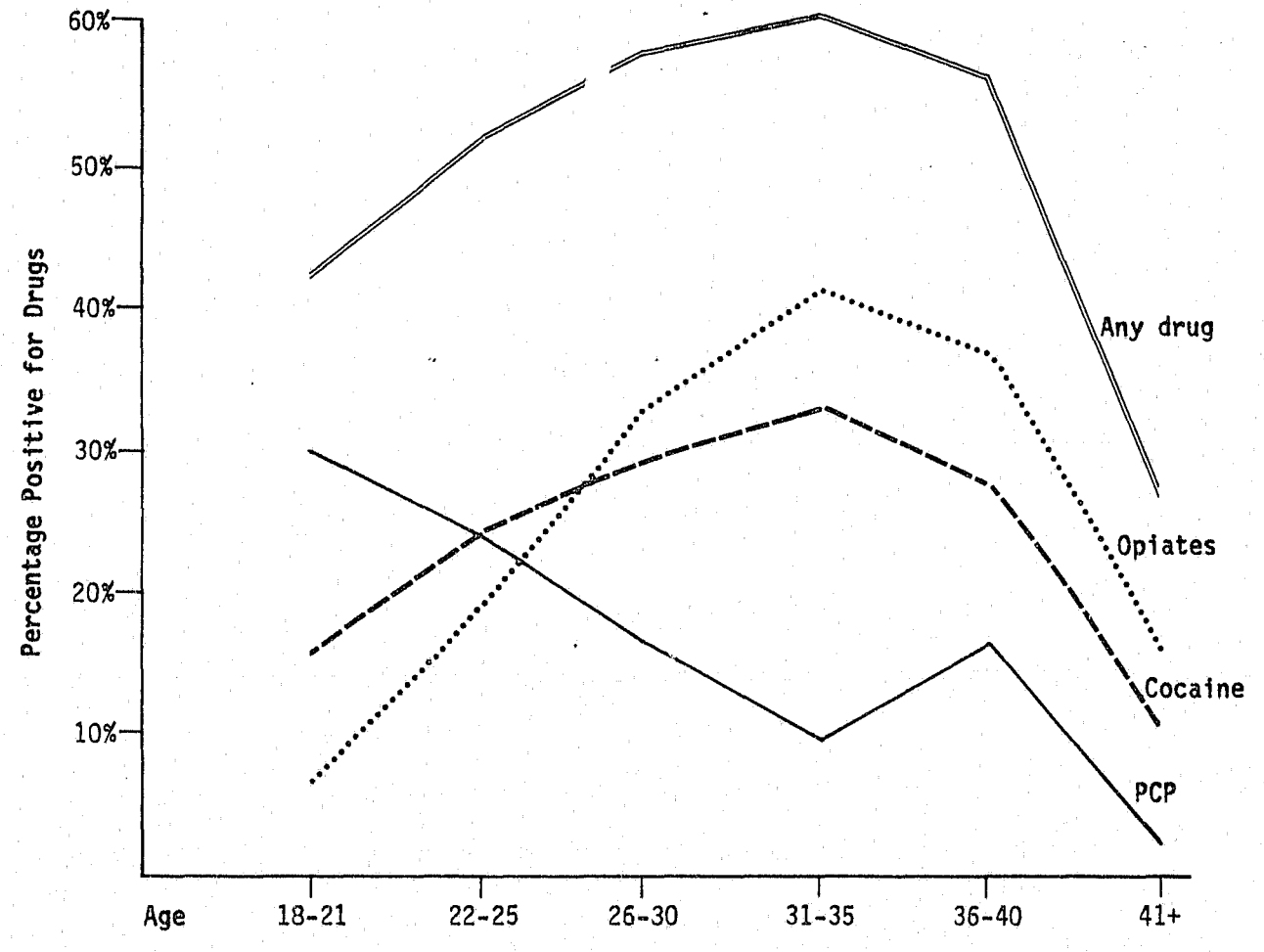


Exhibit 4

Female Arrestees With Positive Urine Tests, By Age and Drug (June 1984–January 1985)

- Women, who comprised 18 percent of all tested arrestees, had the same total rate of drug use (52 percent) as men.
- In contrast with men of the same age (see Exhibit 3), women were typically more likely to use opiates or cocaine and less likely to use PCP.



Number of Defendants	215	289	272	138	68	63

Exhibit 5

Drug Use by Charge
(June 1984–January 1985)

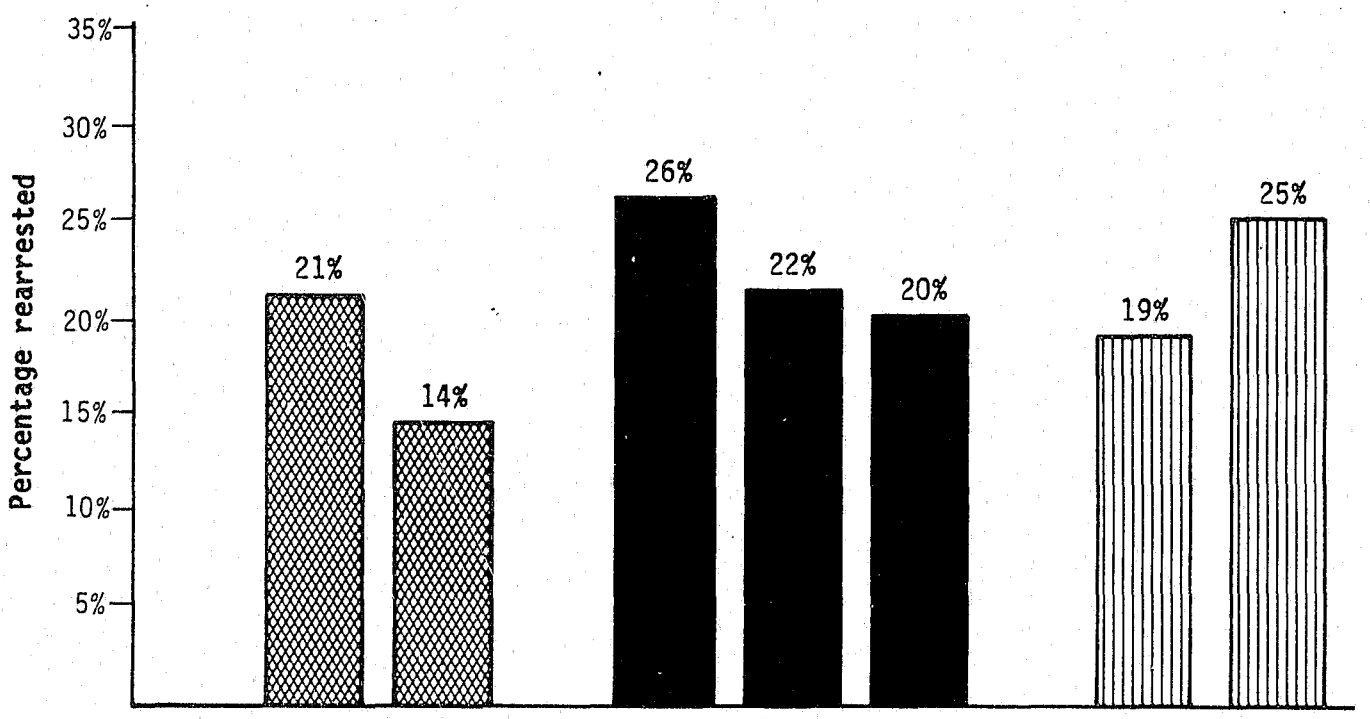
- A substantial percentage of defendants in all charge categories were drug users. For example, more than half the defendants charged with robbery were drug users; two-fifths of the defendants charged with burglary were drug users; and about one-third of the defendants charged with assault were drug users.

Offense Charged	Number	Percent Positive
Drug possession or sale	2,118	71.3%
Receiving stolen property	151	53.0
Robbery	340	51.8
Flight or escape	128	49.2
Auto theft	305	46.9
Larceny	371	43.9
Weapons	214	43.0
Burglary	356	40.2
Prostitution	399	37.1
Destruction of property	174	34.5
Assault	644	32.5
Other offenses	317	41.3
TOTAL	5,517	52.9%

Exhibit 6

Pretrial Rearrest Rates of Released Arrestees, by Urine Test Results (June 1984–January 1985)

- Drug users were 50 percent more likely than nonusers to be rearrested before trial.
- Users of opiates were more likely to be rearrested before trial than were users of cocaine or PCP.
- Users of two or more drugs were more likely to be rearrested before trial than defendants who used only one drug.



Test Results	Used any drug	Nonusers	Used opiates	Used cocaine	Used PCP	Used only a drug	Used 2 or more drugs
Number of Released Defendants	2,480	2,282	843	899	1,443	1,687	793

Urine Testing of Arrestees: Findings from Manhattan

June 5, 1986

By

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Summary

This paper presents early findings from a research project in New York City funded by the National Institute of Justice. The project has two purposes: (1) to examine the workability of a program to obtain urine specimens from arrestees being processed in a large metropolitan area; and (2) to study whether drug use by an arrestee is related to pretrial abscondence and/or rearrest.

In 1984 and 1985, research staff approached 6,406 male arrestees and 227 female arrestees charged with a variety of offenses and asked each to participate in a confidential research interview and to provide a urine specimen for analysis. Over 90% of the persons approached agreed to be interviewed, and over 80% of these provided a urine specimen. Additional information regarding each sample member's case processing, prior record, and subsequent contacts with the criminal justice system was obtained from criminal justice sources and merged with the urine test and interview information. All information was obtained for research purposes only and is accessible only to research staff.

The findings indicate that **thin layer chromatography (TLC), a popular method for screening for many illicit drugs in criminal justice and treatment settings, was less effective for identifying recent drug use** than the more sensitive enzyme multiplied immune urine tests (Emit). Estimates of drug use based on TLC were one-half to two-thirds lower than the estimates from the Emit tests (see exhibit 1).

The results demonstrate that **accurate detection of drug use by self-report is infeasible in an arrestee population.** Even in a confidential, research interview arrestees were likely to deny recent drug use; 28 percent of male arrestees reported using a drug in the past 24 to 48 hours, while 56 percent had a positive urine test (see exhibit 2).

The hard drugs (opiates, methadone, and cocaine) were found mainly in arrestees over age 20 and declined after age 35. Cocaine was the drug most frequently detected in arrestees at all ages. PCP was primarily found in arrestees below age 25 (see exhibit 3). **Although persons charged with the possession or sale of a drug were most likely to have a positive urine test, many of the persons charged with the other offenses were also drug users (see exhibit 4).** Relying solely on drug charges to estimate drug use would seriously underestimate drug use among offenders.

Summary (continued)

Analyses of pretrial rearrests have not been completed. However, this paper does include findings on rearrests that occurred in the 11 to 17 month period after the index arrest. **Not only were arrestees with a positive urine test more likely to have multiple rearrests, but those who had more than one drug in their urine had the greatest number of rearrests** (see exhibit 5). At all age levels, drug users had a greater number of rearrests than nonusers.

Both the urine test results and the interview information indicated that female arrestees were more likely to be abusing drugs than were male arrestees (see exhibit 6). Sixty-nine percent of female arrestees had a positive urine test result; 62 percent were positive for cocaine.

The findings indicate that urine testing in a large urban booking facility has useful applicability. Practitioners wishing to accurately identify drug-using offenders should consider using the more sensitive urine tests and should not rely on voluntary self-reports and/or arrest charges. Urine tests may be a helpful tool for identifying the more criminally active offenders in need of intervention, as well as persons at lower risk for rearrest.

Background

Sample

- 6,406 male arrestees processed in Manhattan Central Booking between April and October 1984; priority given to males charged with nondrug felony offenses;
- 227 female arrestees processed in Manhattan Central Booking between November 1984 and May 1985; priority given to females charged with nonprostitution offenses;
- 95 percent of eligible persons agreed to interview; 84 percent of interviewees provided a urine specimen for analysis.

Method

- Each arrestee was approached in Central Booking before s/he was sent to court for arraignment;
- The interviewer requested voluntary participation in the confidential research;
- At the end of the 5-minute interview about past drug use, each respondent was asked to provide a urine specimen for analysis;
- Urine specimens were analyzed by thin layer chromatography (TLC) and by Emit tests;
- Arrest and case information was obtained from criminal justice records.

Exhibit 1

Drugs Detected in Urine Specimens from Male Arrestees, by Type of Test

Drug Detected	Percentage Positive by Each Test	
	TLC	Emit
Cocaine	14%	42%
Opiates[a]	9%	21%
PCP	NA[b]	12%
Methadone	4%	8%

[a]The Emit test detects any opiate; in this population the most frequent opiate found is morphine, the metabolite of heroin.

[b]Not tested by TLC.

- Estimates of recent drug use by thin layer chromatography (TLC) were consistently lower than estimates based on the more sensitive Emit tests.
- Cocaine was the drug most frequently detected.
- 56 percent were found positive by Emit for cocaine and/or opiates and/or PCP and/or methadone.
- 23 percent were found positive by Emit for two or more drugs.

Exhibit 2

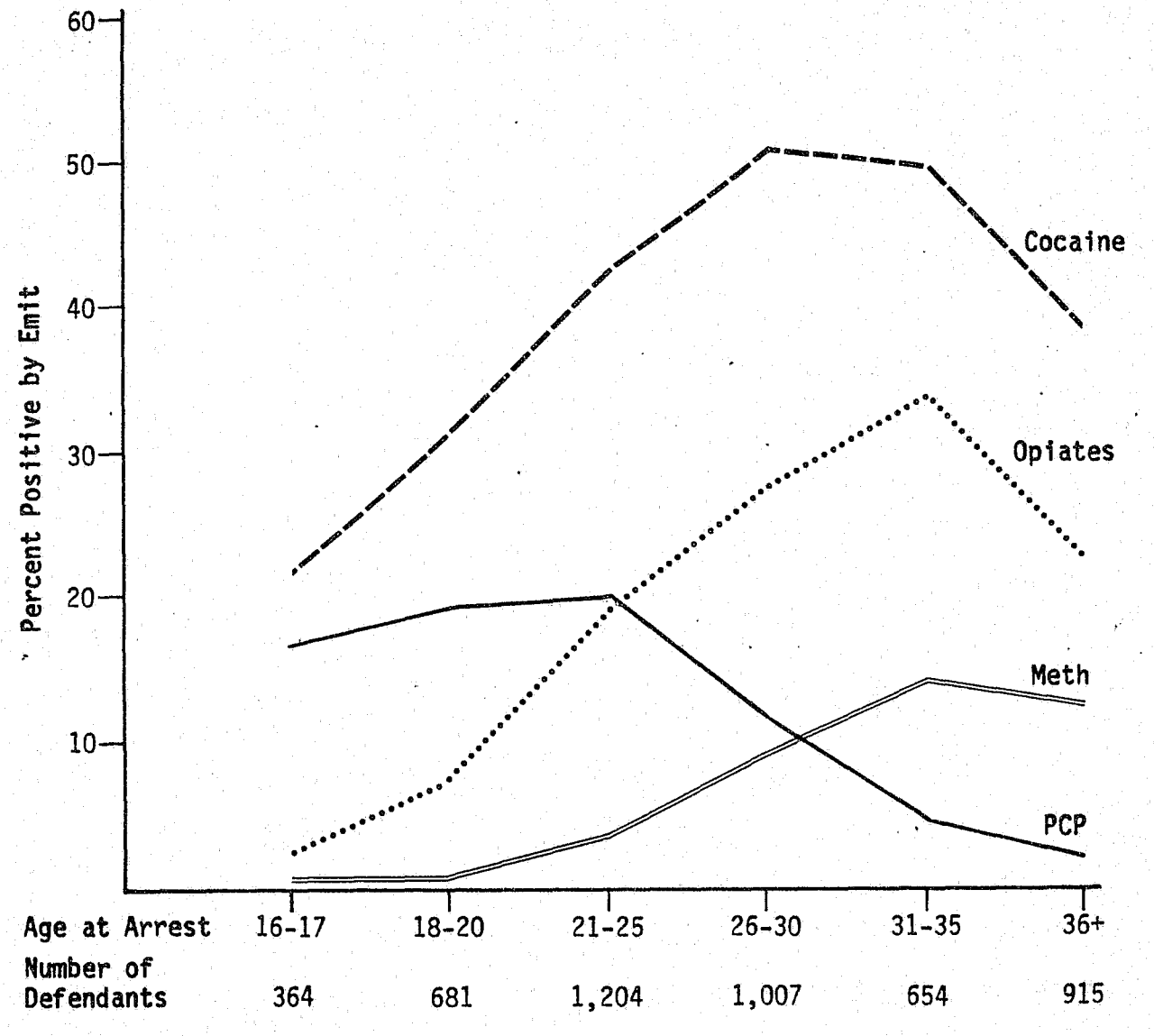
Percentage of Male Arrestees Who Self-Reported Drug Use, Compared With Percentage Positive by Emit

	Reported Using Drug 24-48 Hrs. Before Arrest	Positive by Emit at Arrest
	(N=4,847)	(N=4,847)
Cocaine	20%	42%
Opiates	14%	21%
Methadone	6%	8%
PCP	3%	12%
Any of the above drugs	28%	56%
2 or more of the above drugs	11%	23%

- Even in a confidential research interview, arrestees underreported the recent use of drugs.

Exhibit 3

Male Arrestees With a Positive Urine Test, by Age



- Detection of all drugs except PCP increased with age and peaked in the mid-30's.
- PCP was concentrated among arrestees under age 25.

Exhibit 4

Arrestees Found Positive, by Type of Charge

Arrest Charge	N	Percent Positive[a]
Possession of drugs	615	76%
Sale of drugs	355	71%
Poss. stolen property	474	61%
Forgery	94	60%
Burglary	348	59%
Murder/manslaughter	64	56%
Larceny	667	56%
Robbery	676	54%
Weapons	157	53%
Stolen credit cards	56	52%
Criminal mischief	66	48%
Gambling	147	45%
Sexual assault	79	41%
Public disorder	108	37%
Assault	506	37%
Fare beating	98	37%
Fraud	54	30%
Other offenses	269	45%
Total	4,833	56%

[a]Positive by Emit for opiates, cocaine, PCP, or methadone.

- Many of the arrestees charged with nondrug offenses were detected by urinalysis to have recently used a drug.
- The charges most associated with having a positive test result were drug offenses, possession of stolen property, forgery, and burglary.

Exhibit 5

Percentage of Male Arrestees Who Were Rearrested, by Test Result

	Urine Test Result		
	Negative	Positive for 1 Drug	Positive for 2 or more drugs
	(N=2,101)	(N=1,573)	(N=1,088)
Number of Rearrests[a]			
0	62	50	39
1	18	21	21
2 or more	20	29	40
	38%	50%	61%
	100%	100%	100%

[a] Measures all rearrests in an 11-17 month period after the index arrest.

- Persons positive had more rearrests than persons found negative.
- Persons positive for two or more drugs had the greatest number of rearrests.

Exhibit 6

Drug Use: Arrested Males Compared With Arrested Females

I. Information from self-reports

	Males	Females
Have you ever used any of the following drugs?	(N=5,750)	(N=192)
Marijuana	66%	81%
Cocaine	40%	71%
Heroin/Opiates	27%	40%
Illicit Methadone	12%	22%
PCP	11%	20%
Have you ever been dependent on any of the following drugs?		
Cocaine	11%	21%
Heroin/Opiates	20%	32%
Do you need treatment now?		
Yes	20%	24%

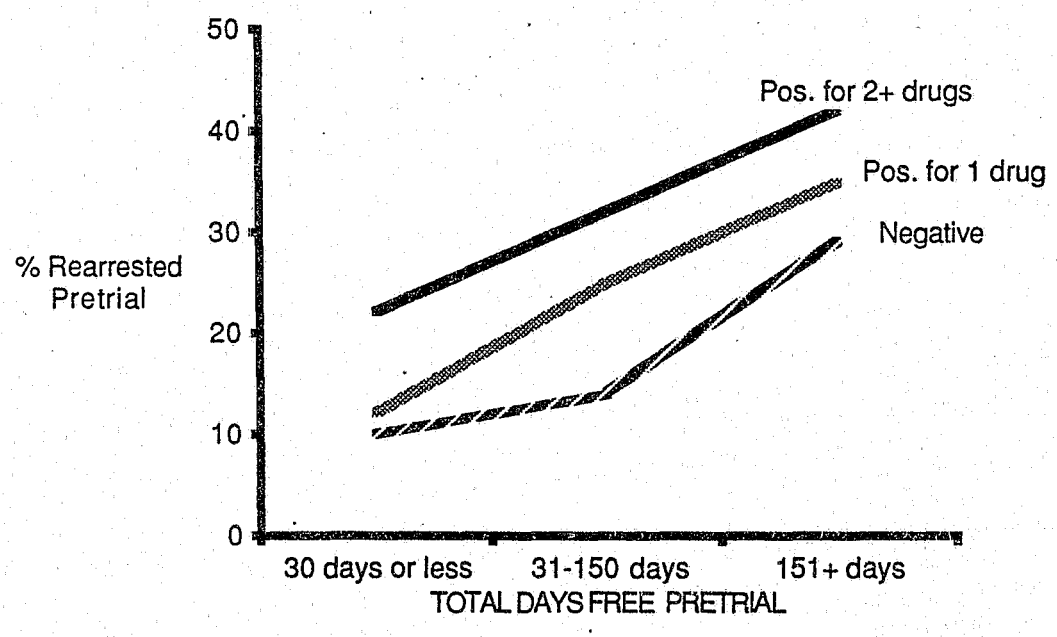
II. Information from urine tests

	Males	Females
	(N=4,847)	(N=149)
Positive for:		
Cocaine	42%	62%
Opiates	21%	28%
PCP	13%	3%
Methadone	8%	12%
Positive for any drug	56%	69%

- Both self-reports and urine tests indicated a greater prevalence of drug abuse among female arrestees than among male arrestees.

Additional Findings From the New York Study

PERCENTAGE OF MALE ARRESTEES IN MANHATTAN WITH AT LEAST ONE PRETRIAL REARREST, BY URINE TEST RESULT AND TOTAL DAYS FREE PRETRIAL
(N= 2,205 arrestees*)



*Excludes persons without a urine test, persons who were remanded for the duration of their case, or those who were disposed immediately at arraignment. Total days free pretrial is the number of days that the arrestee was at liberty during the time between arraignment and case disposition. Urine tests count the number of drugs detected of four: opiates, cocaine, PCP or methadone.

Crime in America is closely related to the use of illegal drugs. Over **half** of all criminal arrestees in New York and Washington, D.C., show a positive drug test result at the time of arrest.

Drug Surveillance Through Urinalysis

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Which one uses drugs?

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Drug Surveillance Through Urinalysis

A new video show

The National Institute of Justice presents a new video show...

Drug Surveillance Through Urinalysis

A recent National Institute of Justice study found that arrestees in Washington, D.C., who are drug users are half again as likely as nonusers to be rearrested before trial.

This 18-minute video presentation takes the viewer through the pretrial process in Washington, D.C., to see how one court is using the latest technology to control pretrial crime.

Five drugs tested

The D.C. program is part of an Institute-funded experiment to identify high risk defendants. The D.C. Pretrial Services Agency conducts urine tests on virtually all persons booked in order to identify high risk defendants.

The program uses Emit®, an automated urine testing process developed for the U.S. military. Arrestees are tested for five drugs: PCP, cocaine, amphetamines, opiates, and methadone.

97 percent accuracy

Emit can detect the presence of cocaine and opiates up to 2 days following use, up to 8 days for PCP. The test is 97 percent accurate for the five drugs tested. Its results help the judge monitor a defendant's use of drugs while awaiting trial.

Pretrial monitoring

If a defendant is released on recognizance while awaiting trial, the judge can order the defendant to stay drug free during the pretrial period and to report routinely to the drug testing unit to monitor his drug use. The judge can then revoke release if urinalysis shows the defendant has been using drugs against court order. Despite early fears, there have been no serious legal challenges to the program.

The video explains the procedures, the judge's alternatives, and the effectiveness of the program. Urinalysis testing creates a new and effective way of helping control pretrial behavior and gives judges, prosecutors, and probation officers additional weapons in the war against drug abuse.

This presentation demonstrates the advantages of drug testing to corrections officials, pretrial services agencies, parole and probation agencies, drug treatment agencies, policymakers, and legislators.

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