Testing Urine for Drugs

Urinalysis is being greatly expanded as part of the war on drugs; so is the controversy surrounding the program. Tests are now fast and accurate

This is the fourth in a series on addiction. Next: the biochemical basis of addiction.

"THEY TEST; WE SUE, it's as simple as that." So says Stephen Sachs, the former attorney general of Maryland, a celebrated prosecutor, now the agent for 100 attorneys in the U.S. Department of Justice who do not want to have their urine tested for drugs.

This frank hostility to urine testing, as a new dragnet gets under way within the federal government, seems out of place among officers of the law. But prosecutors enjoy privacy. What sets them apart from other dissenters is that they are more adept at challenging the law. As a result, the Administration's second big pincer in the war on drugs—a domestic assault on the "demand" side of the market, designed to complement the hunt for smugglers and dealers—is about to run into a tough legal challenge.

Together with lawyers for the American Civil Liberties Union, the Grand Lodge of the Fraternal Order of Police (representing 190,000 members), and agents of the U.S. Customs Service, Sachs is working on a legal blockade to stop urine testing of public employees. The argument is that it violates the Fourth Amendment to the Constitution, which prohibits unwarranted searches and seizures. In January, the Supreme Court agreed to hear a case (*National Treasury Employees Union* v. *William Von Raab*) that argues this point. It was brought by Customs agents, front-line soldiers in the war on drugs, who say they should not be forced to "urinate on demand under the close scrutiny of a stranger." The Supreme Court has combined this with a case from the Ninth Circuit Court of Appeals in which the judge ruled that the government did not have the authority to carry out mandatory drug testing of railroad employees after an accident. The arguments will be heard this fall.

The President launched the new era in drug testing on 15 September 1986 when he signed Executive Order 12,564, requiring that the urine of federal employees in "sensitive" jobs be sampled on a random basis. Draft guidelines came out in February 1987, and, after a lengthy parlay with Congress, the final details were released on 3 May 1988. Random testing of 346,000 key federal workers in 42 agencies is to begin later this year.

This program is meant to cut the demand for drugs, complementing the traditional attack on supplies. It is advertised as one of the few ways in which new technology can be used to combat the drug epidemic. The goal is to identify chronic users and send them off to treatment programs while scaring off casual users with the threat of job penalties.

President Reagan made it clear in 1986 when he signed the order that he intended the program to be a model for other public agencies, for government contractors, for grant recipients, and for private companies. On 9 June, he appeared before a meeting of executives who favor a "drug-free workplace" and promoted a broad national plan for urine testing. It was sponsored by Hoffman–La Roche, manufacturer of the testing system now in widest use by the government. La Roche is understandably enthusiastic about expanding the program.

Some members of Congress also have taken up the cause this year, promoting a variety of new laws that would make urine testing mandatory for many categories of people, including recipients of research grants. None has been put into effect as yet.

The technology traces its origins to the antidrug campaign of the Nixon Administration in the late 1960s and early 1970s, according to Robert E. Willette, president of Duo Research of Annapolis, Maryland, a consultant to federal drug testing programs.

In the Nixon years, Willette worked with New York City and the National Institute on Drug Abuse (NIDA) in Washington to develop a way of monitoring heroin use among people at treatment centers. The goal was to learn which therapies worked and which did not. Urinalysis was a simple and reliable means of checking on clients' progress. In the 20 years since then, urine testing has become quite a sophisticated industry.

Fighting to exonerate one's urine may become as commonplace as fighting for a better credit or insurance rating.

Recently, Willette says, there has been a revolution in the business because of the improved quality of test procedures and a boom in demand. The first improvement came with the introduction of tests that use recombinant DNA techniques to amplify trace chemicals in urine. The leading user of the technology at present is the Syva Corporation, a subsidiary of Syntex Corp. of Palo Alto, California, maker of the first widely used test for marijuana. Its Enzyme Multiplier Immunoassay Test (EMIT), marketed in 1972, has become the standard approach for screening large numbers of urine samples in the civilian world. Another screening method, the radioimmunoassay, is used by the Department of Defense, although it has the disadvantage of producing radioactive waste. (A Defense official says the department is conducting a general review of its screening technology just now.) A new technique, the fluorescence polarization immunoassay, is not so well established and requires a proprietary testing device manufactured by Abbott.

The success of the new tests results in part from their capacity to be used in automatic machinery. EMIT, for example, can be used in a robot tester that employs a light sensor to read urine samples and prints out a value for each of five or six drugs present. The state-of-the-art machine right now is one made by Hitachi, Willette says. It can read bar-code identification stickers on urine containers, reducing logging and tracking time, and churns out 15,000 to 18,000 results an hour.

The newest gadget, according to Willette, is the relatively cheap, desk-top mass spectrometer. Three companies recently introduced new models, each costing around $40,000. They enable urine testers to confirm positive screening results with the more

reliable gas chromatography–mass spectrometry method, and to do so for about $40 to $60 per sample. "Every lab I go into seems to have one now," Willette says. The Navy owns 50.

The military's leap into drug testing has done a lot for the industry. The armed forces began using urinalysis widely during the 1970s when soldiers began coming home from Vietnam with heroin habits. But the critical decision came in 1981, when then Assistant Secretary of Defense Frank Carlucci ruled that evidence from urine tests could be used in disciplinary actions. This gave the testing program teeth, but it also meant that test data would be scrutinized in court, and that they would have to meet the standards of forensic toxicology.

One reason for taking this step, says Willette, was that the Navy "got shocked out of its stripes in 1980" when a confidential survey found that 48% of enlistees had used some illicit drug (mostly marijuana) within the last 30 days. In addition, in another shocking discovery, half the crewmen who were killed by an accidental blast aboard the U.S.S. *Nimitz* in 1981 were found to have traces of marijuana in their bodies.

The Navy put into effect a sweeping program, taking 2.2 million samples annually, equivalent to testing its total population three times a year. The Army randomly tests its personnel once a year, and the Air Force, 50% of its personnel each year.

Navy Captain Leo Cangianelli says the program is a success. "It gives the kids a reason to quit drugs," he claims, and it is "sending a message back to high school—you can't take drugs if you want to be in the Navy." In a random sample of young enlistees in 1980, 48% tested positive for at least one drug (marijuana-positive being defined as more than 5 nanograms per milliliter). In 1987, about 3% tested positive (marijuana-positive being defined as more than 100 nanograms per milliliter). The Navy raised the marijuana value, Cangianelli says, to do away with arguments about "passive inhalation" of ambient smoke and to be certain exposure is recent. The Navy tests admirals as well as deck swabbers, and the iron rule is that two positive tests mean dismissal.

Outside the military, the biggest use of urine testing is in courts and prisons. The National Institute of Justice, the research arm of the Justice Department, has invested several million dollars in drug testing of people who are arrested on "probable cause" evidence of violating the law. People in this status have reduced rights under the law and are more likely to "volunteer" for intrusive testing. As Cangianelli puts it, the military and the police "have better control over people once they're inside." Here, the integrity of the sample is guaranteed because a witness goes into the bathroom with the donor and watches urine going into a cup. In the civilian program, according to published guidelines, the donors will enter a stall or screened area, leaving behind outer coats and baggage, while a monitor watches and listens outside for "any unusual behavior."

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Warning blast. *Half the crewmen killed in an explosion aboard the U.S.S.* Nimitz *in 1981 had traces of marijuana in their bodies; the Navy stepped up random testing soon afterward.*

Everyone arrested and taken to court for arraignment in the District of Columbia today is asked to give urine in the military fashion. Those who do and who test drug free are likely to be released before trial—a powerful incentive to cooperate. This program, begun in 1984 by John Carver, director of the D.C. Pretrial Services Agency, now processes over 25,000 people a year.

There is strong evidence that heavy drug use, particularly multiple drug use, is linked with criminal activity. It makes sense, Carver says, to keep those who test positive locked up until they are drug free. If they are judged by the court to offer only moderate risk to the community, they are sometimes let go on condition that they stay off drugs and report back each week for a test. If they test positive, or if they fail to show up, they may be locked up again for a few days on contempt of court. Carver reports that those who comply with the drug-free regimen are 30% less likely to be rearrested before trial than those not on the regimen or those sent to conventional treatment.

Although some observers believe urine testing has helped to deter drug use, Carver does not make that claim. However, he does say it greatly improves the efficiency of the criminal justice system, providing an objective, reliable standard by which to assess risk. It allows the courts to release more defendants before trial, confident that those it detains are the most dangerous. The process costs about $11 per test, Carver says, not counting staff costs. If the system were not being flooded with new defendants from drug busts, it might even reduce the prison population.

The National Institute of Justice began drug monitoring experiments at ten other major cities this year. The results are disturbing: half of all arrestees, and in most cities three-quarters of them, were on drugs. The pattern holds true even if marijuana is excluded.

As it seeks to expand drug testing to cover more civilians, the government must decide now how broadly to impose this surveillance and whether the loss in privacy will be worth the gain in public health and safety.

Already, thousands of private companies test new job applicants. The American Management Association reports that in 1987 34% of the 1000 companies it surveyed were using some sort of drug screening. In this setting, testing is a condition of employment and, because it is not ordered by the government, it is not considered a Fourth Amendment search or seizure. However, companies must take care in using the test results, for they may be sued on other grounds such as invasion of privacy. EMIT, for example, may tell the employer something about the legal prescription drugs an employee is using. Employers who do not use truly random methods to choose candidates for testing also open themselves to charges of class discrimination.

For years, the main objection raised against urine testing is that the technology is unreliable. This was a problem once, but is not a significant one any longer. Manufacturers of the EMIT screening test claim it is more than 98% accurate, with the error biased

toward false negatives. It is true that EMIT responds to a broad spectrum of opiate and amphetamine compounds, including some prescription medicines, ibuprofen, and poppy seeds. The company says the test could be focused more narrowly, but this has not been done because EMIT is generally used as a screen. Samples that come up positive on EMIT are then retested by gas chromatography–mass spectrometry for confirmation, a process that renders 100% accuracy. For example, eating poppy seeds may trigger a positive signal on EMIT, but the confirmation test tells that a key metabolite of heroin (6-*O*-acetylmorphine) is not present.

The sensitivity of tests varies with the drug being monitored. With EMIT, marijuana use is easy to spot and traces may be present as long as a week after use, or 3 weeks afterward, in the case of a heavy user. Cocaine and amphetamines are difficult to detect more than 48 hours after use. Opiates can be spotted 2 to 4 days after use.

More problematic than the technology is the human factor. The worst fiascoes so far have been caused by sloppy lab work. When the Navy first began its testing program in 1981, the Oakland lab was overwhelmed, Cangianelli says, and standards slipped. The Navy had to reverse all positive findings for a certain number of tests, clear the records, and rehire the people it had fired. Today it invests 20% of the cost of the program in quality control, pays independent scientists to inspect the labs every 2 months, and constantly challenges the system with blind test samples. In addition, the Navy has decided not to use contractors; it owns and operates all five of its labs.

The Federal Aviation Administration recently had problems with its forensic toxicology lab at the Civil Aeromedical Institute in Oklahoma City, where the technical staff proved incompetent. Last year the lab was disbanded. According to a spokesman, the chief toxicologist had acquired a new mass spectrometer but had not learned how to use it. Rather than confess ignorance, he certified that blood taken from engineers involved in a recent fatal train crash did not test positive for drugs. Only under the scrutiny of the court were discrepancies noticed. Officials then learned that the tests had never been done.

This record does not inspire confidence. It raises the question of whether high standards like the Navy's can be maintained among a flock of profit-making test companies, such as those applying to run the millions of tests required by civilian federal agencies. NIDA reports that it has already been swamped by 100 labs seeking certification, the ticket of entry to the bidding, twice as many as expected. New guidelines will impose tough quality controls and frequent inspections. But regulatory systems have a way of running down as time goes by. Fighting to exonerate one's urine may become as commonplace as fighting for a better credit or insurance rating.

Quite apart from the problem of data integrity is the question of relevance, says Allan Adler of the American Civil Liberties Union in Washington, D.C. Much of the discussion so far "misses the main point," he says. Urine tests have a "very limited probative evidentiary value" for the purpose to which they will be put—namely, deciding whether or not a person is doing the job. Urine tests do not tell if a person uses drugs while at work or if performance has been impaired by drug use. What they reveal is that a person has used an illicit drug, information, Adler says, that may be of interest to the police but not to most employers, who are constrained to judge workers by what they do on the job. Except when off-duty drug use has a direct impact on workday activities, it should be treated as a personal or a police matter, he says. Sachs and the Justice Department attorneys may make a similar argument.

As the legal battle gets under way, it is important to remember that most of the fuss will be about the smallest part of the problem, says Eric Wish, a researcher at Narcotic and Drug Research, Inc., of New York. The irony, as he sees it, is that urine testing has already shown where the drug problem is: it is among criminal defendants. Here, drug abuse runs at a phenomenal rate of 60% to 80%. In contrast, only 0.05% to 5% of workers in regular offices test positive. A large public investment may go toward mining a shallow vein of abuse.

"Perhaps the greatest danger posed by urine testing programs," Wish wrote recently, is the belief that "tests will somehow solve the drug abuse problem." They may identify a few more abusers, but drug treatment centers are already filled to capacity and are turning clients away. In Wish's mind, it would make sense to have "a comprehensive strategy for handling test results . . . before urine testing is adopted."

■ ELIOT MARSHALL

Superconductors: Is Japan Ahead?

Japan may pull ahead of the United States in the race to bring new high-temperature superconductors to the marketplace, says the Office of Technology Assessment (OTA) in a new study.* If the United States hopes to compete with Japan in commercializing superconducting technology, asserts OTA, a research arm of Congress, American industry must intensify basic research and work on applications and potential manufacturing processes.

Research conducted by government agencies and federal subsidies for industry, in themselves, are not likely to ensure that U.S. companies are top contenders in the marketplace, according to the study. In fact, the country lacks a cohesive, focused strategy for developing superconductors and applying them to commercial products, OTA contends in the report, which was prepared at the request of several House and Senate committees. While the United States may lead on the science front, this advantage will quickly disappear if American companies are not positioned to transform research findings into viable products.

Although the report is not directly critical of Reagan Administration efforts to promote the field, it indicates that the steps taken to date are not adequate. Not only is a broad spectrum of Japanese industry pursuing this research, but total R&D spending in Japan in 1988 is virtually equal to the $97 million that U.S. companies will spend. A survey conducted by the National Science Foundation (NSF) for OTA also revealed that Japan has 900 people engaged in research on high-temperature superconductors compared to 625 in the United States.

The distribution of federal research funds for high-temperature superconductivity is out of balance, says OTA. Federal funding for high-temperature superconductivity is estimated at $95 million in fiscal year 1988, up from $48 million in 1987. The Department of Defense (DOD) gets almost half of this, $46 million, and Department of Energy (DOE) has another $27.2 million. NSF is spending $14.5 million and has proposed a budget of $17.5 million for 1989.

Of all the federal agencies, OTA says NSF was quickest to respond to the research breakthroughs in the field in 1987. But much of what is funded at university laboratories occurred only because researchers utilized existing agency grants to pursue superconductivity issues. NSF needs an additional $4 million a year for 5 years, OTA suggests, to boost university-based research on high-temperature superconductors and to establish a dedicated research center.

OTA suggests that the U.S. drive to understand superconductors and make use-

**Commercializing High-Temperature Superconductivity* (OTA-ITE-388, U.S. Government Printing Office, Washington, DC, June 1988).