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).

ful materials is partly flawed because there is no assurance of a long-term commitment by government or industry to fund this research. The report examines three possible strategies that policy-makers may face in trying to shape a sustained and coordinated superconductivity R&D program:

■ A business-as-usual approach where DOD pursues processing methods for superconductors to support specialized defense applications. DOE's research would be carried out through its ten national laboratories. The ultimate success of DOE's work, however, would hinge on close ties with industry and the university sector. The federal government would also seek to ease antitrust limits on joint research efforts, enhance intellectual property rights, and encourage more private sector investment.

■ A more "aggressive" course would increase support for NSF-funded research, establish a working group on commercialization of high-temperature superconductors research. Industry, the university sector, and the government agencies would be represented on this working group which, in addition to shaping a consensus on the R&D agenda, would oversee funding for multi-company research groups.

■ Alternatively, the government could establish a federal technology agency or a cabinet-level department of science. Superconductor research might fare better and be more focused because the organizations would centralize many fragmented federal science and technology development efforts.

While making no recommendation, OTA says a reliance on existing federal approaches is likely to result in the United States winning on the science front and losing on the commercial front. Creating a new federal technology or science agency is not likely to be effective either because it cannot be organized quickly enough to mold an effective strategy for pursuing high-temperature superconductor R&D.

Beyond the federal research sector, there is a need to get industry to conduct more long-term research and technology development programs. Government assistance will be required, according to the report, but should be less than 50% of any given undertaking.

Perhaps most importantly, OTA says a way must be found "to stimulate industry to use the results in a timely fashion." American firms need to be looking at ways to use high-temperature superconductors and to consider small applications as a way of gaining experience. Right now, says OTA, too many firms are taking a wait-and-see approach and could find themselves ill-equipped to compete.

■ MARK CRAWFORD

# Dispute Over NIH Firing Heats Up

What began as a substantive tussle over the way the National Institutes of Health (NIH) purchases its laboratory supplies has become a catfight over the fate of a senior scientist. Edwin Becker, a researcher and former top administrator at the NIH campus, was stripped of his command as associate director of the office of research services in April amid allegations of waste and mismanagement in the procurement system (*Science*, 13 May, p. 869). Now, Administration officials want to prevent Becker from resuming his research career at NIH.

The antagonists battling over Becker's future are James Wyngaarden, director of NIH, and Richard Kusserow, the inspector general of NIH's parent agency, the Department of Health and Human Services (HHS). Kusserow claims that Becker's alleged mismanagement resulted in a loss of more than $100 million, a figure that is hotly contested by Becker and senior administrators at NIH.

Wyngaarden has agreed that the decentralized purchasing system at NIH needs to be tightened and that greater savings should be sought. Toward that end, Wyngaarden was ordered to remove Becker from his administrative post and has been instructed to implement a corrective action plan. But Wyngaarden is fighting to retain Becker as a scientist at NIH, where the 58-year-old researcher has spent the last 32 years building a reputation in the field of nuclear magnetic resonance. Kusserow wants Becker banished from NIH forever.

Since this is Washington, the weapons of choice are the searing memorandum and the vigorous response, all duly photocopied, annotated, and widely distributed around the NIH campus, where the whole affair continues to raise hackles.

In a 3 June memorandum to Robert Windom, the assistant secretary for health at HHS, Kusserow was insistent that Becker be reassigned outside NIH. Why not let Becker stay on at his lab? "We view this as unacceptable because the associate director should clearly bear the primary responsibility for waste and mismanagement in purchasing and because another position at NIH may appear to be a reward."

Says S. Anthony McCann, assistant secretary in charge of management and budget at HHS: "NIH is essentially protecting one of its own in a way that is not appropriate." Becker's fate is now in Windom's hands.

In a 10 June letter to Windom in response to Kusserow's volley, Wyngaarden writes that removing Becker from NIH is "inappropriately harsh and effectively denies him the opportunity to resume his scientific career."

Wyngaarden continues: "The proposal to deny a scientist the opportunity to return to his research for administrative reasons has caused great apprehension among the scientists about the desirability of a research career within the Federal bureaucracy."

No matter. Kusserow seems prepared to play hardball. In a section of his memo entitled "Chronology of Problems with Dr. Becker," Kusserow says that his office is investigating a list of allegations concerning Becker, including accusations that Becker issued sole-source contracts in return for gifts, violated equal opportunity rules, and "coerced procurement personnel to permit his fellow scientists to buy whatever they want, at whatever price."

Becker says that these allegations come from an anonymous letter sent to the inspector general's office. In comments on Kusserow's memo circulated around NIH, Becker responds: "There is no substance to any of them. Placing such unsubstantiated allegations in a memorandum of this sort appears to be highly irresponsible." Wyngaarden agrees: "It's dirty pool." As for the specific charges against Becker, Wyngaarden says: "They've been all over NIH and haven't found a thing on Ted. . . . He's as straight as an arrow."

The investigation has had, however, one consequence. During its recent plunge into the affairs of Becker, the inspector general's office discovered that Wyngaarden himself was not personally signing the forms used by NIH to document cash or in-kind payments to researchers who attend conferences or give seminars in exchange for travel reimbursement. In the past, another administrator simply reviewed the forms and passed them along to Wyngaarden's office, where they were signed by rubber stamp. No more. Wyngaarden must sign each one personally. "There are ten on my desk right now," says Wyngaarden. How many forms are out there? Wyngaarden did not know exactly. "It might be quite a vast number." Score at least one for Kusserow.

■ WILLIAM BOOTH