New Drugs—New Strategies

For some people, drugs are part of daily life. But many drugs pose a health hazard to large numbers of people. Today, drugs prescribed for medical uses are increasingly being abused all over the world as “drugs” in the traditional meaning of the word. It isn’t easy to detect them—but we’re working on solutions to this problem.

A Banknote’s “Career”

In the underworld of illegal drugs can be easily detected if you only examine it closely enough. “Almost all of the banknotes that have been in circulation for a while have traces of cocaine sticking to them,” says Hans-Jürgen Maurer, who works at the State Institute for Preventive Action in the German state of Saarland. For that, a clean banknote only needs to briefly lie in a supermarket cash register next to another one that has been used to snort powdered cocaine. The amount of cocaine that sticks to the second banknote is not enough to cause a high, but it’s enough to be detected by the ultramodern methods used by narcotics agents.

This example shows how thoroughly our everyday lives have been penetrated by drugs—not to mention alcohol, cigarettes, and the substances doctors call “everyday drugs,” namely coffee and tea. The use of consciousness-altering substances has been an inextricable part of human history for thousands of years. The oldest written documents testifying to that are 8,000 years old, and the Bible tells us that Noah had the inventor of winemaking.

Every society has a favorite drug

According to the World Drug Report 2009 of the United Nations Office on Drugs and Crime (UNODC), alcohol is consumed at about the same rate in every country of the world, whereas cocaine-like substances dominate in North and South America. Cannabis products are consumed primarily in Africa and the South Pacific region.

Opium is intoxicating the rest of the world, except for countries like Japan and Sweden, where amphetamines are the drug of choice. According to the UNODC, between 172 and 250 million people consumed drugs last year, and this consumption became a problem for 18 to 38 million of them. These figures don’t even include alcohol, which is solely responsible for 85 percent of all drug problems.

Drugs have consequences

Even though people all over the world have different views about where to draw the line between legal and illegal drugs, all cultures are aware of the destructive consequences of drug consumption, not only for the consumers but also for the people around them. Alcohol and other drugs are a risk factor on the road and in the workplace. According to statistics collected by the German Centre for Addiction Issues, about three quarters of employees in Germany engage in the “low-risk consumption” of alcohol. Between two and three percent of employees are addicted to alcohol, and ten percent consume it to a degree that puts them at risk of addiction.

The resulting costs due to loss of productivity in the workplace (through absenteeism and mistakes) amount to billions of euros in Germany alone. Even more problematic is the increased risk of accidents. Every company bears responsibility for the health of its employees. This means it must protect its employees from the consequences of substance abuse. In most countries, works agreements determine whether, when, and how employers are permitted to conduct spot checks. In some sectors it’s already customary for job applicants to provide a blood sample when they are hired, and in safety-relevant jobs these samples may be analyzed to identify substance abuse.

German legislation has drastically limited the possibilities for monitoring substance use in the workplace through medical examinations of employees. Health and safety in the workplace must be balanced against employees’ personal rights. This balancing process leads to the conclusion that personal rights have precedence. This is why such a test requires the individual’s written consent. Labor law specialists point out that job applicants can theoretically refuse to take such tests. However, another topic frequently discussed by company lawyers and labor courts is the question of how voluntary the signature of a statement of consent actually is if the candidate is afraid that a refusal would work to his or her disadvantage in the selection process. Recently a number of major companies and radio broadcasters operating under public law were criticized by the German media and elsewhere because they required job applicants to submit blood samples.

For a long time now, a major chemical company has conducted drug screening whenever one of its employees is transferred to a safety-related position. Seven percent of those screenings indicated drug use. For Dräger company’s medical expert Dr. Frank Ensslen it’s clear that the results of such examinations of prospective and actual employees may not leave the premises of the responsible physician. That’s forbidden by the principle of physicians’ confidentiality. Some experts are now arguing that this issue...
Dräger, believes there are two crucial applications for these devices today. The first of these is in the area of prevention, to keep individuals from operating vehicles or machines if they’ve drunk too much alcohol. In Sweden approximately 40,000 buses, trucks, and taxis are equipped with breathalyzers. “Some local, regional authorities now award transport contracts to school bus operators only if the buses have built-in breathalyzers,” says Lagois. The Swedish parliament even briefly discussed the possibility of building interlocks into every car in order to finally reduce the number of traffic accidents due to alcohol.

In Austria as well, freight forwarders are already building such devices into their trucks, in line with strict regulations. Plans call for pilot programs to be launched next year in Germany as well. In countries including the U.S., Dräger offers, in addition to the breathalyzer and a connected device to monitor the process of starting the vehicle, a “log” of the behavior of individuals who are under observation. “With another third, it soon becomes clear that they’ll do it again. But as for the rest, it’s not clear whether they’ve merely pressured the assessor that they’ve lacked the habit.”

Thanks to the interlocks, one can simply check to see how the client behaves and take remedial measures if necessary. Plans call for pilot programs to be launched next year in Germany as well. In countries including the U.S., Dräger offers, in addition to the breathalyzer and a connected device to monitor the process of starting the vehicle, a “log” of the behavior of individuals who are under observation.

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Two million people in Germany are abusing prescription medications

doesn’t think there’s much technical brevity left when it comes to monitoring the alcohol content of people’s breath. But he estimates that in ten years there might be interlock systems on the market that also test for the presence of other drugs. “It has been possible for more than 60 years to measure the amount of alcohol in an individual’s breath, but only in the past few years have we developed methods of identifying amphetamines, opiates or cannabinoids in a person’s saliva within minutes. Police departments want to have a test for drugs that works just as quickly and reliably as tests for alcohol,” says Hans-Jürgen Maurer, Chief Police Superintendant of the German state of Saarland, who works in the State Institute for Preventive Action and is recognized as one of the pioneers in the area of drug identification in road traffic.

Antibodies on the lookout for drugs

“The DrugTest 5000 can identify most of the known illegal drugs and even unknown ones, because it recognizes familial resemblances between these substances rather than each individual substance,” explains Dr. Stefan Steinmeyer. Unlike the electrochemical sensor used to detect alcohol in a person’s breath, the immunological drug tests use antibodies to identify the illegal substances, because it recognizes “cousins” of the original target molecules; the experts call this “cross-reactivity.” However, it’s almost impossible to quantify the amount of drugs present via this method; above a predefined threshold value, it is merely possible to indicate the presence of a drug. Those who want more precise details must therefore bring the sample to a laboratory and send it through a gas or liquid chromatograph that separates it into all of its components. These components are then identified by a downstream mass spectrometer by means of their molecular weight. Dräger offers such analyses as a service to public authorities and detoxification clinics. Shipping companies also use this service. DrugTest 5000 can identify even medications classified as tranquilizers (see also Dräger Review 96, p. 8 f.). Like alcohol, the benzodiazepines harness tremendous potential for addiction and pose hazards in road traffic and at the workplace because they alter the users’ awareness and slow down their reaction times.

Doping: a wave of new drugs

The experts are already seeing a wave of new drugs approaching the workplace. According to a study conducted by the health insurer DAK, in Germany alone two million people occasionally use pills and other medications to enhance their work performance, and approximately 800,000 people do so regularly. These doping substances often include medications meant for people with depression, dementia or hyperactivity. Such substances, including psychopharmaceuticals, are frequently encountered in the medical context in particular, because they are more easily accessible there. In Germany, for example, among the people insured by the statutory health insurance companies about 1.4 million individuals are addicted to medications prescribed by doctors.

Searching for traces with a brush

As a consequence of a verdict handed down in 2006 by the Hamburg Labor Court, random drug tests may soon be carried out more often in the workplace as well. The court supported a company that had submitted its employees in a container terminal to random drug tests in conformity with a works agreement. The court concluded that the personal rights of the plaintiff had been affected but not violated, and that the infringement of his personal rights through the drug test was commensurable and therefore permissible, because the plaintiff’s tasks were associated with considerable hazards. In the court’s opinion, the purpose of the test was not to establish drug addiction but to determine the plaintiff’s current ability to do his work.

Maurer, the drug expert, is planning to conduct a pilot project soon in a somewhat less hazardous workplace—an educational institution in the Saarland area of Germany. As part of the project he will wipe off the door handles of the institute with a cloth for sample collection and then wash the sample collection device. This mixture, in place of a saliva sample, will then be submitted to the DrugTest 5000. “We first want to establish whether addictive substances are present. If they are, we can then consider what countermeasures we want to take,” he says. Maurer considers it important not to “go hunting” for individuals violating the rules. He believes that employers have a responsibility toward their employees to counter potential drug abuse by means of appropriate informational programs.

Maurer does not yet know what to expect from his experiment with the doorknobs of the educational institution. He may find cocaine, as did other researchers two and a half years ago in the ambient air of La Sapienza University in Rome. But even if that happens, it would still not be clear whether the drug was transferred to the doorknob directly from the hand of a user or via a tainted banknote. It may be possible to reach such a conclusion from the amounts involved. In any case, after the investigation the doorknobs and other surfaces will be very clean. “That might be good for the banknotes—it would surely give the concept of ‘money laundering’ a whole new meaning,” Hanno Chariulis.

Old acquaintances—or the “new drugs”

The “new drugs” include substances used to combat illness—or abused to enhance mental performance or induce a state of intoxication. Examples:

- Galantamin To combat dementia due to an acetylcholine deficiency—or to strengthen the memory
- Donepezil To treat mild to middling levels of forgetfulness—or to enhance memory and cognition
- Modafinil To combat the sleeping sickness known as narcolepsy—or to enhance attention and memory
- Prozoc (active ingredient: fluoxetine) An antidepressant also used in cases of obsessive-compulsive behavior and panic attacks—or to brighten up the user’s mood
- Benzodiazepines Tranquilizers used to treat restlessness, anxiety, and sleeplessness, and as emergency drugs in cases of epileptic seizure—or as intoxicants
- Rivastigmine Medication used for Alzheimer patients—or to enhance memory
- Methylphenidate (e.g. Ritalin) Medication for patients with Attention Deficit Hyperactivity Disorder (ADHD)—or for enhancing concentration, performance, and decision-making ability and suppressing fatigue
- Spice and similar products No medical indication; mixtures of spices and herbs enhanced with chemically produced drugs are illegal drugs

Further information online, including:

Substance abuse and diagnostics

www.draeger.com/99/diagnostics