

Toxicology News

September 2000

An AACC/CAP Educational Newsletter for Toxicology Laboratories

Drug-Facilitated Sexual Assault: Fact and Fiction

By Sarah Kerrigan

The subject of drug-facilitated sexual assault has received much attention of late. The drugs gamma-hydroxybutyrate (GHB) and Rohypnol (flunitrazepam) have received inordinate attention and have been popularized as “date rape” agents in the lay press. The scientific literature, however, suggests that these reports have been oversimplified because more than 20 different drugs have been associated with this crime.

A sexual assault occurs once every 6.4 minutes in the United States (1), 75% of which are reported to be acquaintance rapes (2). Although these crimes are felonies, recent studies indicate that only 18% of adult women report rape (3). This low reporting rate is largely attributed to psychological barriers surrounding the crime, particularly guilt and embarrassment. Adolescents and young adults are four times more likely than women in other age groups to be victims (4). In the vast majority of these cases, the perpetrator is an acquaintance of the victim.

Definitions

The terms drug-facilitated sexual assault and date rape are often used synonymously. However, these terms have very different meanings. Perception of what constitutes a sexual assault varies widely, but rape treatment centers report these common legal definitions (5):

Sexual assault is forced, coerced, or pressured sexual contact. *Acquaintance rape* is nonconsensual sexual contact or intercourse with someone known to the victim. *Date rape* is a type of acquaintance rape, in which nonconsensual sex takes place between two people in a romantic relationship. *Drug-facilitated sexual assault* occurs when a chemical agent is used to assist or procure sexual contact.

Legislative efforts to curb the upward trend in

drug-facilitated sexual assault have included restricting drug access (including scheduling GHB and flunitrazepam under the federal Controlled Substances Act) and increasing sentences for the crime. In particular, the Drug-Induced Rape Prevention and Punishment Act of 1996 (Public Law 104-305) increases penalties for those who use drugs to assist them in committing a violent crime. Under this law, administration of a controlled substance with the intent to commit a sexual assault or other violent crime is a federal felony, punishable by up to 20 years imprisonment.

Recognizing the signs

Normal physical and emotional reactions following a sexual assault can include exhaustion, hyperactivity, insomnia, shock, denial, anger, self-blame, sadness, helplessness, fear, shame, and guilt. Victims of drug-facilitated sexual assault may experience confusion, dizziness, psychomotor impairment, drowsiness, impaired judgment, reduced inhibitions, or slurred speech. They may lose their ability to ward off attackers, develop amnesia, and provide unreliable or confused recall of events.

Drug-induced anterograde amnesia, in which the drug temporarily disables the brain’s ability to store information into memory, may cause the victim to be uncertain about the facts surrounding the assault. This uncertainty may produce an unwillingness to report the rape or provide biological samples for forensic testing. Because many of the depressant effects of drugs used to incapacitate the victim are similar to the effects of alcohol, it is probable that many incidents of drug-facilitated sexual assault are not recognized (6).

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Sexual Assault

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Warning signs that a drug-facilitated sexual assault has occurred include (7):

- If the victim recalls having a drink but cannot recall what happened for a period of time after consuming the drink
- If the victim suspects that sexual contact has taken place but cannot remember details
- If the victim feels more intoxicated than her usual response to the same amount of alcohol
- If the victim wakes up feeling hung over and experiences a memory lapse or can't account for a period of time

Chemical submission

The relationship between drug use and sexual assault is complicated: Illicit drug use not only increases the risk of sexual assault, but sexual assault increases the risk of subsequent substance abuse (8). These findings are supported by the observation that multiple drug use among alleged victims of sexual assault is high. A recent study indicated that 35% of positive urine samples obtained from victims of alleged sexual assault contained multiple drugs (9).

The term chemical submission applies when any drug is administered that renders the victim passive, submissive, or unwilling or unable to resist. Potent, fast-acting depressant drugs that have amnesic properties are effective "knock-out drops." However, a variety of illicit and widely prescribed therapeutic agents, including benzodiazepines, barbiturates, muscle relaxants, hypnotics, and antihistamines, have been associated with drug-facilitated sexual assault (Table 1). Typically, these agents are central nervous system depressants that impair consciousness, impair memory, or lower inhibitions. Others may have an anesthetic effect, causing unarousable sleep or producing an "out of body experience" in which the conscious victim is powerless, paralyzed, or unable to move.

Although drug-facilitated sexual assault is an increasing problem, GHB and flunitrazepam are not as widely associated with this crime as popularly believed. Recent investigation into the prevalence of drugs in sexual assault has shown that alcohol and marijuana are the most commonly encountered substances. This finding supports the view that consumption of impairing substances is an important risk factor in sexual assault.

In a recent study of more than 2,000 victims of sexual assault in California, nearly two-thirds of the urine specimens contained alcohol or drugs (12). Alcohol (63%) and cannabinoids (30%) accounted for

Table 1. Substances Detected in Alleged Cases of Drug-Facilitated Sexual Assault (10, 11)

Alcohol	Flunitrazepam
Alprazolam	γ -Hydroxybutyrate (GHB)
Amphetamine	Ketamine
Barbiturates	Lorazepam
1,4-Butanediol	Marijuana
γ -Butyrolactone (GBL)	Meprobamate
Carisoprodol	Methamphetamine
Chloral hydrate	Methylenedioxymethamphetamine (MDMA)
Chlordiazepoxide	Midazolam
Clonazepam	Opiates
Cocaine	Oxazepam
Cyclobenzaprine	Phencyclidine (PCP)
Diazepam	Scopolamine
Diphenhydramine	Triazolam
Ethanol	Zolpidem
Flurazepam	

the majority of positive samples, while GHB and flunitrazepam accounted for less than 3%.

In a 1999 study of 1,179 alleged victims of sexual assault nationwide, flunitrazepam metabolites were detected in only six urine specimens (9). The prevalence of alcohol was high, followed by cannabinoids, cocaine, benzodiazepines, amphetamines, and GHB (Figure 1). GHB was detected in 8% of alleged sexual assault cases in California, compared with only 4.1% of cases nationwide, which highlights the importance of geographical and regional trends in drug use.

GHB and flunitrazepam have received particular attention in light of their rapid onset, extensive biotransformation, and detection difficulties. The effects of flunitrazepam, which is 7–10 times more potent than diazepam (Valium), begin within 15–30 minutes of administration. Disinhibition, passivity, lack of resistance, muscle relaxation, and anterograde amnesia have been reported. The drug, which is not legally available in the United States, was reformulated to turn blue or hazy in clear or colored beverages. However, illicit sources of flunitrazepam remain odorless, colorless, and tasteless. The dose of flunitrazepam is very low (1–2 mg) compared with that of GHB (2–4 g).

GHB, which was placed into Schedule I of the Controlled Substances Act in April 2000, can take effect in as little as 15 minutes. This drug, which sometimes has a salty or soapy taste, can produce euphoria and disinhibition, as well as nausea, vomiting, respiratory depression, and coma. According to a recent report (13), the Drug Enforcement Administration (DEA) is aware of 43 victims of GHB-related sexual assaults.

The growing availability of some therapeutic drugs on the illicit market is likely to play an impor-

tant role in the prevalence and use of these agents for the purpose of chemical submission. A DEA review of drug seizures reported by the U.S. Customs Service showed that seizures of diazepam, the most commonly encountered benzodiazepine, increased from 1,137 cases in 1997 to 4,957 cases in 1999 (13). Seizures of alprazolam, which was the second most commonly encountered benzodiazepine, increased nearly ten-fold between 1997 and 1999. Likewise, misuse and diversion of zolpidem (Ambien) is of growing concern for law enforcement. Since the drug was marketed in 1994 for the short-term treatment of insomnia, the total annual prescriptions have increased at a rate of nearly 1.5 million per year, to a total of nearly 12 million prescriptions in 1999 (13).

Clinical management and specimen collection

Treatment of sexual assault victims should address physical injuries, pregnancy prophylaxis, sexually transmitted diseases, and psychological sequelae (1). Appropriate referral, follow-up, and information regarding legal rights and prevention should be provided.

Timely collection of biological specimens is crucial. Delay in specimen collection can severely hamper the toxicological and prosecutorial outcome of the investigation. Coordination of law enforcement, medical, and scientific personnel is essential. Immediate action must be taken to preserve the evidence by collection of blood and urine by a health-care professional with authority to initiate the evidence collection process and chain of custody. The victim should be urged not to urinate until the specimen can be properly collected. Collection of 100 mL of urine and 30 mL of blood, drawn into gray-top

tubes containing sodium fluoride and potassium oxalate, is recommended (10).

Collection of blood is particularly important if the ingestion of drug occurred within the past 24 hours. It may also provide valuable interpretive information regarding pharmacological response or impairment. Positive blood toxicology can sometimes be used to corroborate involvement of the drug in the sexual assault, whereas urine toxicology only indicates prior exposure to the drug. Samples should be refrigerated immediately with the date and time of collection documented. Supplemental information, such as the victim's symptoms; the suspected time of the ingestion; and alcohol, drugs or medications ingested prior to the assault should be fully documented.

Toxicological analysis

A forensic laboratory that is familiar with cases of drug-facilitated sexual assault should perform the toxicological analysis. The screening tests performed in most hospitals or in laboratories that perform workplace drug testing are unlikely to provide effective results. The use of appropriate cutoffs and sensitive confirmatory testing procedures are required to identify a single dose of drug that may be present at a very low concentration.

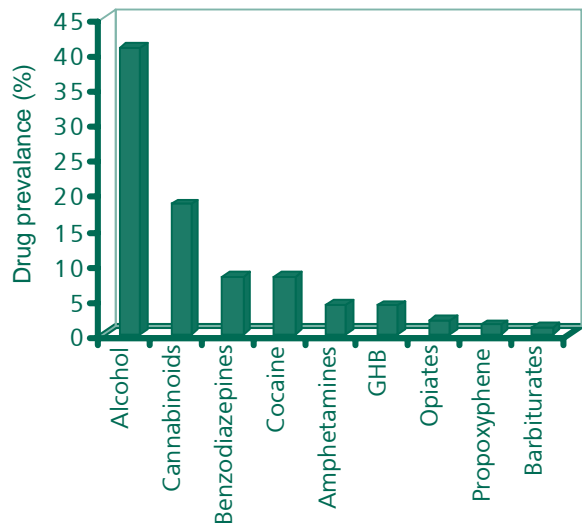
Confirmatory analysis using a sensitive and specific technique (e.g., gas chromatography/mass spectrometry or GC/MS) is necessary. At present, screening tests for GHB in body fluids are limited (14) and not widely used. As a result, most laboratories need to conduct a targeted analysis using a confirmatory technique like GC/MS.

Drugs administered in low doses (e.g., alprazolam), drugs with short half-lives (e.g., GHB), and drugs that undergo rapid and extensive biotransformation (e.g., flunitrazepam) pose a particular challenge to drug detection agencies. Typically, these instances require detection limits of <10 ng/mL. Other challenges presented by these drugs include the poor cross-reactivity of some benzodiazepines in immunoassay screening tests, cross-reactivity toward conjugated drugs, and the absence of effective screening tests for some drugs.

The use of urine as a sample is advantageous from the standpoint of detection time, although drugs with short half-lives may be undetectable within 96 hours or less (Table 2). GHB, which is administered in high doses, is detectable in blood for 6–8 hours and in urine for about 12 hours.

Drug detection times vary considerably, depending on dose, metabolism, and method of analysis. For drugs governed by first-order elimination kinetics, 99.9% of the drug is eliminated after 10

Figure 1. Drug Prevalence in Alleged Sex Assault Cases (9)



half-lives. However, the window of detection may be hours to weeks, depending on the drug dose and assay sensitivity.

Prosecution of drug-facilitated sexual assault and interpretation of toxicological findings is complicated by multiple drug use by the victim. Incapacitation may be the result of a combination of substances, consumed both voluntarily and involuntarily. For example, voluntary ingestion of alcohol, combined with the surreptitious administration of other central nervous system depressants, may have an additive or potentiating effect on impairment.

Prevention

Rape treatment centers provide educational material and tips to minimize the likelihood of drug-facilitated sexual assault. Women who feel unusually intoxicated and suspect that they may have unknowingly ingested a drug should seek immediate assistance.

Other tips for prevention of drug-facilitated sexual assaults include (7):

- Don't drink beverages that you did not open yourself
- Don't share or exchange drinks with anyone
- Don't drink from a container that is being passed around
- If someone offers you a drink, watch it being poured, and carry the drink yourself

Table 2. Doses and Half-Lives of Depressant Drugs (15)

Drug	Dose (mg)	Half-life
Alprazolam	0.25–1	6–27h
Barbiturates (short-acting, e.g., pentobarbital)	50–200	15–48h
Barbiturates (intermediate, e.g., butalbital)	50–100	30–40h
Barbiturates (long-acting, e.g., phenobarbital)	50–200	48–120h
Chlordiazepoxide	10–25	6–27h
Clonazepam	0.5–2	19–60h
Diazepam	5–10	21–37h
Diphenhydramine	50–100	3–14h
Flunitrazepam	1–2	9–25h
Flurazepam	15–30	1–3h
GHB	2000–4000	0.3–1h
Lorazepam	0.5–2	9–16h
Methaqualone	150–500	20–60h
Nitrazepam	5–10	17–48h
Propoxyphene	65–400	8–24h
Temazepam	15–30	3–13h
THC (naïve)	5–20	20–57h
THC (chronic)		3–13d
Triazolam	0.25	2–4h
Zolpidem	5–10	1.4–4.5h

- Don't leave your drink unattended and discard any drinks that have been
- Don't drink anything that has an unusual taste or appearance

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Sarah Kerrigan, PhD, is a forensic toxicologist at the California Department of Justice, Bureau of Forensic Services Toxicology Laboratory, in Sacramento.

A Forensic Toxicologist Reviews *Ur-ine Trouble*

By Dave Armbruster

Forensic urine drug testing is common in the United States, but it is still controversial and subject to criticism and suspicion. A recent book, *Ur-ine Trouble* (1998, Vandalay Press, Scottsdale, Arizona) by Kent A. Holtorf, MD, has been receiving attention in the general media.

This newsletter's editorial board decided that a review of this book, while atypical of our content, would be of interest to the readership. It's appropriate for our readers to be aware of sources that can shape public opinion about our field.

Dr. Holtorf's short biography at the beginning of the book notes that he is trained in general medicine and anesthesiology and that he is an internationally recognized drug-testing expert. He has "spoken with hundreds of people whose lives have been devastated by the inaccuracies of drug testing" and has testified as an expert witness.

Chemical McCarthyism

From the beginning, Holtorf makes it plain that he is not merely skeptical of drug testing, but that he is an unshakeable critic. The first chapter, "The Drug Testing Fallacy," describes drug testing as a major component of the war on drugs. Holtorf's premise is that its efficacy in decreasing drug use has not been proven. Rather, it is a form of "chemical McCarthyism," a term coined by George Lundberg, former editor of the *Journal of the American Medical Association* and a well-recognized critic of drug testing.

Holtorf argues that urine screening is really a test for deviance, not dysfunction, and that "testing unfairly targets the least dangerous of recreationally used drugs, marijuana." As a result, users switch to harder drugs, such as heroin, whose shorter half-lives make them more difficult to detect. This is an interesting alternative theory to the concept that marijuana is a gateway drug that introduces users to the less benign illegal substances.

Holtorf contends that companies are losing their best employees as a result of positive drug tests caused by common foods, over-the-counter medications, prescription medications, or occasional marijuana use during non-working hours. The author is correct that all of these may produce positive *laboratory results*, but he doesn't note that a proper program includes evaluation by a medical review officer that should prevent the reporting of positive *final*

results for the first three situations. In the case of recreational marijuana use, it is the employer's responsibility to decide whether this activity is acceptable and the worker's responsibility to prove that it occurred off-duty and did not affect job performance.

Holtorf warns that employment drug testing is being sold to Americans by a multibillion dollar drug-testing industry. It's true that drug testing can be characterized as an industry and that it does employ sales and marketing personnel. But insiders might argue that these personnel are more likely to be engaged in wooing customers from competitor's labs than truly creating new business, as the customer base seems to have plateaued. In fact, a recent newspaper article suggests that some companies are abandoning drug testing because the booming economy makes it difficult enough to find workers without eliminating candidates through drug testing.

Holtorf correctly points out that a positive drug test does not indicate how much drug was taken, when it was ingested, or whether the drug use represents one time use or continual abuse. Nevertheless, it seems a bit unfair to criticize drug testing because it does *too good a job* of detecting drug users. After all, the usual premise is that people should not use illicit substances at all, regardless of the quantity, frequency, or setting.

Holtorf offers another criticism—that drug testing fails to target alcohol, the abuse of which represents a much greater societal problem than marijuana use. In reality, many companies and some federal agencies do test for ethanol, although the program overseen by the U.S. Department of Health and Human Services does not. This point deserves attention, considering the tragic number of Americans (and their families) who suffer the ill effects of alcohol abuse. Ethanol's position is unique as it is legal in most of the country, but its abuse is often associated with criminal activity, such as drunk driving. Perhaps what merits consideration is not the total cessation of drug testing, but the addition of alcohol testing to more standard drug-test menus.

Holtorf is long on criticism of drug testing, but short on better ideas. He does offer one alternative approach. He suggests that companies truly concerned about safety and performance should replace drug testing with computer programs "that measure hand-eye coordination and response time as compared to the employee's baseline. These arcade-like tests can be done quickly and cheaply every day.... This would not only detect people who are impaired by drugs and alcohol, but also by sleep deprivation, stress, fatigue, emotional problems including anxi-

ety, sickness or other health problems, over-the-counter medications, prescription medications, or are otherwise not able to perform safely.”

This is an intriguing idea. The devices Holtorf describes do exist and, if accurate, could certainly be useful. However, they are not established in society and the workplace, and this reviewer is ignorant of any literature demonstrating their ability to identify impaired workers. Even if these devices worked, such testing would not detect an employee’s use of illicit substances, information that could still be of considerable interest to employers.

Targeting the war on drugs

After thoroughly lambasting drug testing, Holtorf gets around to what is perhaps his real target—the war on drugs—which he feels has been a miserable failure. He criticizes the DARE (Drug Abuse Resistance Education) Program and the “Just say no to drugs” campaign as too simplistic. Holtorf argues that drug abuse is not the root problem but only a symptom of an underlying psychological syndrome. Drug addiction should not be treated as a criminal offense, but as a public health problem. This is an interesting premise, and hard to dismiss as there’s certainly some truth in it.

But, before society abandons drug testing, even with all of its shortcomings, it would be appropriate to have some means of more effectively dealing with drug users. This is perhaps where Holtorf’s book is the weakest. After railing against drug testing, he fails to offer a better approach to the problem, other than the nebulous concept of solving the underlying psychological and physiological problems that he thinks cause drug abuse—easy to say, difficult to do.

Following Holtorf’s logic, one could suggest that all anti-social behavior (theft, assault, rape, traffic violations, etc.) is caused by underlying psychosocial problems and if we could identify and correct them, we would have a crime-free culture. There’s no doubt that some drug abusers have a biochemical basis to their addictions that they are unable to control. And some criminals and some drug abusers suffer from psychoses and neuroses (or at least behavior and personality disorders). Unfortunately, medical science simply does not permit us to identify, treat, and cure all of these people. And, just as certainly, there are some drug users and criminals who are capable of following the rules and being good citizens, but choose not to in hopes of receiving money, pleasure, power, or some other gain.

The gist of chapter two, “What Your Employer May Know About You,” is that employers use drug testing to learn what medications job candidates are

using to screen out those who are likely to use sick leave or medical benefits. It is hard to categorically deny that this may happen, but if it does, it is an inappropriate use of test results by employers (and not the fault of laboratories).

Having identified a legitimate potential abuse of drug testing, Holtorf tarnishes his credibility by writing: “I have yet to see a positive drug test remain confidential. Not only do positive results quickly become known to others in the company, but also the government and insurance companies are notified to deny all possible benefits to those who test positive. A person testing positive will find it difficult to obtain future employment because prospective employers will be told of the positive drug test when they contact the former employer for a reference. I know of many people who have tested positive due to laboratory error and have been essentially blackballed from working in their home towns.” Again, it’s hard to say that such things have never happened, but it’s difficult to believe that a widespread conspiratorial network exists, designed to persecute those with positive drug-test results.

The essence of inaccuracy?

In chapter three, “Drug Testing: The Essence of Inaccuracy,” Holtorf asserts: “Unlike clinical laboratory testing, where results are used for the management of patients, non-clinical substance abuse testing is used for punitive ends such as dismissal or denial of employment. Moreover, clinical results have the benefit of review by a physician who looks at the laboratory values in relation to the entire patient, whereas, drug-testing results stand on their own merit, often without the benefit of review by anyone prior to being released to the employer.”

Although the author grasps the essential difference between clinical and forensic testing, he erroneously suggests that forensic analysis is by its very nature inimical. His assertion that lab results typically are sent unfiltered to employers is highly questionable, considering the key role of the medical review officer (MRO). Later in the book, Holtorf does discuss MROs, but he avoids mentioning them here.

This chapter, and the book as a whole, is well-referenced (237 citations for 147 pages of text). A goodly number of articles are from the professional literature and solid sources, such as the *Journal of Analytical Toxicology* and *Clinical Chemistry*. Holtorf cites many analytical, scientific, and technical problems with drug testing, but most of these issues were identified by the very people who conduct drug testing. Holtorf fails to note that laboratory scientists are monitoring their own activities and working hard

to ensure the highest accuracy for drug-test results.

While the author cites some classic papers in the field, he takes liberties with their findings. For example, he references the well-known article "Critical Issues in Urinalysis of Abused Substances" (Kwong, Chamberlain, et al. Clin Chem 1988;34:605–32). This paper stands as an example of professionals in the field frankly and critically discussing shortcomings and recommending improvements. This seminal paper probably influenced the guidelines for the National Laboratory Certification Program, also created in 1988. But Holtorf concludes, "Laboratories have rejected the recommendations arguing that the additional costs to assure quality and accuracy would put them out of business. Thus, there are virtually no safeguards against positive results, and laboratories continue to run amok."

Later in the chapter, Holtorf cites the same article and states, "Most drug-testing laboratories do not use or even have access to the prohibitively expensive gas chromatograph-mass spectrometer." This statement may have been true in 1988, but it does not reflect the situation today or in 1998 when this book was written. Holtorf stacks the deck by using legitimate literature from what might be called the bad old days, without acknowledging the major improvements made and the current state of practice.

Useful references

The next chapter, "Drug Testing Detects More Than Drugs," catalogs medications that can produce positive, but medically explainable, results. The chapter is actually useful to the toxicologist because of its extensive list of references on cross-reacting compounds. In the course of explaining opiate-positive results due to poppy seed ingestion, Holtorf does acknowledge that the federal testing program requires the interpretation of results by an MRO. However, he concludes, "Unfortunately only those individuals working for a government agency will have the opportunity to explain the reason for the positive test." He reiterates the point later, saying that in private labs "the use of an MRO would be financially prohibitive" so results of non-federal employees are not reviewed. Such patently false statements only serve to cast doubt on his expertise.

Holtorf devotes a short chapter to hair testing, "Hair Testing: Could It Be More Unjust?" Hair testing is definitely controversial and has spawned many legitimate scientific disagreements. But to characterize hair testing outright as being unjust is a demonstration of the hyperbole that Holtorf freely applies. At the same time, the field must expect such criticism if a sufficient corpus of unbiased literature does not convincingly support its use, and if experts are

unable to reach consensus about it.

In the chapter "Pass Them Tests," Holtorf writes: "I am against [drug testing's] widespread use. Thus, I don't mind discussing the methods people are using to pass drug tests." The chapter reviews various strategies used to try to beat tests.

Light on solutions

Holtorf's final chapter, "Addiction Defined," is a scant three pages long. He writes: "Drugs and alcohol are not the addicts' problems: they are the solutions used by the addicts and the alcoholics to their problems. By utilizing a twelve-step program, addicts and alcoholics can find the happiness, serenity, love, self-worth, and inner peace that they had once sought through drugs and alcohol.... Unfortunately, those who fail their preemployment drug test will probably not have the financial resources to pay for and enter a recovery and rehabilitation program. This is a tragedy that hurts me deeply; these people are denied treatment which is their only chance to truly be happy. Employment can give the addict the financial means or medical insurance to enter a rehabilitation and recovery program that would otherwise be impossible."

After attacking drug testing page after page, the author's best alternative for dealing with drug abuse is the hope that abusers will enroll in twelve-step programs, and this solution is developed in a mere three pages. Twelve-step programs, such as Alcoholics Anonymous, have helped many people deal with their addictions but they are not a cure and they don't work for every addict.

One can certainly agree with Holtorf that twelve-step programs offer hope to many, but it is not so easy to agree that workplace drug testing denies drug abusers the opportunity to take advantage of these programs. Many of us probably know relatively little about twelve-step programs, but do know that those who enroll must first admit that they have a problem.

Holtorf argues that drug users would enroll in programs if they were employed because they would not have to pass drug tests. An obvious counter argument is that many drug users would be able to support their addiction legally and feel no need to seek treatment. Ironically, the inability to obtain or retain employment because of failing drug tests might prove to be the impetus for a drug abuser to finally turn to a twelve-step program for help.

Literary style and organization aside, this book is certainly interesting reading. I can't recall exposure to a volume that so readily fits the category of a diatribe or polemic. Of course, my views, as a sometimes forensic toxicologist, must be taken *a granum salis*.

Dr. Holtorf seems to have real concern for drug users who may be inadvertently harmed by drug test-

ing, as he views them as patients who need treatment for addictive behavior. He does raise some legitimate points, and any right-thinking person will admit that there is room for improvement in testing.

On the other hand, forensic urine drug testing is probably the most intensively monitored and regulated type of analysis that is performed by laboratories in this country (at least those labs certified by the National Laboratory Certification Program). *Urine Trouble* is a disturbing book, not so much because of any scientific validity associated with the author's arguments and views, but because of the effect they could have on a general public that may take them at face value.

Dave Armbruster, PhD, is assay applications manager at Abbott Laboratories in Irving, Texas.

SOFT to Meet in Milwaukee

The Society of Forensic Toxicologists' annual meeting will be held Oct. 2–6 at the Hyatt Regency in Milwaukee, Wisconsin. In keeping with the meeting's theme of "Launching Thirty Years of Forensic Toxicology into the Next Millennium," the format will provide continuing education in forensic toxicology focusing on research updates; advances in technology and instrumentation; latest procedures and test methodologies; case study presentations; and emerging areas of interest in the field. The meeting will provide a forum at which participants can exchange expertise and discuss issues. The extensive schedule includes two days of workshops followed

by a three-day scientific program.

For information, contact: Steven Wong, PhD, 414-223-1227, shwong@mcw.edu or Susan Gock, MS, 414-223-1228, ssgoc@aol.com.

Forensic Tox Certification

The American Board of Forensic Toxicology (ABFT) has launched a program to recognize bachelor-level toxicologists. The new Forensic Toxicology Specialist Certification Program is offered to meet the needs of a comprehensive cadre of forensic toxicologists who wish to document their qualifications, particularly in these times of increased professional scrutiny by the courts and the public.

Certification of a forensic toxicology specialist is based on the candidate's personal and professional record of education, training, experience, and achievement, and a formal written examination. Applicants must have three years full-time professional experience in forensic toxicology. For information, visit the ABFT website at www.abft.org.

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Clinical & Forensic Toxicology News does not accept advertising and is supported solely by its readers. Annual subscription price is \$75. Subscribers are encouraged to reproduce copy with appropriate acknowledgment of source.

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