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DREs: Indispensable Tool for ID of Drug-Impaired Drivers

By Thomas E. Page

Drug-impaired drivers represent a significant number of those arrested for driving under the influence (DUI). A drug recognition expert (DRE) is a police officer who has received special training not only to recognize drivers who may be under the influence of drugs, but also to identify the class of drug that may be involved.

The DRE program and procedures were initiated in the 1970s by Los Angeles Police Department (LAPD) officers to better identify, apprehend, and prosecute drug-impaired drivers. The DRE program merged the experience and expertise of narcotics officers with those of DUI enforcement personnel. DRE officers are trained to implement a 12-step assessment to determine the class of drug(s) involved. The primary, but not sole, focus of DRE training is in the DUI of drugs enforcement arena.

Today, the International Association of Chiefs of Police regulates and oversees the administration of the DRE program, which includes stringent requirements for training and certification. Currently, about 6500 officers are certified as DREs throughout the United States and Canada. The program is supported by the National Highway Traffic Safety Administration (NHTSA).

DRE studies: laboratory and field

In the early 1980s, Los Angeles prosecutors began introducing DRE testimony in court to support drug-impaired driving prosecutions. In 1984, NHTSA tested the accuracy of four LAPD DREs at the Johns Hopkins University. Each officer independently conducted an assessment of 80 volunteer drug users. In a double-blind format, each of the volunteers received either marijuana (two dose levels), diazepam (two dose levels), amphetamine (two dose levels), secobarbital (one dose level), or a placebo. Upon completing a 15-minute assessment, each of the officers was required to determine if the volunteer was impaired, and if so, the type of drug that was causing the impairment. The DREs were over 90% accurate in determining impairment and identifying the drug (1).

In 1985, NHTSA conducted a field validation study of the LAPD DRE program. This study involved a much larger group of DREs evaluating individuals actually arrested for suspicion of driving under the influence of drugs. NHTSA contracted with a private laboratory to conduct drug analyses on blood samples from the arrestees.

The results were similar to those of the Hopkins study. Ninety-four percent of the time (162 suspects) a drug other than alcohol was found when the DREs said that the suspect was impaired by drugs. The drug determination was complicated by the fact that more than 70% of the suspects yielded detectable levels of more than one drug.

Overall, the DREs were deemed totally correct in their judgments on 49% of the suspects; that is, all the drugs the DRE identified were found in the samples. They identified at least one of the drugs in an additional 38% of the cases. They identified the drug category incorrectly 13% of the time. In only one case was no drug or alcohol found.

To summarize the NHTSA findings (2):

1. When the DREs claimed drugs other than alcohol were present, they were almost always detected in the blood (94%);

2. Multiple drug use was common: 72% used two or more drugs, including alcohol; 45% used three or more drugs, including alcohol;

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Inside...

Product Safety Commission to Test Child Jewelry for Lead

By Donald Frederick and Gwendolyn A. McMillin

The U.S. Consumer Product Safety Commission (CPSC) issued an "Interim Enforcement Policy for Children's Metal Jewelry Containing Lead" on Feb. 3 (1). The commission addressed this issue because of a case report of a young child who had serious adverse health effects after swallowing a piece of jewelry. Subsequent evaluation of additional pieces of children's jewelry found that many of them contained high levels of accessible lead. Lead poisoning in children continues to be a public health problem and deteriorating lead paint is still the main source of exposure; however, other significant sources of lead exposure must also be considered.

Enforcement policy

Under the new policy, the CPSC screens children's jewelry, and if each component of the jewelry has less than 600 parts per million (ppm) of lead, it is accepted for sale in the United States. For components over 600 ppm, further testing with an acid extraction is performed. If the acid extraction test yields accessible lead above 175 µg/g, the CPSC will take corrective action on a case-by-case basis.

Sources of lead exposure

The case that prompted the CPSC action involved a four-year-old boy who swallowed a metal medallion of less than 1 inch in diameter. The boy developed abdominal cramping, vomiting, and diarrhea without a fever. After other possible causes of the illness were considered, a blood concentration was performed with the result of 123 µg/dL of lead in a whole blood sample. The boy had chelation therapy and was released with a blood lead concentration of less than 40 µg/dL. Investigation of the home did not yield other sources of lead, and his siblings had blood lead concentrations of less than 5 µg/dL. Analysis of the toy indicated that it was nearly 40% lead. Analysis of other toys of similar design yielded lead contents of 37–44%.

Lead may also be found in herbal medicines, as illustrated with case reports involving ayurveda, a traditional form of medicine practiced in India and other South Asian countries. The medications may contain herbs, minerals, metals, or animal products. During 2000–2003 there were at least 12 cases of lead poisoning involving these medications reported to the Centers for Disease Control and Prevention (2). The lead content of these medications can be extremely high, with one case involving a pill, taken four times a day, with a lead level of 73,900 ppm. Blood lead concentrations varied in these cases, with one case elevated to 286 µg/dL.

Table 1 summarizes the lead testing data for a one-year period from ARUP Laboratories. Although the sources of lead are unknown, the data highlights the ongoing problem of pediatric exposure.

References

1. Interim enforcement policy for children's metal jewelry containing lead; Feb. 3, 2005. U.S. Con-

Table 1. Lead Testing Data from ARUP Laboratories

Capillary blood screening (As reported by ARUP clients, most of whom probably screen with in-house methods like LeadCare by ESA Biosciences. Not all clients report results): 99.8% from children <18 years

Number analyzed from 2/1/04–1/31/05: 14,097

Percent elevated (>10 µg/dL): 2.72

Results exceeding CDC* cutoffs (µg/dL)	Number	Percent
10–19.9	314	2.23
20–44.9	61	0.43
45–59.9	4	0.03
60–69.9	2	0.01
>70	3	0.02

Venous blood confirmation: 86.5% from children <18 years

Number analyzed from 2/1/04–1/31/05: 96,543

Percent elevated (>10 µg/dL): 5.40

Results exceeding CDC cutoffs (µg/dL)	Number	Percent
10–19.9	3,675	3.81
20–44.9	1,362	1.41
45–59.9	112	0.12
60–69.9	23	0.02
>70	39	0.04

Results exceeding OSHA† cutoffs (µg/dL)	Number	Percent
10–24.9	4,285	4.44
25–49.9	814	0.84
50–79.9	85	0.09
>80	27	0.03

Industrial population: Venous blood, 99.5% from adults >17 yrs

Number analyzed from 2/1/04–1/31/05: 7,607

Percent elevated (>10 µg/dL): 12.15

Results exceeding OSHA cutoffs (µg/dL)	Number	Percent
10–24.9	668	8.78
25–49.9	230	3.02
50–79.9	26	0.34
>80	1	0.01

* CDC = Centers for Disease Control and Prevention

†OSHA = Occupational Safety and Health Administration

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Methadone: A Decade of Emerging Abuse and Toxicity

By Jeri D. Ropero-Miller

Methadone, a synthetic opioid analgesic, was invented by German scientists and used as a spasmolytic compound and as an alternative to scarce morphine during the early 1940s. Over the next four decades, methadone (Dolophine, Methadose) found medicinal applications in the United States, first as a treatment for opioid abstinence syndrome and subsequently as a maintenance medication for opioid addicts to alleviate craving and withdrawal symptoms.

The number of methadone maintenance treatment programs exploded in the 1970s, but strict federal regulations limited the use of methadone for other indications, including pain relief. In 1976, the American Pharmaceutical Association filed suit and pharmacies won the right to dispense methadone as an analgesic (1). Its use for this purpose was limited mainly to cancer patients until the 1990s, when primary-care physicians and pain-management specialists began treating a broad spectrum of chronic noncancer pain disorders, thus, introducing methadone into the "opioid rotation" for the treatment of chronic and severe pain.

Dosing difficulties

This switch in patient populations in the past decade has contributed to the emerging and prevalent methadone toxicity in the United States. Although professionals urge careful titration and individualized dosing during methadone's induction phase, the number of hospitalizations and deaths continues to rise. Even today, determining an equi-analgesic dose for chronic use of methadone, its effectiveness, and its tolerance are largely debatable issues, given its complex and highly individual pharmacokinetic profile. Physicians are now beginning to realize the importance of titrating and monitoring this potent drug in all individuals, regardless of their prior analgesics use. Furthermore, they are carefully considering methadone's advantages and disadvantages before giving a patient a prescription (Table 1).

Misunderstandings of methadone's potency and its increased abuse have lead to increased morbidity and mortality nationally. Not only has methadone use to treat chronic pain increased, but recreational use has also emerged over the past decade. Greater use and abuse of methadone have been reported from southern and northeastern states. The Substance Abuse and Mental Health Services Administration's (SAMHSA) Drug Abuse Warning Network reported a 163% rise from 1995 to 2002 in mentions of narcotic analgesic/combinations in medication-related emergency department visits among metropolitan populations; methadone mentions increased by 230% during this period (2).

Similarly, the Food and Drug Administration's Safety Information and Adverse Reporting Program released statistics indicating that more than 1,100 adults died from methadone-associated causes over a 32-year period from 1970 to 2002. Methadone-associated deaths heightened in 2001, with a higher death rate than in the 1990s. The number of deaths doubled in 2002 compared with 2001 (3).

The report concluded that methadone-related deaths were associated with: 1) toxicity during an individual's induction period of methadone administration when a balance between steady state and tolerance is unknown; 2) individuals using methadone illicitly who have no or insufficient tolerance; and 3) co-administration of methadone with other central nervous system (CNS) depressants, especially alcohol, benzodiazepines, and other opioids.

Prescription use grows

Prescription narcotic use, both licit and illicit, is also rapidly escalating. The Drug Enforcement Agency Automation of Reports and Consolidated Orders System (ARCOS) records the amounts of drugs legally retailed to registrants (for example, pharmacies, hospitals, medical practitioners, and teaching institutions) in the United States by state and zip code. ARCOS reported that from 1997 to 2002 the total U.S. retail drug distribution of methadone rose by more than 500%, from 518,738 grams to 2,649,559 grams. During this period, the top five states to dispense methadone, without normalizing for population size, remained largely unchanged with a shift from California, New York, Florida, North Carolina, and Washington (1997) to California, Florida, New York, Texas, and North Carolina (2002). The average purchase of methadone for

Table 1. Medicinal Advantages and Disadvantages of Methadone (6, 7)

Parameter	Advantages	Disadvantages
Dosing	Multiple routes of administration Less frequent dosing Longer duration of analgesia (4–6 hr)	Difficult to determine during the induction phase without titration Dosing regimens overlap: <50 mg fatal in a nontolerant individual (even if tolerant to other opioids), whereas maintenance patients receive up to 200 mg daily
Pharmacokinetic profile	Long half-life (30.4 hr ± 16.3 hr) High bioavailability (79% ± 11.7%) Parenteral administration equipotent to morphine Peak plasma concentrations achieved in 2–4 hr	Large volume of distribution (4–5 L/kg) and accumulation in tissues (longer time for blood concentration to equilibrate, requiring slow titration) Highly variable pharmacokinetic profile among individuals, including metabolic capacity
Cost	<$15/100 tablets (other opioid analgesics 6 to 300 times more expensive)	
Clinical effects	Less addictive than other opioid analgesics (less euphoria experienced) Demonstrated efficacy and safety in millions of patients worldwide with appropriate use Few serious adverse reactions No cumulative organ damage Communicable diseases (HIV, hepatitis C) reduced by participation in methadone maintenance therapy	Sedation Respiratory depression and hypoxia Cardiovascular abnormalities (ventricular arrhythmias such as torsades de pointes)
Tolerance		Potential lethality with nontolerance Unpredictable susceptibility to cross-tolerance to other opioids Reduced or lost tolerance with abstinence

Table 2. Average Purchase of Methadone by Business Activity (4)

Business activity	Date	Number of registrants sold to	% change in number of registrants	Total grams sold to registrants	% change in grams sold to registrants	Average purchase in grams	% change in average purchase
Pharmacies	1997	22,304		397,189		17.8	
	2002	38,832	74%	2,328,287	486%	60	237%
Hospitals	1997	3817		121,079		31.7	
	2002	4882	28%	310,027	156%	63.5	100%
Practitioners	1997	17		139		8.2	
	2002	50	194%	10,381	7368%	207.6	2431%
Teaching institutions	1997	2		139		164.7	
	2002	7	250%	847	509%	121	-36%
Mid-level practitioners	1997	None reported		None reported		None reported	
	2002	1		17.5		17.5	

each type of registrant is summarized in Table 2. In all but one instance (average purchase per teaching institution), retail drug purchases increased from 1997 to 2002. Pharmacies and practitioners had substantial increases, which suggests that disbursement to self-monitoring individuals was occurring more frequently, effectively eliminating direct supervision by medical staff.

Medical and death investigation systems are not the only organizations to recognize methadone's popularity. Federal, state, and local governments and law enforcement agencies are also facing increased workloads due to methadone-related criminal actions such as prescription diversion. In 1997, when the DEA implemented the National Forensic Laboratory Information System to systematically collect drug analysis results from state and local forensic laboratories, methadone was not a frequently identified drug (5). By 2003, methadone had surfaced as the 13th most frequently identified drug by crime laboratories with an estimated 4,967 analyses (0.29% of the total). (The top five were cannabis, cocaine, methamphetamine, heroin, and alprazolam.) This survey found that the greatest incidences of methadone-related hospitalizations and deaths occurred in southern and northeastern locations.

Methadone is a powerful opioid analgesic used as an agent for the detoxification and maintenance of narcotic addiction as well as for effective management of chronic pain. Over the past decade, methadone use and abuse have grown drastically while understanding of its toxicity has evolved more slowly. This is evident from statistics in both clinical and forensic fields (Table 3). The full impact and new challenges posed by the use of methadone for the treatment of pain remain to be seen.

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Table 3. How Methadone Use and Abuse Have Changed

Measure/organization	THEN	NOW
How methadone used	Prior to 1990s: • Narcotic withdrawal • Narcotic maintenance (especially heroin) • Management of severe pain in cancer patients	Early 1990s to present: • Continued applications used prior to 1990s • Management of chronic pain in noncancer patients (e.g., back, injury-related, diabetic neuropathy, degenerative joint disease, spinal stenosis, headache, other chronic pain disorders)
Emergency department trends (2)	1995: • 45,254 ED mentions of narcotic analgesics/combinations were estimated in the contiguous U.S. • 4,247 ED mentions of methadone were estimated in the contiguous U.S.	2002: • 119,185 ED mentions of narcotic analgesics/combinations were estimated in the contiguous U.S. (163% change) • 11,709 ED mentions of methadone were estimated in the contiguous U.S. (176% change)
Methadone-associated mortality (3)	1990–9: • Methadone-associated deaths lower than early years of current decade	2001: • Higher death rate than in previous decade 2002: • Death rate doubled from previous year
U.S. drug distribution as reported by ARCOS (4)	1998: • More methadone distributed by opioid treatment programs (OTPs) than by pharmacies • Estimated methadone distribution per 100,000 population by formulation: 400 40-mg diskette (mostly by OTPs) 700 liquid (mostly by OTPs) 200 tablet (mostly by pharmacies) • 500,000 methadone prescriptions written	2002: • Volume of methadone distribution by pharmacies increased fivefold during 4 years while OTP distribution increased 1.5-fold • Estimated methadone distribution per 100,000 population by formulation 600 40-mg diskette (mostly by OTPs) 1200 liquid (mostly by OTPs) 780 tablet (mostly by pharmacies) • Percentage increase for OTPs was 150–170% compared with 390% for pharmacies 2003: • 1.8 million methadone prescriptions written (threefold increase was greater than the increases for hydrocodone,
Prevalence of drugs analyzed by forensic laboratories as reported by NFLIS (3)	1999: • 249 methadone items • 34 liquid methadone items • 66 solid tablets	2002: • 2221 methadone items (790% increase) • 123 liquid methadone items (262% increase) • 756 solid tablets (1045% increase)

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DREs

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3. All of the drugs were identified in almost 50% of the subjects;

4. The DREs correctly identified at least one drug other than alcohol 87% of the time;

5. Only 3.7% of the suspects who had used drugs had a blood alcohol concentration (BAC) $\geq$ 0.10 g/100 mL. It is likely that most, if not all, of the remainder would have been released to possibly drive again if the drug effects had not been recognized by the DREs.

The two NHTSA studies concluded that the LAPD drug recognition procedure provided the trained officer with the ability to accurately recognize the symptoms of many types of drugs used by drivers. Subsequent studies of the DRE protocol and program in other jurisdictions, particularly Arizona, supported the conclusions of the NHTSA studies (3). Preusser and colleagues found that DRE-trained officers are more likely to arrest drivers with lower alcohol levels (4).

Role of the DRE

The principal role of the DRE officer is to determine if a driver is impaired by non-alcohol drugs, either by themselves or in conjunction with alcohol. Classically, the DRE officer becomes involved in a case after a person has been arrested for DUI, often by another officer. Typically, the arresting officer has applied three phases of DUI detection, including standardized field sobriety testing. Characteristically, the suspicion of drug impairment derives from a low breath alcohol concentration in combination with a greater than expected degree of impairment.

Three phases of DUI detection

Three phases of detection apply to nearly all DUI investigations, whether or not non-alcohol drugs are involved. They are: vehicle in motion, personal contact, and pre-arrest screening.

Phase 1, vehicle in motion, is usually the precipitating event that focuses an officer's attention on a specific individual. The primary decision in this phase is whether to initiate a traffic stop.

Phase 2, personal contact, refers to the face-to-face encounter between the officer and the driver, when the officer uses sight, hearing, and smell to identify indicators of alcohol and drug impairment.

Phase 3, pre-arrest screening, primarily consists of the administration and interpretation of the standardized field sobriety test battery, consisting of the horizontal gaze nystagmus (HGN), walk-and-turn, and one-leg stand tests. The phase 3 decision is whether or not to arrest the person. A determination to not arrest the person doesn't necessarily mean that the person is released at the scene, because the person may be suffering from a severe medical condition that requires immediate medical attention.

The twelve-step procedure

Classically, the DRE is requested by an arresting officer to assist in the investigation of a DUI arrestee. The DRE typically responds to a police station where the person is administered an evidentiary breath alcohol test. The DRE officer is responsible for making three determinations: (1) whether the arrestee's impairment is inconsistent with the BAC; (2) whether the individual is under the influence of drugs, and not suffering from a medical condition that requires immediate attention; and (3) the specific category (or categories) of drugs involved.

To reach these three determinations, the DRE uses a 12-step evaluation procedure.

The procedure is considered to be systematic in that it incorporates an assessment of the major body systems. It is also standardized in that all DREs are taught to conduct the evaluation in the same order. In actuality, "12 steps" is an artifact of pedagogical convenience, as there are more than 12 components in the process.

The first (breath alcohol test) and the twelfth (analysis of urine and/or blood for drugs) steps relate to toxicological analysis. The first step elicits the need for a DRE, whereas the twelfth step corroborates (or fails to corroborate) the DRE's opinion.

The twelve steps are:

Step one: The blood (or breath) alcohol concentration. The request for a DRE usually occurs because of an inconsistently low result on an alcohol breath test.

Step two: Interview of the arresting officer by the DRE officer. The scope of the interview depends on the circumstances of the case.

Step three: Preliminary examination. This step includes the first of three pulse measurements, inquiries regarding medical conditions, and checks of the eyes for equal tracking. A primary purpose of this step is to determine if medical conditions are contributing to the impairment.

Step four: Eye examinations. These include HGN, vertical gaze nystagmus (VGN), and lack of ocular convergence.

Step five: Divided attention and psychophysical tests. These tests (modified Romberg balance test, walk-and-turn test, one-leg stand test, and finger-to-nose test) help evaluate ability to divide attention between multiple tasks, balance, fine and gross motor skills, and time estimation or "internal clock."

Step six: Vital signs examinations (second pulse, blood pressure, and temperature).

Step seven: Examinations of pupil size at three light levels: room light, near total darkness, and direct light; also includes an examination of the nasal and oral cavities for signs of drug use.

Step eight: Assessment of skeletal muscle tone.

Step nine: Examination for drug injection sites (includes third pulse).

Step ten: Interview of the arrestee by the DRE. Frequency, history, and type of drug use are the usual topics of inquiry.

Step eleven: Opinion of the DRE. Based on the totality of the investigation (excluding final toxicological analysis), the DRE reaches an opinion of drug influence. The DRE's opinion identifies the class of drug(s) responsible for the observed impairment. A DRE may write: "In my opinion, the arrestee is under the combined influence of alcohol and a central nervous system (CNS) stimulant, and cannot safely operate a motor vehicle."

Step twelve: Toxicology: Obtaining a specimen (usually blood and/or urine) for analysis.

Drug categorization

The DRE program classifies the drugs of abuse into seven categories. A shared pattern of effects, signs, and symptoms is the basis of this classification schema. Substances within a category, at intoxicating levels, produce similar effects. The seven categories of drugs with representative examples are:

CNS depressants: alcohol, benzodiazepines, GHB, barbiturates;

Inhalants: volatile solvents, nitrous oxide, anesthetic gases;

Phencyclidine: PCP and analogues, ketamine;

Cannabis: Marijuana, hash, marinol;

CNS stimulants: Cocaine, amphetamines, methylphenidate;

Hallucinogens: LSD, peyote, MDMA (methylenedioxymethamphetamine or ecstasy);

Narcotic analgesics: opiates and opioids.

The characteristic signs and symptoms associated with these drug categories are summarized in Table 1, commonly called the "DRE Matrix." The prevalence of poly-drug use complicates the identification of impairing substances.

Conclusion

The core of the DRE approach to combating drug-impaired driving is the identification and recognition of drug effects by police officers. Successful and forward-looking DRE programs have incorporated the involvement of other professionals, such as hospital emergency department personnel, into the training for this complex set of tasks. Readers are encouraged to seek out avenues for involvement in their local DRE programs.

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Table 1. Drug Sign and Symptom Matrix

Sign or symptom	CNS depressants	Inhalants	PCP	Cannabis	CNS stimulants	Hallucinogens	Narcotic analgesics
HGN	Present	Present	Present	Not present	Not present	Not present	Not present
VGN	Possibly present	Possibly present	Usually present	Not present	Not present	Not present	Not present
Lack of convergence	Present	Present	Present	Present	Not present	Not present	Not present
Pupil size	Within normal range	Normal range or dilated	Within normal range	Dilated but may be normal	Dilated	Dilated	Constricted
Reaction to light	Slowed	Slowed	Normal	Normal	Slowed	Normal	Little or no visible reaction
Pulse rate	Below normal	Above normal	Above normal	Above normal	Above normal	Above normal	Below normal
Blood pressure	Below normal	Depends on substance	Above normal	Above normal	Above normal	Above normal	Below normal
Body temperature	Within normal range	Depends on substance	Above normal	Within normal range	Above normal	Above normal	Below normal

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