TESTING RECKLESS DRIVERS FOR COCAINE AND MARIJUANA

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Abstract *Background.* Driving under the influence of intoxicating drugs other than alcohol may be an important cause of traffic injuries. We used a rapid urine test to identify reckless drivers who were under the influence of cocaine or marijuana.

Methods. We conducted a consecutive-sample study in Memphis, Tennessee, in the summer of 1993. Subjects arrested for reckless driving who were not apparently impaired by alcohol (did not have an odor of alcohol, tested negative on breath analysis, or both) were tested for cocaine and marijuana at the scene of arrest. The results of the drug tests were compared with clinical evaluations of intoxication made at the scene by a police officer.

Results. A total of 175 subjects were stopped for reckless driving, and 150 (86 percent) submitted urine samples for drug testing at the scene of arrest. Eighty-eight of the 150 (59 percent) tested positive: 20 (13 percent) for cocaine, 50 (33 percent) for marijuana, and 18 (12 percent) for both drugs. Ninety-four of the 150 tested drivers were clinically considered to be intoxicated, and 80 of them (85 percent) tested positive for cocaine or marijuana. The intoxicated drivers had a broad range of affects and appearances. Nearly half the drivers intoxicated with cocaine performed normally on standard sobriety tests.

Conclusions. Over half of the reckless drivers who were not intoxicated with alcohol were found to be intoxicated with other drugs. Toxicologic testing at the scene is a practical means of identifying drivers under the influence of drugs and is a useful adjunct to standard behavioral sobriety testing. (N Engl J Med 1994;331:518-22.)

STUDIES of injured drivers suggest that driving under the influence of drugs other than alcohol is a growing cause of traffic injuries in the United States.[1-6] In some trauma centers and among some age groups, more injured drivers test positive for illicit drugs than for alcohol.[3,7] The use of severe injury as the indicator of driving under the influence of drugs has obvious limitations. In fact, injury often confers protection from enforcement of statutes against driving under the influence, allowing offenders to resume driving without interdiction.[8]

To prevent drug-related traffic accidents, police agencies must be able to detect and interdict drugged drivers just as they detect drivers who are impaired by alcohol. Police in this country are routinely trained to recognize the signs of alcohol intoxication, they have simple behavioral tests to screen drivers for high blood alcohol levels, and they have portable devices to measure alcohol levels.[9] Testing of impaired drivers for alcohol is routinely performed at the scene by police departments throughout the United States and has contributed to a substantial reduction in the number of alcohol-related traffic fatalities.[10,11] Tests for other drugs are rarely used in traffic enforcement.[9] Of the more than 5000 people arrested for driving while intoxicated in Memphis, Tennessee, in 1992, fewer than 1 percent were charged with driving under the influence of drugs. Like police forces in most states, the Memphis Police Department has the legal means to compel drivers suspected of driving under the influence of intoxicants to undergo chemical testing for alcohol or drugs[12] but has rarely ordered drug testing, because the standard laboratory-based tests are costly and cumbersome. We studied the effect of using a rapid field test for drugs to identify people driving under the influence of cocaine or marijuana.

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METHODS

Site

The study was carried out by the traffic division of the police department of Memphis, a city of 690,000. Drug screening was conducted in a converted ambulance (the "drug van"), which was staffed by a patrol officer who had undergone standard police training in the clinical detection of drug intoxication. The drug van was equipped with a secure private toilet, an area for interviewing subjects, equipment to videotape interviews and sobriety tests, and supplies for drug testing. While the drug van was in operation, the police department continued to operate its mobile units equipped with breath analyzers for alcohol. Drivers who were primarily suspected of driving under the influence of alcohol (i.e., who appeared intoxicated and smelled of alcohol) were referred to these mobile units, and they were not the primary focus of our investigation.

The study was conducted during 46 consecutive seven-hour night shifts, Tuesdays through Saturdays from 7 p.m. to 2 a.m. in the summer of 1993. During these times, the drug van patrolled all precincts of the city and stopped vehicles for reckless driving. While the drug van was in operation, all patrol officers were told that they could summon it if they stopped a person suspected of driving recklessly under the influence of cocaine or marijuana.

Subjects

All the drivers evaluated in the drug van were stopped for specific instances of reckless driving that would constitute probable cause to suspect intoxication by drugs. These included driving at high speed within the city limits (more than 20 miles [32 km] per hour over the speed limit), driving on the wrong side of the road, driving at high speed through red lights or stop signs, driving at night without lights, and passing dangerously.

Behavioral Evaluation

All the drivers who were stopped underwent a standard evaluation used by the police department for those suspected of driving under the influence of an intoxicant. This included a brief interview

during which the person was questioned about medical history, drug use, and recent sleep and eating. Each driver was specifically asked whether he or she had used cocaine or marijuana within the previous 12 hours. During the interview, the officer evaluated the driver's speech, alertness, mood, attitude, and cooperativeness. The officer also evaluated each driver for physiologic signs of intoxication, including nystagmus, enlarged pupils, and lack of smoothness in visual pursuit.

The drivers also underwent a standard field sobriety test used by many police departments to assess balance and the ability to follow simple instructions. This included a modified Romberg test, a one-legged stand, a finger-to-nose test, and a walk-and-turn test. All the tests were recorded on videotape in accordance with standard police procedure, and the officer's findings were noted on a standard field-report form. The officer also recorded an assessment of the effects of drugs or alcohol on the driver, grading the appearance of intoxication as "none," "slight," "moderate," or "extreme."

Drug Screening

Two measured aliquots of 200 μl of urine were tested for the presence of cocaine or marijuana metabolites with a rapid one-step qualitative immunoassay kit (Microline Drug Screen, Drug Screening Systems, Blackwood, N.J.). The kit detected the presence of benzoylecgonine, a metabolite of cocaine, and COOH-delta-9-tetrahydrocannabinol, a major metabolite of delta-9-tetrahydrocannabinol, an intoxicant in marijuana smoke. The threshold of the test was 300 ng per milliliter for benzoylecgonine and 100 ng per milliliter for marijuana. These are the threshold levels of the laboratory-based tests routinely used by the traffic division (Emit-Dau, Syva, Palo Alto, Calif.). If a driver tested positive, a second test was performed with a test kit from a separate batch. Only samples that were positive on two consecutive tests were considered to be positive.

The results of the screening test were available within 10 minutes, and all the subjects were immediately advised of their test results and were asked again about their drug use. The time and results were recorded in the field sobriety report. Drivers who were charged with driving while intoxicated were arrested and taken to jail. All the arrested drivers were offered immediate referral to one of several community-based drug-treatment programs. Drivers who were apparently intoxicated with alcohol were not screened for drugs unless they were found to be negative on breath testing. In some cases, evidence was found of alcohol intoxication that was not apparent on initial assessment. These subjects underwent breath analysis after drug screening.

After the screening test had been completed, the remainder of the urine sample was sealed and tagged as evidence. All positive samples were sent to the University of Tennessee Toxicology Laboratory for standard drug testing. This included a laboratory-based screening (Emit-Dau, Syva), with the confirmation of positive results by gas chromatography and mass spectrometry.[13] Only samples that were positive on the confirmatory tests were considered positive.

Legal Justification for the Study

Tennessee law states that "it shall be unlawful for any person to drive an automobile while under the influence of marijuana . . . or any drug producing stimulating effects upon the central nervous system."[14] Any person who drives in Tennessee is deemed to have given consent to a chemical test to determine the drug content of his or her blood, provided that such a test is administered at the direction of a law-enforcement officer who has reasonable grounds to believe that the person has been driving under the influence of an intoxicant.[15] Samples for testing can include blood, breath, or urine. Since drug testing is considered part of a personal search rather than a form of interrogation, the statute does not require that the driver be given any warnings before a sample is obtained for testing.[16] For drugs other than alcohol, the statute requires only that the state prove that the person was operating a vehicle under the influence of the intoxicant. There is no specific requirement that some degree of decreased physical or mental capacity be shown, other than the reasonable suspicion of a law-enforcement officer. Drivers who refused to submit to the test were informed that in Tennessee, refusal to submit to a chemical test or sobriety test is a separate violation of the law and is admissible as being probative on the issue of guilt.[17] They were then given another opportunity to submit to the test.

Results

One hundred seventy-five subjects stopped for reckless driving underwent evaluation for driving under the influence of cocaine or marijuana. Ninety-seven percent of them were male, and their mean (±SD) age was 26.6±7.1 years. One hundred nineteen (68 percent) were initially considered to show moderate or extreme signs of intoxication. All 175 were asked to furnish a urine sample for drug screening, and 150 (86 percent) complied. Eighty-eight subjects who submitted a urine sample (59 percent) tested positive for cocaine, marijuana, or both. This included 86 percent of the 94 subjects who were judged to be moderately or extremely intoxicated. (The proportion of refusals among drivers requested to submit to breath analysis for alcohol during the summer of 1993 in Memphis was 39 percent [533 of 1350 drivers], and the rate of positive tests was 65 percent, but records are not kept on the number of drivers who undergo an initial evaluation and are released without testing.) Table 1 shows our overall screening results and their relation to the level of intoxication. Every driver considered to show behavioral signs of moderate or extreme intoxication was arrested for driving under the influence of an intoxicant, regardless of the result of the screening test.

Subjects Who Tested Positive for Cocaine

All the drivers who tested positive for cocaine were considered to be intoxicated on the pretesting interview. There was no typical appearance associated with drivers who were intoxicated with cocaine. The drivers were classified in one of three groups according to the assessment of their mood: sleepy or slow (21 percent), happy, carefree, and talkative (39 percent), and combative, argumentative, and paranoid (39 percent). They also had a broad range of performances on the field sobriety tests (Table 2). All abnormalities on the behavioral sobriety test were due to losing con-

Table 1. Results of Urine Screening Tests for Cocaine and Marijuana.

Group	Results of Screening Tests			
	Negative	Positive for Both	Positive for Cocaine Only	Positive for Marijuana Only
	number (percent)			
All who submitted a sample (n = 150)	62 (41)	18 (12)	20 (13)	50 (33)
No or mild intoxication (n = 56)	48 (86)	0	0	8 (14)
Moderate or extreme intoxication (n = 94)	14 (15)	18 (19)	20 (21)	42 (45)

centration, failing to cooperate, or losing count of the number of steps. Of the drivers who tested positive for cocaine and who undertook the full field sobriety test, 43 percent performed normally. This included two subjects who were stopped for driving directly into oncoming traffic.

During the initial interview, 7 of the 38 drivers who tested positive for cocaine (18 percent) admitted having recently used cocaine. After being told of their positive test results, 33 (87 percent) admitted having used cocaine within the previous 12 hours. Eighteen drivers who tested positive for cocaine also tested positive for marijuana. The appearance of those who tested positive for both cocaine and marijuana was similar to that of all drivers who tested positive for cocaine. This group included 6 of the 13 drivers who tested positive for cocaine but had normal field-sobriety-test results.

Subjects Who Tested Positive for Marijuana

Of the 68 drivers who tested positive for marijuana, 60 (88 percent) were considered to be moderately or extremely intoxicated and 8 (12 percent) to have no or only slight signs of intoxication on the prescreening evaluation. The intoxicated group included the 18 subjects who also tested positive for cocaine. There was no typical appearance among the subjects arrested for driving under the influence of marijuana alone. Eight (19 percent) were classified as "paranoid, argumentative, or cocky," 26 (62 percent) as "cooperative, carefree, and happy," and 8 (19 percent) as "slow or sleepy." Thirty-six of the intoxicated drivers who tested positive for marijuana alone underwent complete sobriety tests, and all 36 failed. Failures were due to swaying, staggering, loss of balance, or inability to touch the nose. For 20 of the 36 (56 percent), abnormalities were noted on all four aspects of the behavioral test. Twenty-two subjects arrested for driving under the influence of marijuana (52 percent) admitted during the prescreening interview to using marijuana.

Subjects Who Refused Drug Testing

All the drivers who refused to provide a sample for testing were judged to be extremely intoxicated. Eight of these drivers (32 percent) admitted to using drugs that day — five to using cocaine, two to using narcotics, and one to using marijuana.

Subjects Who Tested Negative

Of the 62 drivers who tested negative, 14 failed the field sobriety test and 48 performed normally. Of those who failed the test, eight later tested positive for alcohol and the other six admitted to drug use that day. Thirty-six of the subjects who performed normally were released with traffic citations, and the remainder were arrested on other charges. Ten of the 36 subjects released after normal sobriety tests (28 percent) admitted during the prescreening interview to using marijuana within the previous 12 hours. None admitted to using cocaine.

Table 2. Mood and Results of Sobriety Testing of Drivers Who Tested Positive for Cocaine.

Mood	Normal Test Results	Abnormal Test Results	No Test*
		number	
Slow	3	4	1
Paranoid	3	5	7
Happy	7	7	1
Total	13	16	9

*Nine drivers did not undergo the complete behavioral evaluation because they would not cooperate or posed a high risk of escape.

Alcohol Testing

All the drivers who were tested for drugs were either initially classified by the arresting officer as not being intoxicated with alcohol (i.e., there was no odor of alcohol) or had been assessed for alcohol intoxication with low or negative results on breath analysis. Eighteen of the subjects who tested positive for drugs (14 for marijuana and 4 for cocaine) were initially thought to be intoxicated with alcohol but had negative or low readings on the breath test (<0.03 mg of alcohol per deciliter [0.007 mmol per liter]). These subjects would ordinarily have been released by the mobile unit. Twenty-eight subjects who were initially referred for drug testing because they did not smell of alcohol subsequently reported or showed signs of recent alcohol use and tested positive for alcohol (levels ranging from 0.03 to 0.21 mg per deciliter [0.007 to 0.05 mmol per liter]) after undergoing drug screening. Previous studies have shown that up to a third of subjects with blood alcohol levels in the intoxicated range will have no appreciable odor of alcohol.[18]

Laboratory Confirmation of Screening Tests

The results for all 38 drivers who tested positive for cocaine were confirmed by the laboratory tests. Of the 60 positive screening tests for marijuana, 42 (70 percent) were confirmed by the laboratory tests; the remainder were negative on laboratory testing. Urine samples from 50 drivers who tested negative and were released were sent for laboratory analysis by gas chromatography and mass spectroscopy. Ten (20 percent) were positive for marijuana (>50 ng of COOH-delta-9-tetrahydrocannabinol per milliliter), and none were positive for benzoylecgonine.

Court Outcomes

Overall, 111 subjects in this study were arrested for driving under the influence of drugs: 18 who tested positive for both cocaine and marijuana, 20 who tested positive for cocaine, 42 who tested positive for mari-

juana, 25 who refused to be tested, and 6 who tested negative but appeared intoxicated and failed the sobriety test.

Sixty-one subjects had records of prosecution filed within two months of the end of the study, and 35 (57 percent) entered guilty pleas. They included most of the drivers with unconfirmed marijuana tests and all those who refused to be tested. No court challenges were brought against the testing protocol, and no driver who tested positive for drugs has been acquitted.

Discussion

In this study, we used a rapid field test to evaluate drug use among a selected sample of reckless drivers who were not thought to be driving under the influence of alcohol. We found that over half these drivers were under the influence of drugs. During the study period, the use of testing at the scene led to 111 arrests for driving under the influence of drugs. In a comparable three-month period in the previous year, only six drivers were charged with driving under the influence of drugs in Memphis and the surrounding county — five of them after serious accidents. Although this was not a study of the incidence of driving under the influence of drugs, our findings strongly suggest that it is more common than previous arrest statistics would indicate.

When safety is a concern, the use of chemical screening for drugs has been justified with the argument that waiting for overt signs of drug intoxication may mean waiting too long.[19] The threshold levels of the urine tests we used in this study conform to federal standards for detecting recent drug use in the workplace.[20] The test for cocaine appeared to be both specific and sensitive. The unconfirmed positive tests for marijuana (which accounted for 30 percent of all positive tests for marijuana) probably involved specimens with cannabinoid concentrations below the threshold level. The manufacturers of the field test define its threshold as the level at which 90 percent of specimens with a given cannabinoid concentration will test positive, whereas the threshold for the laboratory test is the level at which 50 percent of specimens with a given cannabinoid concentration test positive. Because of this, the field test will show a positive result for more than half the samples that have cannabinoid concentrations between 50 and 100 ng per milliliter (Pfeiffer FR, Drug Screening Systems: personal communication).

Tennessee courts accept positive urine tests as evidence of drugs in the blood,[21] but such tests do not necessarily confirm that drugs were ingested recently. Regular users of very high doses of cocaine[22,23] and marijuana[24] can excrete metabolites for days after their last use, but such persons may also have prolonged impairment due to their chronic intoxication. Correlating blood or urine levels of certain drugs with specific driving problems is not yet possible,[25] and the correlation between impairment and serum levels of drugs may never be established as it has been for alcohol.[26] This does not have to impede efforts to halt the use of illicit intoxicants by drivers. The presence of an illicit drug in the urine indicates prior illegal action and can add a dimension of probable cause to observed driving performance.[25]

This study highlights the usefulness of coupling toxicologic tests with the clinical assessment of intoxication in selected situations. The variety of presentations of the drivers who were intoxicated with drugs — from drowsy to agitated — reinforces previous findings that drug users have no typical appearance or behavior.[27,28] Although one would expect subjects intoxicated with cocaine to appear stimulated, many cocaine users have severe depression or anxiety after the initial euphoria, and this may coincide with the period of peak impairment.[27,28] This posteuphoric state can last for hours or days, during which users may feel somnolent or confused.[29] Another feature of cocaine use that can lead to a complicated clinical picture is the propensity of the users to combine other drugs, most commonly alcohol, with cocaine.[30]

Simple behavioral tests have been a mainstay of the effort to detect impaired drivers,[9] but these tests are not effective in detecting drug intoxication.[9,31] The field sobriety tests currently used by police officers to evaluate impaired drivers were specifically designed to detect people under the influence of alcohol.[9] We found, for example, that many police officers relied on the presence of nystagmus to make the assessment of intoxication, but drugs that dilate or constrict the pupils (with the exception of methaqualone) do not cause nystagmus.[31] Even police officers specially trained as drug-recognition experts are often unable to identify persons who are under the influence of cocaine.[2] In the short term, cocaine can improve performance on tests of tracking ability, visual search, and (sometimes) attention and can even mask the detrimental effects of other drugs, such as alcohol.[31] Risk taking and judgment — which are affected by both cocaine[27,28,32] and marijuana[33-35] — are not assessed on the behavioral tests used to assess drivers clinically in the field.[31]

Impaired driving is one of this country's most serious public health problems. Traffic accidents are the greatest single cause of death in people 5 to 32 years old, and most of the accidents are due to intoxicated drivers.[36] The data that we already have on injured drivers underscore the need to investigate the effects of cocaine and marijuana on driving.[31] Programs of drug testing such as ours could be useful in preventing traffic injuries. They might also deter drug use.[37,38] Many users will not stop using drugs or seek treatment until they reach bottom through arrest, abandonment, or loss due to drug abuse.[39] Further study should show whether a program such as ours could effectively raise that bottom while preventing injury.

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