Official Newsletter of Drug Free Workplaces
May 2017 Vol. 13 No. 5

Published by The Council on Alcohol and Drugs
Tel (404) 223-2486 | Fax (866) 786-9811 | www.LiveDrugFree.org

2/3 of the high school-age students who drink do so to the point of intoxication.
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Supervisor Newsletter

Information for this issue of the Supervisor Training Newsletter is made available by the National Institute on Drug Abuse (NIDA).

Workplace and Roadside Breath Testing for Marijuana

Breath expelled into a Breathalyzer-style collection device contained measurable amounts of marijuana's main psychoactive ingredient, tetrahydrocannabinol (THC), for up to 2 hours after participants in a recent clinical trial smoked the drug. The finding by researchers at NIDA's Intramural Research Program (IRP) affirms that workplace and roadside breath testing for recent marijuana use is feasible in principle.

"Ours is the first basic research study using controlled administration of marijuana to determine if it is possible to detect metabolites in breath," says study leader Sarah Himes, a doctoral candidate in toxicology and Intramural Research Training Award fellow at NIDA. Her positive result opens the way to further development of the marijuana breath-testing technique, which holds the potential to fulfill a public-safety need that has become increasingly pressing as marijuana use has risen and some jurisdictions have legalized use of the drug.

"Our method allows a window of detection of only 1 to 2 hours after smoking," Ms. Himes says. "There's still a lot of work to be done to improve sensitivity and increase detection at later time points." Ideally, a roadside testing device should reliably yield positive results for as long as a smoker's driving remains impaired, or for at least 6 hours.

Ms. Himes, working with Dr. Marilyn Huestis and colleagues at NIDA's IRP, recruited 13 frequent and 11 occasional marijuana smokers for their study. The frequent users reported smoking the drug 4 or more times per week in the last 3 months, and the occasional users reported smoking less than twice weekly during that time. The researchers corroborated the participants' self-reported use by measuring the concentrations of THC metabolites in their urine, saliva, and blood.

In the study, each participant smoked a single marijuana cigarette containing 6.8% THC, then provided breath samples at regular intervals using the SensAbues collection device. The device, designed by study collaborator Dr. Olof Beck of Karolinska University Hospital in Stockholm, Sweden, traps cannabinoids on a polymeric filter pad. The IRP research team assayed the pads for THC using mass spectrometry.

Steps to Road Readiness

Two hurdles must be surmounted before breath testing for marijuana can become a useful tool for highway safety: determining the concentrations of THC that correspond to driving impairment, and developing equipment that will permit on-the-spot analysis of breath-testing results.

In response to the first of these challenges, the researchers are planning studies in which participants will take simulated driving tests after smoking marijuana. The results will guide lawmakers in setting reasonable legal limits for drivers' THC breath concentrations.

An issue that will need to be addressed in setting such limits is the difference, seen in the current study, between frequent and occasional marijuana smokers' breath THC concentrations. The reason for the difference, Dr. Huestis explains, is that the two groups smoke the drug differently: "People control

how much drug they put in their bodies by the depth of inhalation, how quickly they puff, the time between puffs, and exhalation time." Occasional users probably do not take in as much drug from the cigarette as frequent users do, Dr. Huestis says, nor do they have as much buildup of THC in their systems. However, occasional users, having less tolerance for the drug's effects, may be impaired at lower concentrations.

Although the SensAbues breath-collection device fits easily into a glove compartment or a coat pocket, the liquid chromatography-coupled tandem mass spectrometer that the IRP team used to assay the breath pads is a large machine found only in laboratories. Its lack of portability might not pose an obstacle for drug testing in workplaces and other situations where results are not needed on the spot and samples can be mailed away to be assayed. However, for use in identifying drugged drivers, both the collection device and the analysis equipment must be small enough to be kept ready at hand.

"This is just the start," says Dr. Huestis. "We were able to achieve beautiful sensitivity using our sophisticated lab equipment. The next step will be to find instrumentation that can be used at the roadside." Dr. Huestis believes this can be done, and points, as an example, to the equipment used in airports to check for explosives—which in fact are much smaller versions of the instruments used in the study.

In the meantime, police are administering roadside field sobriety tests and companies are utilizing oral fluid tests to determine THC impairment.

Field Sobriety Tests for Marijuana

In most jurisdictions, if a police officer makes a traffic stop and has reason to believe the driver is under the influence of marijuana, the first course of action to verify the suspicion is to conduct a field sobriety test.

Field sobriety tests are a series of mental and physical exercises employed by police officers to determine a driver's level of impairment.

There are three standardized field sobriety tests used by police. The first is the Horizontal Gaze Nystagmus Test. This test detects an involuntary jerking of the eye when an object is moved from side to side in front of the face. The second is the Walk and Turn Test. The officer directs the subject to walk a straight line, and while the person is doing so the officer looks for loss of balance, an inability to stay on the line, an inability to follow directions, wrong number of steps, etc. The third test is the One-Leg Stand. As the name implies; the officer instructs the subject to raise his or her foot, hold still, and count while looking down. The officer then watches to see if the person sways, hops, or puts the foot down. Police are using oral fluid tests along with field sobriety tests to confirm impairment.

Oral Fluid Tests

Testing of oral fluid for cannabis use provides a quick and non-invasive specimen for the test both at roadside traffic stops and in the workplace. Oral fluid testing is an affordable testing method for employers, and is an alternative to urine testing when substitution or adulteration is suspected.