Drugged Driving: Future Research Directions

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Speakers

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Welcome

Wilson Compton, M.D., M.P.E. National Institute on Drug Abuse (NIDA)

Dr. Compton welcomed participants to this meeting on drugged driving. He explained that the meeting came about as a result of a conversation he had with Robert DuPont, M.D., a report on this issue released by the National Highway Traffic Safety Administration (NHTSA), and plans by the White House Office of National Drug Control Policy (ONDCP) to make drugged driving a signature initiative.

Dr. Compton thanked Aria Crump, Sc.D.; Steven Gust, Ph.D.; and Jeffrey Schulden, M.D., of the National Institute on Drug Abuse (NIDA) for organizing the meeting. He also thanked Kurd Ali and the Educational Services, Inc., staff for coordinating the meeting.

Meeting Goals and Charge to Participants

Nora D. Volkow, M.D., NIDA
A. Thomas McLellan, Ph.D., ONDCP

Dr. Volkow thanked participants for coming to this meeting and helping NIDA to identify next steps in the drugged driving area. This topic has been ignored for many reasons, but recently released data have alerted the research community of the problem's magnitude and the urgency of addressing it.

The purpose of this meeting was to determine where investments in science might be most valuable to help change the existing policy structure that might not favor diminution of the adverse effects of drugs on driving. This will require an understanding of the problem's magnitude. Dr. Volkow asked participants to consider the following questions during their discussions:

- Which data could be objective and solid enough to have the power to change current laws?
- Are these data currently available? If not, how do we begin to collect this data?
- How can the health care provided to individuals involved in drugged driving accidents be better managed?
- What methodologies could be used to improve the quantification of drugs?

Dr. Volkow urged participants to be bold and to ensure that all ideas have a chance to surface. She looked forward to seeing the recommendations from the meeting and planned to ask for the group's feedback as NIDA moves this agenda forward.

Dr. McLellan explained that drugged driving is a signature issue for ONDCP. If researchers can develop sensible, evidence-based ways to move forward in this area, the public will appreciate the severity of the problem and the importance of doing something about it. ONDCP needs the facts so that it can make policy.

NHTSA recently released the results of its 2007 National Roadside Survey of Drivers. This survey included 7,500 daytime and nighttime drivers who answered survey questions and provided oral fluid and blood samples. Of the 5,970 drivers who provided specimens, 11% had detectable levels of illegal drugs and 5% had medications.

President Obama's 2010 Drug Control Strategy was about to be released, and drugged driving is one of the strategy's three top issues. As ONDCP tackles this issue, it needs information to guide its activities.

Priorities include developing standard screening methods for drug-testing laboratories and encouraging states to adopt drug per se laws. Law enforcement personnel, prosecutors, and judges need training about drugged drivers, and communities and professionals need

education to better prevent drugged driving.

Background and Historical Perspective on Drugged Driving: Policies, Legislation, and Early Research Efforts

J. Michael Walsh, Ph.D., The Walsh Group

Dr. Walsh provided an overview of more than 30 years of research related to drugged driving that NIDA sponsored since the 1970s, many of these projects involved collaborations with the NIDA research community, other federal agencies, and international partners.

Several studies in the United States and a collaborative US -EU project found that at least 35% of people stopped for erratic driving, drivers involved in a crash, and fatally injured drivers had at least one drug in their system, and many were under the influence of both drugs and alcohol.

Currently, 33 states have behaviorally based impaired driving statutes that make it a crime to drive while impaired or under the influence of a prohibited drug. Seventeen states have a per se, or "zero tolerance," statute, which makes it a crime for a driver to operate a vehicle with a prohibited drug in his or her system. Two states have a per se statute for drivers under age 21, and it is illegal in five states for any "drug addict" or "habitual user of drugs" to drive.

Problems with the U.S. legal approach include the difficulty of proving that drug use caused the impairment and of prosecuting drugged driving cases in many states. Many per se statutes do not create an incentive for police officers to look for drugs because drivers found to be legally drunk face no additional penalties for having illegal drugs in their system. The drugs covered, specimens to collect, and cutoff levels used by laboratories differ by state.

Marijuana is the most prevalent drug, after alcohol, found in samples from drivers involved in traffic accidents or stopped for impaired driving. Blood concentrations of delta-9-tetrahydrocannabinol (THC), marijuana's main active chemical, tend to peak shortly after or even before smoking ceases. These concentrations tend to fall precipitously within the first 60 minutes to 5-10% of peak concentration values, but the behavioral effects of THC on driving skills can last for hours even when the blood concentrations are very low. Therefore enforcement of drugged driving laws should be tied to the presence of THC.

Epidemiological Studies on Drugged Driving: Current and Future Research Efforts at NHTSA

Richard Compton, Ph.D., NHTSA

Dr. Compton cautioned that researchers should not approach drugged driving in the same way as alcohol-impaired driving because drugs are much more complex than alcohol. For example, blood alcohol concentration (BAC) is closely associated with impairment levels, but it is not currently possible to specify drug levels that indicate impairment.

Drugs are often used in combination with alcohol but police officers have no incentive to look for drugs other than alcohol. It is much easier to prosecute an impaired driving charge based on alcohol impairment than it is for drug impairment, thus officers typically will look for signs of alcohol impairment first. If alcohol impairment is found during the investigation usually stops at that point. Impaired drivers face no enhanced sanction if they are prosecuted for multiple substances, so police officers have no incentive to look for drugs. In addition, while most police officers are well trained to investigate alcohol-impaired driving many are not as well trained to investigate drug-impaired driving. This is especially true for impairment due to prescription medicines and the impairments caused by over-the-counter medicines.

Physicians and pharmacists are not well trained to discuss drugs' potential to impair driving. NHTSA has issued some guides with the American Medical Association, which offers continuing education courses on potential impairing effects of prescription drugs on driving for physicians. NHTSA also provides training for pharmacists and has developed educational materials and programs for the general public.

NHTSA conducted its 2007 National Roadside Survey of Alcohol and Drug Use in 300 sites across the United States. Police officers randomly stopped motorists on the road and the drivers were asked by researchers to participate in the survey. The survey took place off the roadway where the drivers answered survey questions, took a breath test, and provided oral fluid and blood samples.

The study found that the percentage of weekend nighttime drivers testing positive for alcohol has dropped substantially from 36.1% in 1973 to 12.4% in 2007. Drivers with BAC's over the current legal limit of 0.08 g/dL also dropped significantly from 7.5% in 1974 to 2.2% in 2007. In addition, for nighttime drivers 16.3% of drivers tested positive for drugs, 11.3% were positive for illegal drugs, and 1.1% were positive for illegal drugs and medications. Positive test result rates were higher late at night than during the day, and males were more likely to test positive than females.

Dr. Compton is currently conducting a case-control study to assess the crash risk of driving under the influence of drugs, alcohol, and drugs and alcohol. The study is collecting blood and oral fluid samples and measuring breath alcohol in 2,500 drivers involved in crashes and in a control sample 5,000 non-crash involved drivers who were driving at the crash location (same road location, day of week, and time of day one week later) in Virginia Beach, VA.

Prevention and Detection of Drugged Driving: The Policy and Political Context

Robert L. DuPont, M.D., The Institute for Behavior and Health, Inc.

No other initiative in highway safety has the potential for saving lives and reducing costs from crashes that is equal to that of dealing with the drugged driving problem. Furthermore, a major effort to address the drugged driving problem will have a significant effect on the demand for drugs and on drug use in the United States.

Dealing with drugged driving provides a major new path into treatment and recovery for millions of people. Addressing drugged driving therefore provides a tremendous opportunity to help people who have problems with drugs confront and overcome those problems. This is the case with alcohol and can become the case with drugs.

Dr. DuPont listed five areas in which NIDA could make a major contribution.

1. A more sensitive, portable oral fluids test and a breath test for illegal drugs.
2. A score card against which to measure the impact of policies. Dr. DuPont recommends using the Fatality Analysis Reporting System (FARS) data, which is the simplest approach and has the most "street credibility." Other options are more expensive and difficult; these include repeated roadside surveys and studies of seriously injured drivers in shock trauma units across the country.
3. A path to discovery of drugged driving enforcement.
4. Collaborations with researchers in other countries.
5. Research on and development of best practices for addressing drugged driving. Simply counting the number of assessments per year for drugged driving and comparing this number to drunken driving assessments will be very helpful.

Policy Research on Impaired Driving: Lessons from Alcohol Research

Ralph Hingson, Sc.D., M.P.H., National Institute on Alcohol Abuse and Alcoholism (NIAAA)

Forty percent of people who die in crashes involving drinking drivers are people other than the driver. In addition, the more severe the traffic crash is, the greater the likelihood that alcohol was involved. Only a small minority of drivers in alcohol-related fatal crashes have a prior driving-under-the-influence (DUI) conviction. Thirty-two percent of drivers in crashes under the influence of alcohol meet the Diagnostic and Statistical Manual of Mental Disorders, 4th edition (DSM-IV) criteria for alcohol dependence, and 58% meet the alcohol abuse criteria. While the information cited above is available for alcohol and driving, it will need to be determined for drugs and driving.

Roadside surveys show that the rates of drinking and driving have declined in the last four decades, and alcohol-related traffic deaths per 100,000 people declined by 55% between 1982 and 2008. According to one estimate, approximately 150,000 lives were saved during this period by the decrease in drinking and driving. Part of the reason this occurred is most fatally injured drivers are tested for alcohol. This has enabled researchers to compare states that pass laws to reduce driving after drinking with those that did not. This resulted in the development of a body of scientific literature about what drinking and driving laws are effective. The data also allowed research on what types of community programs can reduce drinking and driving. Because testing fatally injured drivers for drugs is not as consistent, a literature has not developed on what drug driving laws or community programs to reduce drugged driving are most effective.

Selling alcohol to people under age 21 is illegal in every state. Raising the drinking age to 21 led to substantial declines in binge drinking and alcohol-related traffic deaths in youth. A 2001 review of 49 studies published in scientific journals found that alcohol-related traffic crashes increased by 10% when the drinking age was lowered and decreased by 16% when the drinking age was raised.

Recent studies have shown that adults who grew up in states that allowed them to purchase alcohol before age 21 have higher odds as adults of experiencing alcohol use disorders and drug use disorders, both of which independently predict driving after drug use. Most young people under age 15 obtain alcohol from their parents or other family members or they take the alcohol from their home. Those with access to alcohol at home in 6th grade have higher past-week alcohol use, binge drinking, and drunkenness rates by 8th grade than those without such access.

Studies also show that screening and brief motivational interventions can reduce alcohol consumption, new injuries requiring treatment in the emergency department, and drunk driving arrests. This approach has been found to be effective in people aged 12-19 and the effects are long lasting. Similar studies for drugs are needed.

Most people with alcohol or drug problems do not receive treatment. In most states, insurance laws deny medical reimbursement for people injured under the influence of alcohol or drugs. Several states recently repealed denial of health insurance benefits for sickness due to intoxication, and several state Medicaid programs now cover screening and brief intervention. Research needs to determine the impact of these policy changes on the number of people screened and treated.

Group Discussion—Current State of Drugged Driving Science: What Do We Know and What Are the Gaps

FARS

Dr. Wilson Compton asked participants to clarify how enhancing FARS to collect data more consistently and in more locations is a research question. Dr. Hingson explained that FARS is a research tool that can be linked to policy or community research questions. With a more complete spectrum of testing, researchers can study the data to determine which types of policies and programs make a difference. FARS is the only system, for example, that could provide community-level drug data. Furthermore, enhanced FARS data might be used to

develop imputation systems similar to those used by NHTSA to assess whether drivers who are not tested were involved in substance-related fatal crashes.

Dr. Richard Compton pointed out that FARS has more data than many people realize. Five states are testing more than 90% of fatally injured drivers for drugs, and 14 states have testing rates that are higher than 80%. Dr. Hingson said that the states that test most fatally injured drivers for alcohol and drugs do so as a result of laws. Citizen activist groups could influence states to pass legislation to enhance FARS.

Dr. DuPont commented that research is using knowledge to inform and inspire improvements in public health. NIDA can play an important role in improving public health by sponsoring research in collaboration with other agencies and passing the results to another agency for implementation. "Selling" this type of research at the National Institutes of Health can be difficult because this research is not necessarily scientifically innovative; however, it has high relevance to public health.

Barry K. Logan, Ph.D., commented that FARS has gaps. For example, different laboratories test samples for different drugs and the program has no standard thresholds for determining whether a result is declared positive or negative. Furthermore, no leverage is available to ensure that laboratories actually perform testing on samples from motor vehicle deaths. Monitoring or quality checks from FARS or the use by more states of centralized testing would produce a better picture of the data collected. The program should also offer incentives to states to make their testing more uniform. From my notes: Even when the testing is done, the results don't always get reported up through the various bureaucratic layers to the FARS system. Both deceased and surviving drivers in fatal crashes are supposed to be tested and compliance on surviving drivers is even poorer.

Role of Parents

Dr. Richard Compton commented on the need to consider parents not only as advocates but also as communicators with their children. Parents need information they can use in discussions with their children to persuade them that drugged driving is dangerous.

Drug Testing

Kevin Sabet, Ph.D., asked about the Food and Drug Administration's (FDA's) impact on the development of better onsite testing technology. Marilyn Huestis, Ph.D., explained that the FDA monitors the accuracy, sensitivity, and specificity of testing devices. New products must meet or exceed existing standards.

Dr. Richard Compton commented that the FDA has not addressed the harms caused by substances used by drivers. Efforts have been made to enable greater FDA involvement in this issue through the development of a standardized protocol for determining the potential of substances to impair driving. An expert working group has developed recommendations for a tiered approach to identify which substances have the potential to cause impairment.

Inger Marie Bernhoft, M.Sc., supported the use of liquid chromatography-tandem mass spectrometry (LCMS/MS), which is more cost effective and rapid than alternatives. Some European countries use this technique to analyze samples for up to 40 substances. Dr. Huestis added that LCMS/MS can test for a wide spectrum of drugs in a single sample with good sensitivity and specificity. The technique can be used with a small sample and is cost effective. Dr. Huestis further explained that matrix effects are a serious issue for LCMSMS and must be evaluated for during method validation and requires inclusion of deuterated internal standards to compensate for matrix effects.

Drugs and Impairment

Dr. Huestis said that the field has more gaps than knowledge about the level of drugs needed

to cause impairment, and inter-individual differences in the pharmacodynamic response to drugs make it exceedingly difficult to suggest a specific drug concentration as indicative of impairment. Differences between drugs, people who use drugs and administration routes make this issue challenging to address. In fact, as we examine different matrices for monitoring drug use, such as oral fluid, we are still learning about which analytes should be examined, and for how long they can be detected after use (windows of drug detection).

Dr. Liguori commented that, in addition to drug-related gaps, there are gaps in the complex area of driving impairment, both on the road and with simulators, that need to be addressed in future studies. As there are differences among drugs, drug users, and administration routes, there are also differences among the many specific components of driving behavior (steering, braking, lane position maintenance, vigilance, etc.) and the unique effects of drugs on these components. Dr. Walsh pointed out that European countries dispense drugs with specific warnings and let patients know that they should not drive while taking certain drugs.

Policy-Related Research Gaps

A participant suggested that the Substance Abuse and Mental Health Services Administration and NIDA collaborate to address the need for a portable, sensitive, and specific drug-testing device that can be used for workplace and roadside testing.

A participant commented that because payers can deny reimbursement claims for treatment needed as a result of drug use, providers do not test patients in the hospital for drugs so that their insurer will not deny the claim. Researchers should learn from this type of experience and examine the impact of incentives for testing.

Dr. Gust suggested taking advantage of natural experiments, such as what happens when a state adopts a per se law. Researchers should also examine the impact of legalized marijuana for medical purposes on drugged driving.

Dr. Hingson reported that NIAAA tracks alcohol policies by state and date of enactment, and researchers can use these data to evaluate the effects of new statutes. NIAAA should work with NIDA to develop a drug policy information system, similar to NIAAA's system, to determine the impact of changes in alcohol and drug laws on alcohol and drug outcomes. The database should also include other relevant laws, such as those pertaining to insurance.

Dr. Richard Compton cautioned that studies of natural variations in laws, policies, and procedures are hampered by the lack of data on impaired driving arrests. For examples, states do not routinely indicate whether impaired driving arrests involved alcohol or drugs.

Toxicology Research and Technology Advances to Improve Research on Drugged Driving

Marilyn Huestis, Ph.D., NIDA

Toxicologists have developed sensitive and specific procedures to analyze drugs of interest in many biological matrices, including whole blood, plasma, serum, oral fluid, urine, and hair. However, few controlled drug administration studies are available to define impaired drug concentrations and windows of drug detection.

Roadside oral-fluid testing devices give rapid results, but many devices do not measure a precise volume of oral fluid that would enable calculation of drug concentrations. Also, many oral fluid collection devices adsorb drugs to the device, reducing sensitivity. Modifications of the devices employ elution solvents to elute drugs from the device, but these solvents also dilute drug concentrations, reducing test sensitivity. Furthermore, many elution solvents interfere with LCMS/MS analysis.

Every matrix is different and tests need to assess each analyte of each drug individually.

Plasma and oral fluid concentrations of methamphetamine and amphetamine do not correlate well. This shows the danger of trying to predict blood concentrations from oral fluid concentrations. Laws therefore need to be per se or related to oral fluid concentrations, rather than predicting a whole blood drug concentration.

A study by Dr. Huestis detected THC in whole blood and plasma up to 7 days after heavy cannabis smokers began a continually monitored abstinence period. Also, THC was detected in urine of chronic daily cannabis smokers up to 24 days after initiation of abstinence. This study showed that THC in frequent cannabis users' specimens might not indicate recent cannabis exposure. Currently, some indication of behavioral impairment is needed to justify a traffic stop that precedes collection of a biological specimen. Random traffic stops and per se laws are important deterrents of DUID. How do we reconcile per se laws with extended detection of cannabinoid analytes in chronic daily users? Are chronic daily cannabis users impaired when there are still residual drug concentrations in biological fluids? Based on neurocognitive evidence, chronic cannabis smokers are impaired anywhere from 7 to 28 days (or longer) after initiation of abstinence.

Advances from the European Union on Drugged Driving Research

Inger Marie Bernhoft, M.Sc., Technical University of Denmark

The Driving Under the Influence of Drugs, Alcohol, and Medicines (DRUID) project is assessing the impact of the use of alcohol, other psychoactive substances, or both on road safety. The study includes reviews of epidemiological studies and consumption data; prevalence studies of drugs in drivers in the general population, injured or killed drivers, and drivers in fatal accidents; analyses of relative accident risk while impaired; and interviews to assess motives to drive while impaired and accident factors of impaired drivers.

The study on prevalence of drugs in drivers in the general population has collected samples from approximately 50,000 drivers in 13 European countries. Some countries collect only saliva, some collect blood and saliva, and one collects only blood. The study leaders therefore decided to accept saliva samples. The researchers are also evaluating the prevalence of drugs in the general population. To evaluate drug prevalence in seriously injured drivers, hospitals in six countries are collecting blood from seriously injured drivers.

Case-control studies are using data from hospital studies (cases) and roadside surveys (controls) to evaluate the relationship between drug impairment and traffic accidents. One case-control study is based on data from all drivers involved in fatal accidents reported in France in a number of years to determine the involvement of cannabis, amphetamines, opiates, and cocaine.

A pharmaco-epidemiological study is determining whether drivers who use psychoactive medications are involved in more traffic accidents than those who do not use these medications. This study will link data from pharmacy prescriptions, police traffic accidents, and driving license databases.

Two studies are collecting data on the characteristics of drivers who use drugs. These studies will yield important qualitative data to use with the quantitative data collected by DRUID.

Group Discussion—Strengthening Current Collaborative Research Efforts in Drugged Driving

Dr. Gust asked Ms. Bernhoft to comment on future research support from the European Union. Ms. Bernhoft explained that the sponsors want to see the results of DRUID before funding additional studies. The most problematic issue in DRUID is the inability to collect blood samples at the roadside in all participating countries.

Dr. Liguori asked Ms. Bernhoft to comment on DRUID's use of smart phones to collect data. Ms. Bernhoft explained that drivers use the phones to enter information on their drug use and on every trip they take over several weeks. Dr. Liguori inquired about the extent to which self-report measures could be influenced by drug use.

Dr. Walsh noted that the rates his study found in a shock trauma unit in Baltimore do not necessarily reflect what is occurring in other communities. The field needs epidemiology studies around the country. For example, NIDA or ONDCP should establish agreements with police departments and trauma centers in several metropolitan areas to collect urine specimens for a period of 60 to 90 days from every suspect brought to the station for a breath test or admitted to a trauma center. The resulting data could be used to make the public aware of the prevalence of drugged driving. In addition, local leaders could take action based on their own data.

Dr. Richard Compton said that international collaboration can make an enormous difference. Data on risks, testing techniques, screening techniques for police, and other issues can readily transfer between countries. It makes no sense to duplicate such efforts.

Dr. Huestis called for education for the public, police officers, attorneys, and judges. Fatality and accident data are needed to communicate the urgency of this issue to the public. However, all of these efforts need to be based on scientific data, and the public will not approve of claims based on incomplete data, such as urine tests that detect drugs used 3 weeks earlier.

A participant pointed out that workplace drug tests cannot distinguish between prescription drugs taken as directed by a medical care provider and those obtained by diversion. However, whether the drug was prescribed or diverted is important for case law and DUI enforcement.

Dr. Gust said that NIDA needs to determine how to add small studies to ongoing research projects. He also asked participants to send him additional suggestions.

Panel Discussion—Reflections on the Sate of the Science and New Directions for Drugged Driving in Research

Richard Catalano, Ph.D., University of Washington
Debra Furr-Holden, Ph.D., Johns Hopkins University
Anthony Liguori, Ph.D., Wake Forest University School of Medicine
Barry K. Logan, Ph.D., NMS Labs
Robert Voas, Ph.D., Pacific Institute for Research and Evaluation
Terry Zobeck, Ph.D., ONDCP

Dr. Catalano focused his remarks on teenaged drivers. Motor vehicle crashes are the leading cause of death among youths aged 15 to 20 years in the United States. Youth account for 4.5% of miles driven and 32% of crash costs. Insufficient driving experience, poor judgment, impulsivity, peer influence, DUI, and parenting practices are predictors of poor driving.

Parenting affects poor driving in many ways. Parents need to monitor their children's behavior; talk to their children about expectations; and help them develop skills in all areas, including managing moods and making decisions.

Young people appear to understand the message about drinking and driving but they need more information about using drugs and driving. Parents need to talk to their children about risk-taking behavior and explaining that driving is a responsibility, not a right. Parents need to set the conditions under which their children may drive; a driving contract between parents and their teenage children can be useful for this purpose.

Adolescence creates the perfect storm for risky driving, and teens are more likely to drive under the influence of drugs than of alcohol. Parent-teen prevention programs can reduce teen drunk driving and have promise for drugged driving. International studies of harm reduction and zero tolerance policies have shown that zero-tolerance policies for those under 21 have reduced alcohol-related harms but are apparently leading to higher marijuana use rates. Interventions to prevent teen drugged driving should address policy, norms, and parent-teen discussions.

Dr. Furr-Holden emphasized the need for enhanced rapid roadside technology. Even if drugged driving messages were disseminated, technology would not be available to test the impact of these messages or enforce compliance.

Approximately 75% of young people leaving bars in the Washington, DC, and San Francisco Bay area test positive for drug use at impairing levels. Place-based prevention strategies are needed.

Mass media are not used enough in this arena and no drugged driving message has been disseminated. Reducing drugged driving rates will require good epidemiological data on the extent of the problem so that researchers can measure the impact of interventions. Federal policy will be required to obtain these data. Research has shown that brief interventions have a major impact on alcohol problems, and research should explore how they might affect drugged driving.

Dr. Liguori commented that no universal understanding of "impairment" exists; different studies focus on the impact of drugs on steering, braking, attention, maintenance of lane position, or other factors, but most studies do not address all of these measures. As a result, researchers cannot easily compare data from different studies.

Dr. Liguori offered the following recommendations.

1. Increase consistency and clarity of dependent measures.
2. Develop measures of motivation to drive for simulator and on-road studies. Too many studies treat driving simply as a task, but driving because the driver is participating in a study is very different from driving because the driver needs to get to work.
3. Study distractions. We live in an era of texting or talking on the telephone while driving. Simply having another person in the car can distract the driver. The most substantial distractor is sleepiness, whose impact on driving is vastly understudied. Researchers do not know enough about the effects of these distracters and the impact of drugs on distraction.
4. Revisit the legal limit for alcohol impairment. Enough data show that drivers are impaired at .05. Research should compare the impact of lowering the legal limit to that of increasing the drinking age.
5. Prevent drugged driving by informing the public of its specific behavioral impairments. Currently, public service messages often focus on punishment (e.g. "If you drink and drive, you will get caught."). In addition to these messages the public needs to understand more about the dangerous effects of drugs on driving.

Dr. Logan pointed out that alcohol- and drug-impaired drivers are not separate populations; comorbidity is common. Opportunities for intervention are missed because the criminal justice systems cut off testing the impaired population at a .08 BAC. Access to many of the tools and populations needed for research rely on effective law enforcement tools that can create a case to take to court and establish probable cause to collect samples for testing. Additional work is needed to fine tune and reassess the Drug Recognition Evaluation program based on experience with it and make sure that it is used effectively.

Roadside testing is valuable to confirm a police officer's suspicion of impairment but it will never be as comprehensive as laboratory-based testing. If a police officer suspects that a driver is impaired and the driver has a negative roadside test result, the police officer will

not release the driver. Although oral fluid testing has a great deal of potential, it should be regarded as an opportunity for rapid sampling proximal to the time of driving and used to support the officer's opinion that the person was under influence of a drug. However, confirmatory testing in a laboratory is always necessary.

The methodology for drug testing in drivers, regardless of whether the studies are in people who are injured or killed in an accident or stopped for drunk driving, needs to be standardized. The European countries participating in DRUID have shown the feasibility of agreeing on a protocol and scope of testing. Although guidelines have been published in the United States to encourage use of more appropriate criteria by laboratories, no leverage is available to ensure that laboratories implement these standards.

Dr. Logan offered the following recommendations.

1. Enhance FARS as a research and monitoring tool. The field has made progress with alcohol as a result of FARS, and the same needs to happen with drugs.
2. Promote uniformity of testing through participation in grants tied to certain minimum levels of testing, as occurs in DRUID.
3. Study the effects of new medications on driving before these medications are released. Study the most frequently implicated drugs in motor vehicle crashes and fatalities to better inform consumers and prescribers about the risks of different medications.
4. Work with the FDA in a consultant role in planning research on drugged driving.

Dr. Voas explained that when handheld testing devices initially became available for alcohol, the Supreme Court granted an exception to the fourth amendment of the U.S. constitution, which prohibits unreasonable search and seizure. The court argued that stopping people from drinking and driving is so important that police officer may stop people and seize vehicles without probable cause. However, police officers must still have behavioral evidence before they may administer a roadside test or bring the driver to the police station for testing.

One of the problems for police is paperwork. Police officers must fill out forms when they stop a car to document that the driver was impaired before they can administer a test. Police officers cannot use handheld units to check immediately whether the driver is worth investigating; they can only use the test after they have recorded all relevant behavioral data.

Even if researchers developed roadside drug tests, the rules would still require police officers to document impaired behavior. Some behavior might be easy to document, such as weaving down the road. However, the equivalent signs of drug impairment to those used for alcohol, such as a flushed face or the smell of alcohol, are not known. This area remains to be investigated.

The problem starts at the roadside and goes to the court. Defense attorneys can use the police officer's paperwork on the event to show that the alcohol test was not justified. Showing probable cause or reason to believe that a driver was impaired by drugs is likely to be even more difficult than for alcohol.

Dr. Voas hoped that researchers could learn from the experience with alcohol, when researchers put all of their effort into determining the levels of alcohol that affect behavior and neglected to address the relevant enforcement issues. Researchers did not put sufficient effort into preparing to use the testing technology when it became available. Dr. Voas is concerned that researchers are heading in the same direction with drugged driving studies.

Dr. Zobeck reported that ONDCP's national drug control strategy covers approximately $16 billion worth of federal resources across 12 federal departments and agencies. The strategy addresses a wide range of activities, including prevention and treatment. Drugged driving is one of the strategy's three signature initiatives, showing how important this issue is to ONDCP. ONDCP is developing several action items on drugged driving and will ask other

government representatives to join work groups to address these items. Many of the recommendations made at this meeting fall under these items:

1. Encourage states to adopt per se laws.
2. Conduct more research and collect more data on drugged driving.
3. Enhance the prevention of drugged driving by educating communities and professionals.
4. Develop standards for toxicology laboratories.
5. Increase training for law enforcement on identifying drugged driving.

Central to these action items is the research discussed at this meeting. Dr. Zobeck invited participants to share their feedback on the strategy when it is posted.

Discussion

Law Enforcement

Dr. Walsh explained that the test courts use to determine whether search and seizure by the government is unreasonable is whether the intrusion into the person's privacy is merited by benefits to the public. The courts have supported workplace drug testing programs, especially random testing without cause, for law enforcement officers, airline pilots, and others whose impairment could affect public safety. The research question is whether minimally intrusive drug-testing technology can be developed.

A participant added that the testing needs to be forensically defensible. Will the test results be admissible in courts based on science? In addition, safeguards must be in place to ensure that the test is properly administered. These are research questions and the FDA should be involved in planning this research. It was further added the the FDA can be involved in whether the screening devices perform in a valid manner, but the FDA is not and should not be involved in whether the confirmation procedures are valid. The standards of testing and validity of testing are determined by the practioners (toxicologists) in the field, and their overarching authorities (professional organizations, accrediting bodies, state and federal legislators). This aspect of forensic toxicology is currently under review by both White House and Congressional committees to improve standardization and quality of practice.

Dr. Voas expressed concern about the separation of policy and research because many questions are related to both research and policy. Research is needed, for example, on the signs and behaviors that police can use to initiate drugged driving enforcement. Dr. Wilson Compton clarified that NIDA sponsors research that is directly related to policy but does not do studies intended to produce policy change.

A participant commented that even if drivers are successfully charged with drugged driving, the justice system and jail might not be the best response. People charged with drugged driving might not go through these systems because their crimes might seem less serious than other crimes and the system does not have the capacity to handle them. Representatives of the criminal justice and treatment systems should be involved in planning research related to drugged driving.

Self-Reported Measures

Dr. Wilson Compton asked about the potential value of self-reported measures, such as the Monitoring the Future and Youth Risk Behavior Surveillance System surveys. Questions could be added to these surveys at very little cost.

Dr. Zobeck said that both the household survey and Monitoring the Future ask respondents if they have driven while consuming drugs and these data are helpful. Combining these measures with the roadside survey and FARS data would provide a good set of data to use for making the case to the public that drugged driving is a significant problem.

Dr. Catalano said that self-reported responses are accurate as long as the self report is conducted in an anonymous or confidential manner. Self reports whether done by anonymous paper and pencil questionnaires, confidential web or computer assisted self report tend to get higher rates of reporting drug use and other sensitive behaviors than telephone surveys.

Dr. Furr-Holden reported that people are unlikely to admit that they are drinking and driving at the roadside, even if their BAC is positive. But when asked two days later by telephone if they had been drinking and driving, they will admit it.

A participant reported validating the reliability of self-report through parallel collection and testing of biological specimens. The concordance for urine testing was high, showing that self-report data are good. The participant added that the question about drugs consumed in the NHTSA survey needs to be updated to include prescription as well as illegal drugs. In addition, surveys need to ask people whether they used the drug within the number of days during which the substance can be identified in a biological sample.

Per Se Laws and Impairment

Dr. Logan commented that no evidence is available to correlate levels of the vast majority of drugs, even in blood, with impairment levels. Most people who take drugs take more than one type of drug, and it is difficult to study the many possible combinations and individual variations. This is one reason why per se laws for illicit drugs are so important.

Dr. Richard Compton explained that per se laws make possession of an illegal drug in the body while driving illegal.

Dr. Walsh pointed out that ample evidence shows that some people at .08 BAC are not impaired but, according to the law, anyone with a .08 BAC is impaired. Dr. Zobeck explained that the difference with illicit drugs is that, because they are illegal, any level of these drugs in a person's body is illegal; no impairment level can be set. Dr. DuPoint explained that per se laws do not imply that people who use drugs or alcohol are impaired, and linking per se laws to the concept of impairment confuses the issue. According to per se laws, someone with a BAC of .08 has violated the law.

Dr. Catalano suggested policy research comparing accidents and DUI arrests in states that permit the use of medical marijuana to rates in states without such laws.

Dr. DuPont argued that it is inconsistent to say that commercial drivers, but not other drivers, may not use marijuana when they drive. How could anyone make this case?

Dr. Zobeck noted that approximately 5% of people in the Roadside Survey had taken prescription drugs, primarily narcotic analgesics. Dr. Wilson Compton pointed out that police officers can stop a car if the driver appears to be impaired, regardless of whether the driver has used a substance.

Dr. DuPont explained that per se laws do not apply to prescription drugs; with prescription drugs, enforcement is based on impairment because the behavior is illegal. Driving while impaired is legal if the substance that caused the impairment was legal; this is also true for alcohol because someone with a BAC lower than .08 can be charged for impaired driving.

Closing Remarks

Dr. Wilson Compton said that the group had accomplished Dr. Volkow's charge of proposing bold ideas. The bold ideas proposed included monitoring national and state DUI trends, developing new technologies that could be applied in real-world settings, harnessing the changes that will be driven by the new national drug strategy, and studying the impact of

new laws.

Dr. Wilson Compton summarized the presentations at this meeting:

- Dr. Walsh summarized the drugged driving research over the past few decades and showed that some of the issues that researchers are trying to prove have already been studied.
- Dr. Richard Compton demonstrated leadership and persistence in following through with his research program, and Dr. Wilson Compton looked forward to working with him on his case-control study.
- Dr. DuPont presented five intriguing challenges and urged the enhancement of FARS. Dr. DuPont and his colleagues will help NIDA develop a white paper and a journal article based on the discussions at this meeting.
- Dr. Hingson demonstrated the interactions between the alcohol and drug abuse fields and showed that underage drinking research addresses many of the same issues as drug abuse studies.
- Dr. Huestis provided evidence on the key role of toxicology in drugged driving research.
- Ms. Bernhoft described some impressive studies and she should consider discussing her case-control studies with Dr. Richard Compton, whose case-control studies are quite different. The possibility exists for new collaborations between U.S. and European investigators.

Dr. Wilson Compton thanked the participants for helping to set a potentially historic turning point in policy, practice, and research on driving under the influence of drugs.

Participant list (PDF Format, 600kb)
