



Working to Reform Marijuana Laws

**Testimony of Paul Armentano
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My name is Paul Armentano and I am the Deputy Director for NORML, the National Organization for the Reform of Marijuana Laws. In this capacity, I have reviewed hundreds of studies relevant to the issue of cannabinoids and behavioral performance. My own papers pertaining to the subject of cannabis and psychomotor performance have appeared in various anthologies and in peer-reviewed scientific journals. I have spoken on this topic at various academic forums, including the California Association of Toxicologists, and at numerous CLE and CME-sponsored events, as well as before several state legislatures. I have also attended numerous training seminars pertaining to the issue of cannabis and drugged-driving behavior, including symposiums sponsored by the American Academy of Forensic Sciences (AAFS), the Society of Forensic Toxicologists (SOFT), the International Council on Alcohol, Drugs, and Traffic Safety (ICADTS), and the National Institute on Drug Abuse (NIDA).

I am testifying before you today to highlight the problematic nature of Nevada's present *per se* traffic safety laws as they pertain to the trace presence of delta-9-THC and/or its inert metabolite, carboxy-THC. To be clear, I am not testifying this morning in regard to whether cannabis may adversely influence psychomotor performance. It is well established that cannabis may temporarily impact driving performance in a dose-dependent manner¹ – particularly when consumed by cannabis-naïve subjects,² and most especially when consumed in combination with alcohol.³ By contrast, it is far from established that the identification of either THC or the carboxy THC metabolite may be consistently correlated with behavioral impairment.⁴ In fact, America's leading traffic safety agencies, such as the National Highway Traffic Safety Administration (NHTSA) and the US Department of Transportation, advise explicitly against the imposition of *per se* laws for cannabinoids, such as those in place in the state of Nevada.

Leading Traffic Safety Experts Oppose *Per Se* Limits For Cannabis

¹ Armentano. 2013. Cannabis and psychomotor performance: A rational review of the evidence and implications for public policy. *Drug Testing and Analysis*: 52-56.

² Theunissen et al. 2012. Neurophysiological functioning of occasional and heavy cannabis users during THC intoxication. *Psychopharmacology*: 341-350.

³ Poulsen et al. 2014. The culpability of drivers killed in New Zealand road crashes and their use of alcohol and other drugs. *Accident Analysis and Prevention*: 119-128.

⁴ Armentano. 2013. Should *per se* limits be imposed for cannabis? Equating cannabinoid blood concentrations with actual driver impairment: Practical limitations and concerns. *Humboldt Journal of Social Relations*: 45-55.

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For example, the NHTSA fact-sheet, entitled 'Drugs and Human Performance' – presently available on the NHTSA.gov website – acknowledges: "It is difficult to establish a relationship between a person's THC blood or plasma concentration and performance impairing effects. ... It is inadvisable to try and predict effects based on blood THC concentrations alone, and currently impossible to predict specific effects based on THC-COOH concentrations."⁵

This conclusion is similar to findings issued previously by NHTSA, published in the federally-funded report 'Marijuana and Actual Driving Performance,' which determined: "One of the program's objectives was to determine whether it is possible to predict driving impairment by plasma concentrations of THC and/or its metabolite, THC-COOH, in a single sample. The answer is very clear: it is not. Plasma of drivers showing substantial impairment in these studies contained both high and low THC concentrations; and, drivers with high-plasma concentrations showed substantial, but also no impairment, or even some improvement."⁶

Likewise, the current edition of the US Department of Transportation's 'Drug Evaluation and Classification Training' student manual explicitly states: "Toxicology has some important limitations. One limitation is that, with the exception of alcohol, toxicology cannot produce 'per se' proof of drug impairment. That is, the chemist can't analyze the blood or urine and come up with a number that 'proves' the person was or wasn't impaired."⁷

Most recently, testifying before the US House of Representatives, Committee on Oversight and Government Reform on July 31, 2014, Dr. Jeffrey Michael, Associate Administrator for Research and Program Development at NHTSA affirmed, "The available evidence does not support the development of an impairment threshold for THC (in blood) which would be analogous to that (of) alcohol."⁸

Why Are Per Se Limits Inadvisable For Cannabis

There are several reasons for this fact. One, rising blood alcohol levels correlate with rising levels of behavioral impairment. This is not the case with THC, which is present at peak levels in the blood of subjects well before the onset of acute impairment.⁹

Two, the available evidence indicates that the response of individuals to increasing amounts of THC is much more variable than it is for alcohol. For example, experienced cannabis consumers tend to

⁵ NHTSA Factsheet online at: <http://www.nhtsa.gov/People/injury/research/job185drugs/cannabis.htm>

⁶ US DOT, *NHTSA Final Report: Marijuana and Actual Driving Performance*, page 107. Online at: <http://ntl.bts.gov/lib/25000/25800/25867/DOT-HS-808-078.pdf>

⁷ US DOT, NHTSA, Traffic Safety Institute. *Drug Evaluation and Classification Training Program, The Drug Recognition Expert School, January 2011 edition.*

⁸ Archived testimony, July 31, 2014, before the US House of Representatives, Subcommittee on Oversight & Government Reform here: <http://oversight.house.gov/hearing/planes-trains-automobiles-operating-stoned/>

⁹ Schwoppe et al. 2012. Psychomotor performance, subjective and physiological effects and whole blood delta-9-tetrahydrocannabinol concentrations in heavy, chronic cannabis smokers following acute smoked cannabis. *Journal of Analytical Toxicology*: 1-8.

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display little to no change in psychomotor performance following cannabis administration,¹⁰ while more naïve may display significant changes in reaction time, brake latency, and in standard deviation of lateral positioning.¹¹ Several recent papers in the scientific literature affirm this phenomenon of cannabis tolerance, such as a 2012 literature review published in the official journal of the German medical association, which states, “Patients who take cannabinoids at a constant dosage over an extensive period of time often develop tolerance to the impairment of psychomotor performance, so that they can drive vehicles safely.”¹² Similarly, in regard to the consumption of dronabinol, (oral, synthetic THC) prior to driving, the US Food and Drug Administration acknowledges that persons acclimated to the effects of the drug “are able to tolerate the drug and to perform such tasks safely.”¹³

Three, cannabis’ acute effects of psychomotor performance are typically short-lived.¹⁴ States the NHTSA.gov website, “Effects from smoking cannabis products are felt within minutes and reach their peak in 10-30 minutes.”¹⁵ Likewise, the US Department of Transportation report, ‘State of Knowledge of Drug-Impaired Driving’ acknowledges, “Experimental research on the effects of cannabis have produced mixed results, indicating that any effects ... dissipate quickly after one hour.”¹⁶ Consequently, experts writing in the peer-reviewed scientific literature advise that a time span of three to four hours following cannabis inhalation “could be recommended to users as a minimum wait period before driving.”¹⁷

By contrast, THC and its metabolite carboxy THC may be present in subjects for prolonged periods of time following cannabis consumption. This is because both substances are lipid soluble, not water soluble. As a result, both substances possess a uniquely prolonged half-life in human subjects. For example, the presence of residual quantities of THC may be identified in the blood of former, habitual cannabis consumers for periods of time exceeding 7 days¹⁸ – long after any psychomotor impairing effects of the substance have worn off.¹⁹ The inert carboxy THC metabolite possesses an even longer detection time, with case studies documenting its presence in the urine of former users for periods exceeding 100 days.²⁰

¹⁰ Sewell et al., 2009. The effect of cannabis compared with alcohol on driving. *American Journal of Addiction*: 185-193.

¹¹ Armentano, 2013. Op. Cit.

¹² Grotenhermen and Muller-Vahl. 2012. The therapeutic potential of cannabis and cannabinoids. *Deutsches Arzteblatt International*: 495-501.

¹³ Online at: <http://www.fda.gov/ohrms/dockets/dockets/05n0479/05N-0479-emc0004-04.pdf>

¹⁴ Sewell et al., Op. Cit.

¹⁵ NHTSA Factsheet, Op. Cit.

¹⁶ US DOT, NHTSA. *State of Knowledge of Drug-Impaired Driving: Final Report*, page 55. Online at: <http://www.nhtsa.gov/people/injury/research/stateofknwlegedrugs/stateofknwlegedrugs/>

¹⁷ Fischer et al. 2011. Lower risk cannabis use guidelines for Canada. *Canadian Journal of Public Health*: 324-327.

¹⁸ Karschner et al., 2009. Do delta-9-tetrahydrocannabinol concentrations indicate recent use in chronic cannabis consumers? *Addiction*: 2041-2048.

¹⁹ Ronen et al., 2008. Effects of THC on driving performance, physiological state and subjective feelings relative to alcohol. *Accident, Analysis and Prevention*: 926-934.

²⁰ Musshoff and Madea. 2006. Review of biological matrices (urine, blood, hair) as indicators of recent or ongoing cannabis use. *Therapeutic Drug Monitoring*: 155-163.

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As a result, the Arizona Supreme Court earlier this year struck down provisions in that state's traffic safety law that inappropriately equated the presence of THC metabolites with *per se* psychomotor impairment, arguing that the enforcement of such a statute would lead to "absurd results." The Court added, "Additionally, this interpretation would criminalize otherwise legal conduct. In 2010, Arizona voters passed the Arizona Medical Marijuana Act legalizing marijuana for medicinal purposes. ... Because carboxy-THC can remain in the body for as many as twenty-eight to thirty days after ingestion, the State's position suggests that a medical-marijuana user could face prosecution for driving any time nearly a month after they had legally ingested marijuana."²¹

Nevertheless, despite the dearth of evidence in support of cannabinoid *per se* limits, Nevada imposes an inflexible *per se* threshold of 2ng/ml of THC in blood and/or 15ng/ml carboxy THC in blood or urine. These limits were not chosen following any scientific debate. Rather, lawmakers selected these limits because they were the lowest limits of quantitation available at that time. Because the majority of qualified patients recommended medicinal cannabis consume the substance either daily or near-daily, it is probable that most, if not all, of this patient population is vulnerable to criminal prosecution under Nevada's existing *per se* statute any time they operate a motor vehicle – absent any evidence of behaviorally impairment.

Common Sense Alternatives to *Per Se* Limits

In lieu of the continued imposition of such unscientific and potentially problematic *per se* limits for cannabinoids, lawmakers ought embrace alternative public policies to both discourage and better identify drugged driving behavior.

In order to best educate the public as to the potential risks of cannabis-influenced driving and to discourage such behavior, state-funded public awareness campaigns should be created and marketed toward the younger driving population aged 18 to 25, as this group is most likely to consistently use cannabis and is also likely to acknowledge having operated a motor vehicle shortly after consuming the substance. Such campaigns should especially emphasize the fact that the concurrent use of cannabis and alcohol has an exponentially adverse effect on psychomotor performance.

Increased efforts should be made within the law enforcement community to encourage officers to engage in drug recognition evaluation (DRE) or equivalent training (such as ARIDE: Advanced Roadside Impaired Driving Enforcement) so that a greater number of police may be able to better identify drivers who may be operating a vehicle while influenced by cannabis. Further, the reliability of standard field sobriety testing ought to be critically assessed regarding whether these procedures are sufficiently sensitive to reliably identify cannabis-influenced subjects. Presently, standard field sobriety tests have been validated for alcohol, but their sensitivity to subjects influenced by

²¹ In the Supreme Court of the State of Arizona: State of Arizona v Hrach Shilgevorkyan. Decided April 22, 2014. Online at: <http://archive.azcentral.com/ic/pdf/arizona-court-marijuana-ruling.pdf>



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cannabis is far less reliable.²² Further research ought to be encouraged in this arena to identify more sensitive and reliable behavioral, performance, and clinical indicators of cannabis intoxication.

Though the development of roadside cannabinoid-specific detection testing technology is still in its infancy, one may argue for the provisional use of such tests by specially trained members of law enforcement. The use of rapid response cannabis-sensitive technology to rapidly identify the presence of THC in drivers, such as a roadside saliva test or breath test, would provide utility to law enforcement in their efforts to better identify suspected intoxicated drivers. However, since THC concentrations in saliva or breath have yet to be correlated with behavioral or psychomotor impairment, a positive test result should not be inferred as *per se* evidence of driver impairment, but rather as a potential indicator of recent cannabis ingestion.

Finally, just as many states classify the consumption of alcohol while driving as a traffic safety violation, lawmakers may wish to consider similar traffic safety provisions classifying the act of cannabis consumption while driving as a *per se* traffic safety offense.

In Conclusion

In conclusion, the sole presence of THC and/or its metabolites, particularly at low levels, is an inconsistent and inadvisable indicator of psychomotor impairment in cannabis consuming subjects. Cannabinoids' absorption patterns and effects on performance vary widely from person to person, raising concerns that imposed limits are unlikely to be consistently applicable to individual subjects. In particular, experienced cannabis consumers – such as the majority of Nevada's qualified medical marijuana patients – become tolerant to the substance's behavioral effects. These subjects also retain trace concentrations of THC and/or carboxy THC for extended periods of time well beyond the duration of impairment, making them especially vulnerable to inappropriate prosecution and conviction under the law.

As a result, NORML maintains that *per se* measures for the presence of cannabis' constituents in blood or urine are an unscientific and disproportionate response to behavior that is already sufficiently addressed by present traffic safety laws which already criminally prohibit driving while impaired by drugs, including marijuana. The imposition and enforcement of such *per se* measures risks inappropriately convicting unimpaired subjects of traffic safety violations, including and most especially legally qualified patients who may have previously consumed medicinal cannabis in the privacy of their own home some days earlier.

I thank you for your time and I would be happy to answer any questions you may have.

²² Bosker et al., 2011. A placebo-controlled study to assess Standardized Field Sobriety Tests performance during alcohol and cannabis intoxication in heavy cannabis users and accuracy of point of collection testing devices for detecting THC in oral fluid. *Psychopharmacology*: 439-446.