STATE OF MICHIGAN
IN THE COURT OF APPEALS

PEOPLE OF THE STATE OF MICHIGAN,

Plaintiff-Appellee,

v

RODNEY LEE KOON,

Defendant-Appellant.
/

Court of Appeals No. 301443

Grand Traverse Circuit Ct. No. 10-28194-AR

AMENDED BRIEF OF ATTORNEY GENERAL BILL SCHUETTE AS *AMICUS CURIAE*

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Dated: March 8, 2011

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INTEREST AND STATEMENT OF POSITION OF AMICUS CURIAE

The Attorney General is the chief law enforcement officer of the State of Michigan,[1] and as such has an interest in both enforcing the criminal law and protecting the safety of Michigan's citizens. The circuit court's decision in this case involves both these interests, because it hampers proper enforcement of the law and imperils the safety of Michigan roadways by allowing individuals to drive with marijuana in their systems. It is necessary for this Court to grant the People's application and reverse the lower court's decision in a published opinion, not only to correct the error with respect to the instant defendant, but also to guide lower courts in the proper narrow application of the Michigan Medical Marihuana Act.

[1] *Fieger v Cox*, 274 Mich App 449, 451; 734 NW2d 602 (2007).

STATEMENT OF QUESTION INVOLVED

The question before this Court is best understood as follows:

I. The motor vehicle code protects the safety of Michigan roadways by prohibiting driving with any amount of marijuana, a known intoxicant, in the driver's body, with no requirement that a defendant be shown to be impaired. The Michigan Medical Marihuana Act provides a limited protection from prosecution to certain individuals who use marijuana in accordance with that act, but provides no such protection to those who drive with marijuana in their system. Here, defendant was arrested while driving with marijuana in his bloodstream. Did the circuit court err when it held that the People cannot convict defendant solely on evidence which showed he was driving with marijuana in his bloodstream?

Plaintiff-appellant answers: Yes.

Attorney General Bill Schuette answers: Yes.

Defendant-appellee will answer: No.

INTRODUCTION

This case asks whether the Michigan Medical Marihuana Act[2] (MMMA) displaced the long-standing Michigan law that it is *per se* illegal to drive with any marijuana,[3] a schedule 1 substance, in the body. The answer is clear: it did not. The circuit court's opinion, affirming the district court's denial of the prosecutor's proposed jury instruction that presence of marijuana in the blood was sufficient for conviction, manufactured a false conflict between the two statutes through negative inference alone, and wrongly concluded that, because of language in the MMMA, a prosecutor must instead prove the driver was under the influence of marijuana. The Attorney General recognizes that this is an issue of great public importance. Any interpretation of Michigan's laws that allows drivers to traverse Michigan's roadways with schedule 1 substances in their bodies places Michigan's citizens at risk. This Court should grant the application and reverse the circuit court in a published opinion.

The operating under the influence of drugs (OUID) statute[4] prohibits driving with *any amount* of a schedule 1 substance in the body; marijuana is a schedule 1 substance. And the OUID statute exists in order to protect Michigan's citizens on Michigan roadways.[5] For example, the Michigan State Police report that in 2009, 52 people were killed and 282 injured in 916 car crashes in Michigan involving a driver who had used drugs.[6] Here, defendant was driving with marijuana in his system when he was arrested, and admitted to having used marijuana earlier that afternoon.

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[2] MCL 333.26421 *et seq.*

[3] Michigan statutes, as codified in Michigan Compiled Laws, use the spelling "marihuana." The Attorney General notes that our courts usually use the spelling "marijuana," except when quoting statutes. This brief adheres to the latter practice, but it should be noted that both spellings may be used interchangeably to refer to the same controlled substance.

[4] MCL 257.625(8).

[5] *People v Williams*, 236 Mich App 610, 614; 601 NW2d 138 (1999).

[6] Michigan Traffic Crash Facts, available at <http://www.michigantrafficcrashfacts.org> (accessed March 3, 2011).

The MMMA is a voter initiative approved in 2008 that provides a limited defense from criminal prosecutions under narrowly prescribed circumstances to certain individuals who use marijuana in accordance with the act. Nothing in the MMMA even purports to repeal, limit, or modify the OUID statute. Five principal arguments support this position:

First, although the MMMA expressly limits the application of laws that are inconsistent with it, the OUID statute is not inconsistent with the MMMA. The circuit court applied an unwarranted negative inference to reach the erroneous conclusion that the MMMA conflicts with the OUID statute's prohibition on driving with any schedule 1 substance in the body.

Second, the statutes are on different subject matters and need not be read *in pari materia*. The OUID statute exists to protect the safety of our citizens, while the MMMA does not. Each statute should be read according to its plain terms, and interpreted and applied as written. Nothing in the MMMA statute overrides the plain prohibitions in the OUID statute.

Third, even if the statutes are read *in pari materia*, they should be harmonized to give effect to both as much as possible. Giving full effect to the OUID statute takes nothing away from the MMMA statute, because defendant here is not being prosecuted for using marijuana, but for driving shortly after using it, an action the MMMA does not protect.

Fourth, adopting defendant's argument would enact a repeal by implication, which is disfavored. The MMMA does not expressly repeal or limit the application of the OUID statute. The very limited situations in which a repeal by implication may be found are not present here.

Fifth, the lower court erroneously relied on the Michigan Supreme Court's holding in *People v Feezel*[7] in deciding this case. *Feezel* does not apply here because defendant is not claiming the existence in his system of THC metabolite, the substance that the Supreme Court

[7] *People v Feezel*, 486 Mich 184; 783 NW2d 67 (2010).

addressed in *Feezel*. Rather, this case involves *active* THC, a substance *Feezel* did not purport to address and which remains unlawful for all Michigan drivers.

It is necessary for this Court to review the decision in this case, not only to correct the lower court's error in deciding the issue, but also to provide guidance for other trial courts faced with the same issue, to ensure both correct and consistent application of the criminal law.

STATEMENT OF PROCEEDINGS AND MATERIAL FACTS

The Attorney General adopts the statement of facts set forth by the People of the State of Michigan in their application for leave to appeal.

ARGUMENT

I. The MMMA's very limited protections for medical-marijuana users do not authorize driving with marijuana in the body, contrary to the OUID statute.

Section 625(8) of the motor vehicle code prohibits, among other things, operating a motor vehicle with any amount of a schedule 1 substance in his or her body.[8] Marijuana is a schedule 1 substance.[9] Tetrahydrocannabinol (THC) is the psychoactive ingredient of marijuana, and is therefore also a schedule 1 substance.[10] Section 7 of the MMMA affirmatively acknowledges, in relevant part, that the MMMA "shall not permit any person to . . . [o]perate, navigate, or be in actual physical control of any motor vehicle . . . while under the influence of marihuana."[11] No section of the MMMA, however, purports to permit driving with marijuana in the body, as defendant did here, contrary to § 625(8).

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[8] MCL 257.625.
[9] MCL 333.7212(c); see also *Feezel*, 486 Mich at 215 n 16; 783 NW2d 67 (2010); *accord Feezel*, 486 Mich at 225-226 (Opinion of YOUNG, J.).
[10] See *People v Derror*, 475 Mich 316, 319; 715 NW2d 822 (2006), overruled on other grounds *Feezel*, 486 Mich at 216.
[11] MCL 333.26427(b)(4).

The circuit court relied on § 7(e) of the MMMA in its holding. That section provides, "All other acts and parts of acts inconsistent with this act do not apply to the medical use of marihuana as provided for by this act."[12] The court's error, however, was in finding that the two acts are inconsistent in the first instance. The circuit court created this false inconsistency when it found that the MMMA prohibits driving under the influence of marijuana but allows the use of marijuana under some circumstances. There is no inconsistency between these two positions—after all, Michigan law prohibits driving under the influence of alcohol, but allows the use of alcohol under some circumstances. Moreover, prosecutors are not always forced to demonstrate actual impairment in charging drunk driving.[13] Section 7(b) of the MMMA explicitly leaves in place a prohibition on driving under the influence of marijuana; that section should not be read as saying that *only* driving under the influence may be punished, while driving with THC in the system is now permitted.

Such a reading is wrong for several reasons: First, it is not supported by the statute's plain language. The MMMA is unambiguous, and Michigan law consistently holds that, when reading such a statute, "no further judicial construction is required or permitted, and the statute must be enforced as written."[14] There is no room for the negative inference advanced by defendant. Second, defendant's reading ignores the context of § 7 by adopting a reading that makes no sense within that context. Section 7(b) is a list of things that *remain illegal* following the passage of the MMMA. It defies logic to read as part of § 7(b) a *removal* of the prohibition on driving with drugs in the system. Third, § 7(b)(4) should be interpreted—to the extent it should be interpreted at all—as a recognition on the part of the MMMA drafters that, whatever

[12] MCL 333.26427(e).
[13] See MCL 257.625(1)(b).
[14] *People v Morey*, 461 Mich 325, 330; 603 NW2d 250 (1999).

narrow protections the act would provide, they should not and do not extend to driving. If someone is a qualified individual with a serious or debilitating medical condition who seeks to use marijuana under the conditions provided in the act, the act purports to allow this, but it does *not* claim to allow that individual to drive immediately afterwards, as defendant chose to do here.

II. The statutes need not be read *in pari materia*, because the statutes are unambiguous, and because the OUID statute protects public safety while the MMMA does not.

There are two reasons why the statutes in question need not be read *in pari materia*: first, there is no ambiguity in the statutes necessitating interpretation; and second, the two statutes deal with different subject matter and do not conflict.

The doctrine of *in pari materia* is a rule of statutory construction.[15] But judicial construction of a statute is "neither required nor permitted," when, as here, statutory language is clear and unambiguous.[16] The MMMA lays out in clear terms what it permits and what it prohibits. Nowhere does it purport to permit driving with marijuana in the system. Nor does the OUID statute contain any ambiguity that would allow for application of *in pari materia*.

The second, more fundamental reason why *in pari materia* need not apply here is that the two statutes in question are separate in purpose and scope. As our Supreme Court has explained:

> Statutes *in pari materia* are those which relate to the same person or thing, or to the same class of persons or things, or which have a common purpose; and although an act may incidentally refer to the same subject as another act, it is not *in pari materia* if its scope and aim are distinct and unconnected.[17]

The purpose of the OUID statute is protection of the public from dangers on the public roads. The MMMA lays out its findings and declarations, and none of them deny or diminish the

[15] See *County Rd Assn v Bd of State Canvassers*, 89 Mich App 299, 307; 279 NW2d 334, rev'd in part on other grounds 407 Mich 101 (1979).
[16] *Petersen v Magna Corp*, 484 Mich 300, 307; 773 NW2d 564 (2009).
[17] *Rathbun v State*, 284 Mich 521, 543; 280 NW 35 (1938).

fact that marijuana is a dangerous intoxicant in the body and brain of someone behind the wheel of an automobile.[18]

It is true that § 625(8) "incidentally refer[s] to the same subject as" the MMMA, because the Legislature has recognized the harmful influence of marijuana as a danger on the roads. It is also true that the MMMA incidentally refers to driving—but it does so specifically in order to signal that it is *not* attempting to change the law regarding driving after using marijuana. This highlights the ironic error of defendant's approach: the very section of the MMMA in which it makes plain that it does *not* interfere with the motor vehicle code is being used to support the proposition that the MMMA *does* interfere with the motor vehicle code. This Court should reject such an absurd interpretation of the MMMA.

III. Even if the statutes are read *in pari materia*, they should be read in harmony to give effect to both as much as possible.

It is an axiom of statutory construction that repeals by implication are disfavored.[19] Although the Attorney General maintains that these two statutes are not conflicting or *in pari materia*, if this Court does find a conflict, it remains the "usual rule of statutory construction that apparently conflicting statutes should be construed, if possible, to give each full force and effect." [20]

Here, defendant may argue that this repeal is explicit, not implicit, because § 7(e) is explicit in its repeal or partial repeal of acts or parts of acts inconsistent with the MMMA. But that only goes so far. No part of the MMMA explicitly overrides the OUID statute's explicit and plain prohibition on driving with marijuana in the system. The only way to find an inconsistency is, as defendant has done, through the use of negative inferences. Even if such inferences were

[18] MCL 333.26422.
[19] *City of Kalamazoo v KTS Indus*, 263 Mich App 23, 36; 687 NW2d 319 (2004), citing *Wayne Co Prosecutor v Dep't of Corrections*, 451 Mich 569, 576-577; 548 NW2d 900 (1996).
[20] *State Hwy Commr v Detroit City Controller*, 331 Mich 337, 358; 49 NW2d 318 (1951).

reasonable, "repeal by implication will not be found if any other reasonable construction may be given to the statutes."[21]

IV. Repeal by implication is not warranted here, because the MMMA explicitly disclaims any attempt to either repeal the OUID statute, or to "occupy the entire field."

There are only two instances in which a court might infer a repeal: "(1) where it is clear that a subsequent legislative act conflicts with a prior act; or (2) when a subsequent act of the Legislature clearly is intended to occupy the entire field covered by a prior enactment."[22] Here, it is not at all clear that there is a conflict between the two statutes. Such a conflict can only be found by resorting to tenuous negative inferences, as noted. And it cannot be said that the MMMA "clearly is intended to occupy the entire field" of marijuana use. As this Court recently held in *People v King*,

> the [M]MMA constitutes a determination by the people of this state that there should exist a *very limited*, *highly restricted* exception to the statutory proscription against the manufacture and use of marijuana in Michigan. As such, the [M]MMA grants *narrowly tailored* protections to qualified persons as defined in the act if the marijuana is grown and used for *certain narrowly defined* medical purposes.[23]

Defendant's interpretation is contrary to the narrow construction given by the MMMA in *King*, as well as to the axiom that repeal by implication is disfavored.

The proper interpretation is one that gives full effect to both statutes. It is unreasonable to expect that the MMMA would list every activity that remains prohibited. It is unreasonable to deduce that, because the MMMA contains a list of some activities that remain prohibited, all activities not listed become permitted. As Justice Young put it in a different, but related, context:

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[21] *KTS Indus*, 263 Mich App at 36-37.
[22] *KTS Indus.*, 263 Mich App at 37, citing *Donajkowski v Alpena Power Co*, 460 Mich 243, 253; 596 NW2d 574 (1999).
[23] *People v King*, __ Mich App __, slip op. at 4 (February 3, 2011) (emphasis added).

> The Legislature should not have to draft a statute in the manner of a person wearing a belt and suspenders, by expressly banning every conceivable iteration and by-product of marijuana in order to protect the citizens of Michigan from people who drive with marijuana and marijuana by-products in their systems.[24]

Although Justice Young was discussing the interpretation of the public health code, the principle applies with equal force to the MMMA. Although the MMMA is not a model of statutory draftsmanship, its authors did take care to note several activities that remained prohibited even after its passage, and included a reference to the driving. But it did not include an exhaustive list of all prohibited activities, to be interpreted to legalize all unlisted activities through sheer force of negative inference.

Moreover, the principle of *expressio unius est exclusio alterius* does not apply in this case for two main reasons. First, because, as a rule of statutory construction, it may not be applied where statutes are unambiguous and no judicial construction is required or permitted.[25] Second, our Supreme Court has defined the maxim in a way that does not encompass the question before this Court:

> When what is expressed in a statute is creative, and not in a proceeding according to the course of the common law, it is exclusive, and the power exists only to the extent plainly granted.[26]

Section 7(b) of the MMMA, however, is decidedly not creative, and does not grant powers. It only provides examples of rights that the MMMA does not grant. This cannot be read to mean that all rights not enumerated *are* granted. Such would not be the application of *expressio unius*, but only the erroneous application of an unwarranted negative inference, made even more harmful because it would result in a repeal by implication.

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[24] *Feezel*, 486 Mich at 223 (Opinion of YOUNG, J.).
[25] See *Detroit v Redford Twp*, 253 Mich 453, 456; 235 NW 217 (1931).
[26] *Feld v Robert & Charles Beauty Salon*, 435 Mich 352 at 362-363; 459 NW2d 279 (1990), quoting *Taylor v Pub Utilities Comm*, 217 Mich 400, 403; 186 NW 485 (1922).

V. The concerns that motivated the *Feezel* majority are not at issue in this case, where defendant tested positive for actual THC, a psychoactive substance known to impair driving ability.

Finally, it must be noted that the concerns expressed in obiter dictum in *Feezel* are not in play here, either under the specific facts of this case, or under the general precedent that will be set by this Court in deciding this case. The *Feezel* majority, in holding that 11-carboxy-THC, a metabolite (naturally occurring byproduct) of THC, was not a schedule 1 substance, expressed its concern that "individuals who use marijuana for medicinal purposes will be prohibited from driving long after the person is [sic] no longer impaired."[27] This case, however, does not deal with 11-carboxy-THC, but actual THC. After being arrested, defendant admitted to having used marijuana earlier that afternoon. While 11-carboxy-THC remains in the system for weeks, THC itself only remains for a matter of hours.[28]

And THC is known to impair driving. As the National Highway Traffic Safety Administration reports, effects of THC include "relaxed inhibitions, . . . disorientation, altered time and space perception, lack of concentration, impaired learning and memory, alterations in thought formation and expression, drowsiness, sedation, . . . a dulling of attention despite an illusion of heightened insight, image distortion, and psychosis."[29] Side effects include "[f]atigue, paranoia, possible psychosis, memory problems, . . . decreased motor coordination, lethargy, . . . and dizziness."[30] NHTSA further reports:

> [L]aboratory performance studies indicate that . . . perceptual functions are significantly affected. The ability to concentrate and maintain attention are decreased during marijuana use, and impairment of hand-eye coordination is dose-related over a wide range of dosages. Impairment in retention time and tracking, subjective sleepiness, distortion of time and distance, vigilance, and loss

[27] *Feezel*, 486 Mich at 214.
[28] National Highway Traffic Safety Administration, Drugs and Human Performance Fact Sheets (Excerpt attached as Appendix A), pp 8-9.
[29] Drugs and Human Performance Fact Sheets, p 9.
[30] Drugs and Human Performance Fact Sheets, p 9.

> of coordination in divided attention tasks have been reported. . . . [R]esidual effects have been reported up to 24 hours.[31]

With respect to driving, NHTSA found that THC impairs "cognitive and psychomotor tasks associated with driving" even at low doses, and severely impairs it at high doses, or with chronic use.[32]

Further, as even the circuit court here conceded, "It is possible for a person to be affected by marijuana use with concentrations of THC in their blood below the limit of detection of the method."[33] In other words, this is not a case where, as the *Feezel* majority worried, the chemical remains in the blood long after any impairment ends. This is the opposite: the impairment exists when THC is present and remains even after the chemical—or detectable amounts of it—has left the blood. For this Court to allow the lower courts' error to stand would hobble the People's ability to protect Michigan drivers by prosecuting individuals affected by THC in cases where the effects of THC are not outwardly visible, in direct contradiction to the Legislature's determination that a detection of "any amount" of THC in the body is a danger on the roadways, and sufficient to convict.

VI. This Court's review of this matter is necessary to correct the error of the lower courts and to provide guidance to other trial courts faced with the same issue.

The fact that both lower courts in this case misinterpreted the MMMA, creating an inconsistency which was not there, demonstrates the need for this Court to grant the People's application for leave to appeal. The law on this subject is evidently not clear to trial courts. There exists not only the danger of other trial courts reaching the same erroneous result as was reached here, but also the danger that different trial courts will reach different results on the issue, creating an unacceptable inconsistency in the application of the criminal law.

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[31] Drugs and Human Performance Fact Sheets, pp 10-11.
[32] Drugs and Human Performance Fact Sheets, p 11.
[33] Drugs and Human Performance Fact Sheets, p 9 (quoted in Decision and Order, p 4).

This Court should therefore provide guidance to the trial courts and correct the error of the lower courts in this case, by granting the People's application for leave to appeal and reversing the decision of the circuit court in a published opinion.

CONCLUSION AND RELIEF SOUGHT

WHEREFORE, *Amicus Curiae* Attorney General Bill Schuette respectfully asks this Honorable Court to reverse the decision of the circuit court in a published opinion.

Respectfully submitted,

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Dated: March 8, 2011
20110005211A/Koon, Rodney/KoonAmicus

APPENDIX A

NATIONAL HIGHWAY TRAFFIC SAFETY ADMINISTRATION

Drugs and Human Performance Fact Sheets

U.S. Department of Transportation
National Highway Traffic Safety Administration

NHTSA
People Saving People
www.nhtsa.dot.gov

Introduction

The use of psychoactive drugs followed by driving has been an issue of continual concern to law enforcement officers, physicians, attorneys, forensic toxicologists and traffic safety professionals in the U.S. and throughout the world. At issue are methods for identifying the impaired driver on the road, the assessment and documentation of the impairment they display, the availability of appropriate chemical tests, and the interpretation of the subsequent results. A panel of international experts on drug-related driving issues met to review developments in the field of drugs and human performance over the last 10 years; to identify the specific effects that both illicit and prescription drugs have on driving; and to develop guidance for others when dealing with drug-impaired driving problems.

This publication is based on the deliberations of the International Consultative Panel on Drugs and Driving Impairment held in Seattle, WA in August 2000. This meeting was sponsored by the National Safety Council, Committee on Alcohol and other Drugs; the State of Washington Traffic Safety Commission; and the National Highway Traffic Safety Administration. Delegates represented the fields of psychopharmacology, behavioral psychology, drug chemistry, forensic toxicology, medicine, and law enforcement experts trained in the recognition of drug effects on drivers in the field. The Fact Sheets reflect the conclusions of the Panel and have been designed to provide practical guidance to toxicologists, pharmacologists, law enforcement officers, attorneys and the general public on issues related to drug impaired driving.

Sixteen drugs were selected for review and include over-the-counter medications, prescription drugs, and illicit and/or abused drugs. The selected drugs are cannabis/marijuana, carisoprodol, cocaine, dextromethorphan, diazepam, diphenhydramine, gamma-hydroxybutyrate, ketamine, lysergic acid diethylamide, methadone, methamphetamine/amphetamine, methylenedioxymethamphetmaine, morphine/heroin, phencyclidine, toluene, and zolpidem.

The Fact Sheets are based on the state of current scientific knowledge and represent the conclusions of the panel. They have been designed to provide practical guidance to toxicologists, pharmacologists, law enforcement officers, attorneys and the general public to use in the evaluation of future cases. Each individual drug Fact Sheet covers information regarding drug chemistry, usage and dosage information, pharmacology, drug effects, effects on driving, drug evaluation and classification (DEC), and the panel's assessment of driving risks. A list of key references and recommended reading is also provided for each drug. Readers are encouraged to use the Fact Sheets in connection with the other cited impaired driving-related texts.

The information provided is uniform for all the Fact Sheets and provides details on the physical description of the drug, synonyms, and pharmaceutical or illicit sources; medical and recreational uses, recommended and abused doses, typical routes of administration, and potency and purity; mechanism of drug action and major receptor sites; drug absorption, distribution, metabolism and elimination data; blood and urine concentrations; psychological and physiological effects, and drug interactions; drug

effects on psychomotor performance effects; driving simulator and epidemiology studies; and drug recognition evaluation profiles. Each Fact Sheet concludes with general statements about the drugs' ability to impair driving performance. The authors strongly believe that all the above information needs to be taken into account when evaluating a drug.

Case interpretation can be complicated by a number of factors and one of the main limitations of the Fact Sheets is that they primarily relate to single drug use. Other factors which influence the risk of effects on driving for any drug include the dose, the dosage frequency, acute and residual effects, chronic administration, route of administration, the concentration of the drug at the site of action, idiosyncrasies of metabolism, drug tolerance or hypersensitivity, and the combined effects of the drug with other drugs or alcohol, to name but a few.

Individual Fact Sheets

Cannabis/Marijuana
Carisoprodol (and Meprobamate)
Cocaine
Dextromethorphan
Diazepam
Diphenhydramine
Gamma-Hydroxybutyrate (GHB, GBL, and 1,4-BD)
Ketamine
Lysergic acid diethylamide (LSD)
Methadone
Methamphetamine (and Amphetamine)
Methylenedioxymethamphetamine (MDMA, Ecstasy)
Morphine (and Heroin)
Phencyclidine (PCP)
Toluene
Zolpidem (and Zaleplon, Zopiclone)

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Disclaimer

The information contained in the Drugs and Human Performance Fact Sheets represents the views of the contributors and not necessarily those of their place of employment or the National Highway Traffic Safety Administration.

Cannabis / Marijuana (Δ^9-Tetrahydrocannabinol, THC)

Marijuana is a green or gray mixture of dried shredded flowers and leaves of the hemp plant *Cannabis sativa*. Hashish consists of resinous secretions of the cannabis plant. Dronabinol (synthetic THC) is a light yellow resinous oil.

Synonyms: Cannabis, marijuana, pot, reefer, buds, grass, weed, dope, ganja, herb, boom, gangster, Mary Jane, sinsemilla, shit, joint, hash, hash oil, blow, blunt, green, kilobricks, Thai sticks; Marinol®

Source: Cannabis contains chemicals called cannabinoids, including cannabinol, cannabidiol, cannabinolidic acids, cannabigerol, cannabichromene, and several isomers of tetrahydrocannabinol (THC). One of these isomers, Δ^9-THC, is believed to be responsible for most of the characteristic psychoactive effects of cannabis. Marijuana refers to the leaves and flowering tops of the cannabis plant; the buds are often preferred because of their higher THC content. Hashish consists of the THC-rich resinous secretions of the plant, which are collected, dried, compressed and smoked. Hashish oil is produced by extracting the cannabinoids from plant material with a solvent. In the U. S. , marijuana, hashish and hashish oil are Schedule I controlled substances. Dronabinol (Marinol®) is a Schedule III controlled substance and is available in strengths of 2.5, 5 or 10 mg in round, soft gelatin capsules.

Drug Class: *Cannabis/Marijuana*: spectrum of behavioral effects is unique, preventing classification of the drug as a stimulant, sedative, tranquilizer, or hallucinogen. *Dronabinol*: appetite stimulant, antiemetic.

Medical and Recreational Uses: *Medicinal*: Indicated for the treatment of anorexia associated with weight loss in patients with AIDS, and to treat mild to moderate nausea and vomiting associated with cancer chemotherapy. *Recreational*: Marijuana is used for its mood altering effects, euphoria, and relaxation. Marijuana is the most commonly used illicit drug throughout the world.

Potency, Purity and Dose: THC is the major psychoactive constituent of cannabis. Potency is dependent on THC concentration and is usually expressed as %THC per dry weight of material. Average THC concentration in marijuana is 1-5%, hashish 5-15%, and hashish oil $\geq$ 20%. The form of marijuana known as *sinsemilla* is derived from the unpollinated female cannabis plant and is preferred for its high THC content (up to 17% THC). Recreational doses are highly variable and users often titer their own dose. A single intake of smoke from a pipe or joint is called a hit (approximately 1/20th of a gram). The lower the potency or THC content the more hits are needed to achieve the desired effects; 1-3 hits of high potency sinsemilla is typically enough to produce the desired effects. In terms of its psychoactive effect, a drop or two of hash oil on a cigarette is equal to a single "joint" of marijuana. Medicinally, the initial starting dose of Marinol® is 2.5 mg, twice daily.

Route of Administration: Marijuana is usually smoked as a cigarette ('joint') or in a pipe or bong. Hollowed out cigars packed with marijuana are also common and are called

`. Joints and blunts are often laced with adulterants including PCP or crack cocaine. Joints can also be dipped in liquid PCP or in codeine cough syrup. Marijuana is also orally ingested.

Pharmacodynamics: THC binds to cannabinoid receptors and interferes with important endogenous cannabinoid neurotransmitter systems. Receptor distribution correlates with brain areas involved in physiological, psychomotor and cognitive effects. Correspondingly, THC produces alterations in motor behavior, perception, cognition, memory, learning, endocrine function, food intake, and regulation of body temperature.

Pharmacokinetics: Absorption is slower following the oral route of administration with lower, more delayed peak THC levels. Bioavailability is reduced following oral ingestion due to extensive first pass metabolism. Smoking marijuana results in rapid absorption with peak THC plasma concentrations occurring prior to the end of smoking. Concentrations vary depending on the potency of marijuana and the manner in which the drug is smoked, however, peak plasma concentrations of 100-200 ng/mL are routinely encountered. Plasma THC concentrations generally fall below 5 ng/mL less than 3 hours after smoking. THC is highly lipid soluble, and plasma and urinary elimination half-lives are best estimated at 3-4 days, where the rate-limiting step is the slow redistribution to plasma of THC sequestered in the tissues. Shorter half-lives are generally reported due to limited collection intervals and less sensitive analytical methods. Plasma THC concentrations in occasional users rapidly fall below limits of quantitation within 8 to 12 h. THC is rapidly and extensively metabolized with very little THC being excreted unchanged from the body. THC is primarily metabolized to 11-hydroxy-THC which has equipotent psychoactivity. The 11-hydroxy-THC is then rapidly metabolized to the 11-nor-9-carboxy-THC (THC-COOH) which is not psychoactive. A majority of THC is excreted via the feces (~65%) with approximately 30% of the THC being eliminated in the urine as conjugated glucuronic acids and free THC hydroxylated metabolites.

Molecular Interactions / Receptor Chemistry: THC is metabolized via cytochrome P450 2C9, 2C11, and 3A isoenzymes. Potential inhibitors of these isoenzymes could decrease the rate of THC elimination if administered concurrently, while potential inducers could increase the rate of elimination.

Blood to Plasma Concentration Ratio: 0.55

Interpretation of Blood Concentrations: It is difficult to establish a relationship between a person's THC blood or plasma concentration and performance impairing effects. Concentrations of parent drug and metabolite are very dependent on pattern of use as well as dose. THC concentrations typically peak during the act of smoking, while peak 11-OH THC concentrations occur approximately 9-23 minutes after the start of smoking. Concentrations of both analytes decline rapidly and are often < 5 ng/mL at 3 hours. Significant THC concentrations (7 to 18 ng/mL) are noted following even a single puff or hit of a marijuana cigarette. Peak plasma THC concentrations ranged from 46-188 ng/mL in 6 subjects after they smoked 8.8 mg THC over 10 minutes. Chronic users can have mean plasma levels of THC-COOH of 45 ng/mL, 12 hours after use; corresponding

THC levels are, however, less than 1 ng/mL. Following oral administration, THC concentrations peak at 1-3 hours and are lower than after smoking. Dronabinol and THC-COOH are present in equal concentrations in plasma and concentrations peak at approximately 2-4 hours after dosing.

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. It is possible for a person to be affected by marijuana use with concentrations of THC in their blood below the limit of detection of the method. Mathematical models have been developed to estimate the time of marijuana exposure within a 95% confidence interval. Knowing the elapsed time from marijuana exposure can then be used to predict impairment in concurrent cognitive and psychomotor effects based on data in the published literature.

Interpretation of Urine Test Results: Detection of total THC metabolites in urine, primarily THC-COOH-glucuronide, only indicates prior THC exposure. Detection time is well past the window of intoxication and impairment. Published excretion data from controlled clinical studies may provide a reference for evaluating urine cannabinoid concentrations; however, these data are generally reflective of occasional marijuana use rather than heavy, chronic marijuana exposure. It can take as long as 4 hours for THC-COOH to appear in the urine at concentrations sufficient to trigger an immunoassay (at 50ng/mL) following smoking. Positive test results generally indicate use within 1-3 days; however, the detection window could be significantly longer following heavy, chronic, use. Following single doses of Marinol®, low levels of dronabinol metabolites have been detected for more than 5 weeks in urine. Low concentrations of THC have also been measured in over-the-counter hemp oil products – consumption of these products may produce positive urine cannabinoid test results.

Effects: Pharmacological effects of marijuana vary with dose, route of administration, experience of user, vulnerability to psychoactive effects, and setting of use.
Psychological: At recreational doses, effects include relaxation, euphoria, relaxed inhibitions, sense of well-being, disorientation, altered time and space perception, lack of concentration, impaired learning and memory, alterations in thought formation and expression, drowsiness, sedation, mood changes such as panic reactions and paranoia, and a more vivid sense of taste, sight, smell, and hearing. Stronger doses intensify reactions and may cause fluctuating emotions, flights of fragmentary thoughts with disturbed associations, a dulling of attention despite an illusion of heightened insight, image distortion, and psychosis.
Physiological: The most frequent effects include increased heart rate, reddening of the eyes, dry mouth and throat, increased appetite, and vasodilatation.

Side Effect Profile: Fatigue, paranoia, possible psychosis, memory problems, depersonalization, mood alterations, urinary retention, constipation, decreased motor coordination, lethargy, slurred speech, and dizziness. Impaired health including lung damage, behavioral changes, and reproductive, cardiovascular and immunological effects have been associated with regular marijuana use. Regular and chronic marijuana smokers may have many of the same respiratory problems that tobacco smokers have (daily cough

and phlegm, symptoms of chronic bronchitis), as the amount of tar inhaled and the level of carbon monoxide absorbed by marijuana smokers is 3 to 5 times greater than among tobacco smokers. Smoking marijuana while shooting up cocaine has the potential to cause severe increases in heart rate and blood pressure.

Duration of Effects: Effects from smoking cannabis products are felt within minutes and reach their peak in 10-30 minutes. Typical marijuana smokers experience a high that lasts approximately 2 hours. Most behavioral and physiological effects return to baseline levels within 3-5 hours after drug use, although some investigators have demonstrated residual effects in specific behaviors up to 24 hours, such as complex divided attention tasks. Psychomotor impairment can persist after the perceived high has dissipated. In long term users, even after periods of abstinence, selective attention (ability to filter out irrelevant information) has been shown to be adversely affected with increasing duration of use, and speed of information processing has been shown to be impaired with increasing frequency of use. Dronabinol has an onset of 30-60 minutes, peak effects occur at 2-4 hours, and it can stimulate the appetite for up to 24 hours.

Tolerance, Dependence and Withdrawal Effect: Tolerance may develop to some pharmacological effects of dronabinol. Tolerance to many of the effects of marijuana may develop rapidly after only a few doses, but also disappears rapidly. Marijuana is addicting as it causes compulsive drug craving, seeking, and use, even in the face of negative health and social consequences. Additionally, animal studies suggests marijuana causes physical dependence. A withdrawal syndrome is commonly seen in chronic marijuana users following abrupt discontinuation. Symptoms include restlessness, irritability, mild agitation, hyperactivity, insomnia, nausea, cramping, decreased appetite, sweating, and increased dreaming.

Drug Interactions: Cocaine and amphetamines may lead to increased hypertension, tachycardia and possible cardiotoxicity. Benzodiazepines, barbiturates, ethanol, opioids, antihistamines, muscle relaxants and other CNS depressants increase drowsiness and CNS depression. When taken concurrently with alcohol, marijuana is more likely to be a traffic safety risk factor than when consumed alone.

Performance Effects: The short term effects of marijuana use include problems with memory and learning, distorted perception, difficultly in thinking and problem-solving, and loss of coordination. Heavy users may have increased difficulty sustaining attention, shifting attention to meet the demands of changes in the environment, and in registering, processing and using information. In general, laboratory performance studies indicate that sensory functions are not highly impaired, but perceptual functions are significantly affected. The ability to concentrate and maintain attention are decreased during marijuana use, and impairment of hand-eye coordination is dose-related over a wide range of dosages. Impairment in retention time and tracking, subjective sleepiness, distortion of time and distance, vigilance, and loss of coordination in divided attention tasks have been reported. Note however, that subjects can often "pull themselves together" to concentrate on simple tasks for brief periods of time. Significant performance impairments are