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June 2, 2005

To: Oregon House Judiciary Committee

Re: Public testimony on HB 2693-1

Thank you for taking my testimony. I am board certified in internal medicine and practiced in Lake Oswego, Oregon where I routinely cared for chronically ill patients. In addition, I was awarded a Fellowship in the American College of Physicians (FACP), co-authored: *Is Marijuana the Right Medicine For You? A Factual Guide to Medical Uses of Marijuana* by Zimmerman, Bayer, and Crumpacker (1998 Keats Publishing), and was a chief petitioner, co-author, and spokesperson for the Oregon Medical Marijuana Act (OMMA) Oregon voters approved in November 1998. I maintain a website with a medical cannabis bibliography<sup>1</sup>, authored an article in the peer-reviewed *Journal of Cannabis Therapeutics*<sup>2</sup>, regularly review medical literature concerning cannabis<sup>3</sup>, and testify as a medical cannabis expert in Oregon courts.

During a recent trial in Oregon, I was asked whether inhaled cannabis alone eight hours prior to work might cause psychomotor impairment at work increasing risk, particularly around motor vehicles. This relates directly to HB 2693-1.

This patient was typical in that he reported smoking marijuana in the evening after work but never used any cannabis within a nine-hour period prior to work. He was reported to a supervisor because his jacket allegedly smelled like marijuana and was asked for a urine test. He voluntarily showed his Oregon Medical Marijuana Program (OMMP) registration card to his supervisor demonstrating he was a medical marijuana patient registered with the Oregon Department of Human Services. His attending physician had approved his application for severe pain, a debilitating condition as defined by the Oregon Medical Marijuana Act<sup>4</sup>. Since no one claimed impairment at work, the question was whether smoking a cannabis cigarette eight to nine hours before going to work causes impairment at work.

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<sup>1</sup> *Medical Cannabis (Marijuana) Bibliography* [www.omnia1998.org/omr\\_mmj\\_bibliography.html](http://www.omnia1998.org/omr_mmj_bibliography.html)

<sup>2</sup> Bayer MD, Richard: "Therapeutic Cannabis (Marijuana) as an Antiemetic and Appetite Stimulant in Persons with Human Immunodeficiency Virus (AIDS). *Journal of Cannabis Therapeutics* 1(3/4) 2001. Pp 5-16. [www.omnia1998.org/Bayer-Cannabis\\_for\\_nausea\\_in\\_AIDS\\_JCT\\_2001.pdf](http://www.omnia1998.org/Bayer-Cannabis_for_nausea_in_AIDS_JCT_2001.pdf)

<sup>3</sup> National Library of Medicine search engine [www.ncbi.nlm.nih.gov/entrez/query.fcgi](http://www.ncbi.nlm.nih.gov/entrez/query.fcgi)

<sup>4</sup> ORS 475.300 -- ORS 475.346 [www.dhs.state.or.us/publichealth/mm/475a.cfm#300](http://www.dhs.state.or.us/publichealth/mm/475a.cfm#300)

Cannabis has been used to relieve pain for centuries throughout the world, including the US, prior to the enactment of the Cannabis Tax Act of 1937<sup>5</sup>. Cannabinoids are a category of substances with cannabis-like properties and include the natural cannabis plant, synthetic cannabinoids, and internal (endogenous) hormones that mimic cannabis. Case reports of the benefit of smoked cannabis to relieve pain are published<sup>6</sup>. The major psychoactive cannabinoid, THC, is as effective as codeine for relieving pain. Researchers wrote, "This trial has demonstrated an analgesic [anti-pain] effect of THC in patients with cancer pain"<sup>7</sup>. Experiments with monkeys and rats show unequivocal science for the analgesic effect of cannabinoids in laboratory animals<sup>8</sup>. Endogenous cannabinoids are important in pain control<sup>9</sup>. GW Pharmaceuticals has performed randomized double-blind placebo-controlled trials showing Sativex®, a cannabis extract administered under the tongue, markedly improves pain and muscle spasm<sup>10</sup>. Canada recently approved Sativex® for treating pain with applications pending in the US and other countries<sup>11</sup>. The International Association for Cannabis as Medicine (IACM) lists dozens of clinical studies including studies on pain<sup>12</sup>. Perhaps the best summary is from the prestigious Institute of Medicine, "In conclusion, the available evidence from animal and human studies indicates that cannabinoids can have a substantial analgesic effect"<sup>13</sup>.

The Oregon Medical Marijuana Act passed by Oregonians in 1998 states in **ORS 475.300 Findings**, "The people of the state of Oregon hereby find that: (1) Patients and doctors have found marijuana to be an effective treatment for suffering caused by debilitating medical conditions, and therefore, marijuana should be treated like other medicines;"<sup>14</sup> An important part of the law is "**marijuana should be treated like other medicines**". This means Oregonians voted to make medical marijuana treated like medical morphine, medical synthetic THC, or Food and Drug Administration-approved medicines.

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<sup>5</sup> Tod Mikuriya, MD. Editor of *Marijuana: Medical Papers 1839 – 1972*. Medi-comp Press 1973. [www.mikuriya.com/mmp.html](http://www.mikuriya.com/mmp.html)

<sup>6</sup> B Zimmerman PhD, R Bayer MD, & N Crumpacker MD: *Is Marijuana the Right Medicine For You? A Factual Guide to Medical Uses of Marijuana*: Chapter 10. Keats Publishing 1998.

<sup>7</sup> R Noyes, F Brunk, D Avery, & A Canter: "The analgesic properties of delta-9-tetrahydrocannabinol and codeine". *Clinical Pharmacology and Therapeutics*: vol. 18, pg. 84, 1975.

[www.omma1998.org/Noyes-THC\\_v\\_Codeine\\_for\\_pain\\_CPT\\_1975.pdf](http://www.omma1998.org/Noyes-THC_v_Codeine_for_pain_CPT_1975.pdf)

<sup>8</sup> Deadwyler, Vivian, Meng, Walker, Simone, & Hargreaves. *Marijuana & Analgesia*. Press Conference October 26, 1997 at the 27<sup>th</sup> Annual Meeting of the Society for Neuroscience in New Orleans, LA, USA. [www.omma1998.org/analgesia\\_mj.htm](http://www.omma1998.org/analgesia_mj.htm)

<sup>9</sup> Walker, Huang, Strangman,Tsou, & Sanudo-Pena: "Pain modulation by release of the endogenous cannabinoid anandamide". *Proceeding of the National Academy of Sciences*: October 12, 1999.

<sup>10</sup> GW Pharmaceuticals Research and Development on pain: [www.gwpharm.com/research\\_pain.asp](http://www.gwpharm.com/research_pain.asp)

<sup>11</sup> GW Pharmaceuticals Press Release: [www.gwpharm.com/](http://www.gwpharm.com/)

<sup>12</sup> International Association for Cannabis as Medicine: [www.acmed.org/english/nav/home-science.htm](http://www.acmed.org/english/nav/home-science.htm)

<sup>13</sup> J Joy, S Watson, J Benson. Editors of *Marijuana and Medicine: Assessing the Science Base*. Institute of Medicine. 1999. Page 145 of hardback edition. [www.nap.edu/catalog/6376.html](http://www.nap.edu/catalog/6376.html)

<sup>14</sup> ORS 475.300 -- ORS 475.346 [www.dhs.state.or.us/publichealth/mm/475a.cfm#300](http://www.dhs.state.or.us/publichealth/mm/475a.cfm#300)

The psychoactive effects of both synthetic THC (Marinol® brand of dronabinol) and herbal marijuana are due primarily to THC<sup>15</sup>. The timing issues about how a drug behaves in the body are called pharmacokinetics and are mostly dependent on the method of administering the drug. For example, an inhaled medicine typically works faster but the effects usually do not last as long as a medicine taken by mouth that must be absorbed by the digestive tract. Inhaling cannabis through smoking or vaporizing cannabis bypasses the digestive tract.

In *A Primer of Drug Action*, pharmacologist Robert Julian, MD, PhD, states, “absorption of inhaled drugs is rapid and complete. The onset of behavioral effects of THC in smoked marijuana occurs almost immediately after smoking begins and corresponds with the rapid attainment of peak concentrations in plasma. Unless more is smoked, the effects seldom last longer than 3 to 4 hours.”<sup>16</sup>

In the *Journal of Cannabis Therapeutics*, Franjo Grotenhermen, MD wrote “Clinical Pharmacokinetics of Cannabinoids” and summarizes, “Pulmonary [lung] assimilation of inhaled THC causes a maximum plasma concentration within minutes, while psychotropic effects [the “high”] start within seconds to a few minutes, reach a maximum after 15 to 30 minutes, and taper off within 2 or 3 hours.” On page 29, he states, “The peak psychotropic effects (“high”) after intravenous and inhaled THC application were noted after 20-30 minutes and decreased to low-levels after 3 hours and to baseline after 4 hours (Hollister et al 1981, Lindgren et al 1981, Chiang and Barnett 1984)”. He continues on page 30, “Hence about 1-4 hours after smoking there is a good correlation between plasma level and effects (Chiang and Barnett 1984). There was also a good correlation between THC plasma levels and other effects in this phase, with heart rate (Cocchetti et al 1981) and with psychomotor impairment (Barnett et al 1985)”. In summary, this peer-reviewed scientific article informs us that **the impairment resolves when plasma THC levels return to low-levels at 3 hours and baseline around 4 hours after smoking marijuana**<sup>17</sup>.

Since THC acts identically whether synthetic or herbal, we should look at the warnings section of the US Food and Drug Administration (FDA)-approved Marinol® brand of synthetic THC or dronabinol: **“WARNINGS: Patients receiving treatment with Marinol should be specifically warned not to drive, operate machinery, or engage in any hazardous activity until it is established that they are able to tolerate the drug and perform such task safely.”**<sup>18</sup> This is sound advice.

In the above studies, impairment from smoked cannabis or marijuana resolves within four hours. Since synthetic THC and herbal THC are identical once inside the body,

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<sup>15</sup> Wachtel, ElSohly, Ross, Ambre, de Wit. “Comparison of subjective effects of Delta(9)-tetrahydrocannabinol and marijuana in humans”. *Psychopharmacology (Berlin)*. June 2002. 161(4): 331.

<sup>16</sup> Julian PhD MD, Robert. *A Primer of Drug Action* (8<sup>th</sup> edition, Freeman 1998) page 329.

<sup>17</sup> Grotenhermen MD, Franjo. “Clinical Pharmacokinetics of Cannabinoids”. *Journal of Cannabis Therapeutics*. Volume 3. Number 1. Pp 3 - 51. 2003 Haworth Press.

<sup>18</sup> Marinol® brand of dronabinol (THC) manufacturer’s package insert from Unimed Pharmaceuticals Inc. [www.marinol.com](http://www.marinol.com)

there is no scientific rationale for discrimination against those who prefer medical THC from an herbal rather than a synthetic source. **The Marinol® package insert warnings should be heeded regardless of whether a person uses synthetic FDA-approved THC (as in Marinol) or herbal THC (as in marijuana or cannabis).**

When a clinician monitors drug therapy, s/he educates a patient through a careful explanation of the procedure (method of use and expected results), alternative therapies, and risks involved in using or not using the medicine. There are many medicines - prescription or nonprescription - that cause drowsiness or impairment. These include medicine for blood pressure, diabetes, arthritis, respiratory infection, allergies, mood stabilization, and pain. Physicians and patients use good communication to lessen risks of adverse drug reactions.

It is important to avoid impairment when driving, operating machinery, or engaging in any hazardous activity whether in the workplace or not. Monitoring by family, friends, peers, and co-workers for anyone's impairment can improve safety. One reason that direct observation of impairment is important is that impairment can be caused by health problems not related to prescription medicines. Things like non-prescription over-the-counter medicines, acute influenza, or a family emergency resulting in lost sleep can cause impairment. This means good communication between employees and employer can lessen risk of impairment at work.

Urine drug testing to monitor therapy is not routinely used in clinical medicine. It is helpful in toxicology or poisoning cases when a doctor is uncertain what drugs are in the body. Urine tests are also used in medical-legal settings. The standard urine test for "marijuana" does not test for the "parent drug" THC, but tests for an inactive non-psychoactive "metabolite" or breakdown product of THC. Inactive breakdown products in a standard "urine marijuana test" can remain positive for weeks to months after consuming cannabis even when there is no impairment. The US Department of Transportation commented about urine drug testing stating that, "while a positive urine test is solid proof of drug use within the last few days, it cannot be used by itself to prove behavioral impairment during a focal event<sup>19</sup>". In other words, **urine drug testing does not prove impairment – it only proves recent use.**

Between 1976 and 1991, there were at least four flight-simulator studies published according to a Library of Medicine search. One showed impairment for at least 2 hours that resolved by 4 to 6 hours<sup>20</sup>. Three others by a different research team showed conflicting results. Two of those three show some impairment at 24 hours<sup>21</sup><sup>22</sup> while one of the three studies showed abnormal flight simulator results only at 4

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<sup>19</sup> US Department of Transportation National Highway Traffic Safety Administration. *State of Knowledge of Drug-Impaired Driving*. September 2003. DOT HS 809 642.

[www.nhtsa.dot.gov/people/injury/research/StateofKnowledgeDrugs/StateofKnowledgeDrugs/](http://www.nhtsa.dot.gov/people/injury/research/StateofKnowledgeDrugs/StateofKnowledgeDrugs/)

<sup>20</sup> Janowsky, Meacham, Blaine, Schoor, Bozzetti. "Simulated flying performance after marihuana intoxication." *Aviation Space and Environmental Medicine*. Feb 1976. 47(2): 124-8

<sup>21</sup> Yesavage, Leirer, Denari, Hollister. "Carry-Over Effects of Marijuana Intoxication on Aircraft Pilot Performance: A Preliminary Report. *American Journal of Psychiatry*. 142: 1325, 1985.

<sup>22</sup> Leirer, Yesavage, Morrow. "Marijuana Carry-Over Effects of Marijuana Intoxication on Aircraft Pilot Performance". *Aviation Space and Environmental Medicine*. March 1991. 62:221-7

hours but none at 8 or 24 hours<sup>23</sup>. Another unpublished study by the same group failed to find impairment<sup>24</sup> bringing the total studies to five. These mixed results create confusion. Since blood levels of THC are near baseline 4 hours after smoking cannabis and impairment beyond 4 hours cannot be consistently demonstrated, the researchers actually call this flight simulator result a “hangover effect” rather than intoxication. According to Dr. Leirer, the purported hangover effect is “very marginal” and is only detected in tests of “very complex human/machine performance”. Comparable, subtle effects are reported at very low blood alcohol levels of 0.025%, which is even under the .04% level allowed in commercial motor vehicle drivers<sup>25</sup>.

Possibly because of confusion surrounding flight simulator data, other researchers study actual motor vehicle accidents. In 2002, authors Gregory Chesher and Marie Longo concluded, “At the present time, the evidence to suggest an involvement of cannabis in road crashes is scientifically unproven”<sup>25</sup>. However as they note, some of this may be because of evolving science. As mentioned above, testing for inactive urine metabolites does not test for impairment. Recent studies continue to show that “no increased risk for road trauma was found for drivers exposed to cannabis”<sup>26</sup>.

But, there is also an effort to base impairment on measuring the “parent drug” responsible for impairment, namely THC. Dr. Olaf Drummer, measured THC levels in fatal crashes in Australia and noticed an association between high THC levels and risk of traffic fatality even in the absence of other drugs<sup>27</sup>. Based on forensic evidence he determines whether a driver is “culpable” or responsible for the fatal accident and correlates it to blood THC levels. Drummer and colleagues conclude, “Recent use of cannabis may increase crash risk, whereas past use of cannabis does not”<sup>28</sup>. Dr. Franjo Grottenhermen’s review of Dr. Drummer’s work adds, “While drivers with low concentrations [of THC] in their blood had a lower probability of

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<sup>23</sup> Leirer, Yesavage, Morrow. “Marijuana, Aging, and Task Difficulty Effects on Pilot Performance”. *Aviation Space and Environmental Medicine*. Dec 1989. 60:1145-52

<sup>24</sup> Gieringer, D. “Evidence for 24-hour pot hangover”. *California NORML newsletter*. August 1991.

<sup>25</sup> Chesher G. and Longo M. “Cannabis and Alcohol in Motor Vehicle Accidents”. Chapter 28: page 322 from *Cannabis and Cannabinoids: Pharmacology, Toxicology, and Therapeutic Potential*. Edited by Grottenhermen and Russo. 2002 Haworth Press.

<sup>26</sup> Movig, Mathijssen, Nagel, van Egmond, de Gier, Luefkens, Egberts. “Psychoactive substance use and the risk of motor vehicle accidents”. *Accident Analysis and Prevention*. 36: 631, 2004.

<sup>27</sup> Drummer, Gerostamoulos, Batziris, Chu, Caplehorn, Robertson, Swann. “The incidence of drugs in drivers killed in Australian road traffic crashes”. *Forensic Science International*. 2003. 134:154-162.

<sup>28</sup> Ramaekers, Berghaus, van Larr, Drummer. “Dose related risk of motor vehicle crashes after cannabis use.” *Drug Alcohol Depend*. Feb 7, 2004. 73(2): 109-119

<sup>29</sup> Grottenhermen, F. *International Association for Cannabis as Medicine (IACM) Bulletin* of Feb 15, 2004. [www.acmed.org/english/nav/home-bulletin.htm](http://www.acmed.org/english/nav/home-bulletin.htm)

<sup>30</sup> Armentano, P. *DUID Legislation: What It Means, Who's Behind It, and Strategies to Prevent It*. Senior Policy Analyst. NORML Foundation. 2004 Winter Legal Conference [www.norml.org/pdf\\_files/NORML\\_You\\_Are\\_Going\\_Directly\\_To\\_Jail.pdf](http://www.norml.org/pdf_files/NORML_You_Are_Going_Directly_To_Jail.pdf)

causing a traffic accident than drug free drivers, higher THC concentrations were associated with a considerably higher culpability ratio”<sup>29</sup>.

It remains unclear how to define the gray area about what is “recent” and what is “past” use of cannabis even if one supports using parent drug blood THC levels as a marker for impairment. This is because the THC level below which there is no impairment, varies dramatically among individuals. Plus, the actual numbers of persons who have only THC in the blood and are involved in accidents is low and studies still lack adequate statistical significance to draw scientifically firm conclusions. Those concerned about legislation suggest that since no culpability appears to exist below blood levels of 10 nanograms per milliliter (ng/ml), that any proposed cutoffs be above 10 ng/ml of THC<sup>30</sup>. A study using coordination testing showed inevitable failure on field sobriety testing if blood THC levels were 25-30 ng/ml but many failed testing at 90 and 150 minutes after smoking even though plasma concentrations were rather low. The researchers had the foresight to conclude that “establishing a clear relation between THC plasma concentrations and clinical impairment will be much more difficult than for alcohol<sup>31</sup>”. This is primarily because alcohol and THC are chemically different and are metabolized differently inside the body. With passage of medical marijuana laws, we need additional research to show if there is a correlation between clinical impairment and blood THC levels. Daily cannabis users (like patients) can have levels as high as 6 to 10 ng/ml without clinical impairment even after 24 or more hours of abstinence<sup>32 33</sup>. While the science evolves, most experts think it remains premature to make firm conclusions about the proper cutoff levels using blood THC for “Driving Under the Influence” suspicion<sup>34</sup>. Proper clinical discussion of medical marijuana therapy and necessary clinical observation for impairment remain the primary methods of monitoring for possible adverse reactions at this time.

In summary, there is no consistent scientific evidence showing any impairment beyond four hours from smoking marijuana and no scientific evidence of any increased risk of motor vehicle accidents beyond four hours after smoking marijuana. As a medical cannabis expert, I do not condone any medical marijuana use of cannabis at work. But, private employer-employee agreements to abstain within 4 or 8 hours prior to work seem a reasonable type of compromise. This still

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<sup>31</sup> Reeve, Grant, Robertson, Gillespie, Hollister. “Plasma concentration of delta-9-tetrahydrocannabinol and impaired motor function”. *Drug Alcohol Depend.* April 1983.11(2): 167.

<sup>32</sup> Skop, Richter, Potsch. “Serum Cannabinoid levels 24 to 48 hours after cannabis smoking”. *Arch Kriminol (German)*. Sept-Oct 2003. 212 (3-4): 83-95.

<sup>33</sup> Cheshire, Gregory and Marie Longo: “Cannabis and Alcohol in Motor Vehicle Accidents.” Chapter 28. Page 318 from *Cannabis and Cannabinoids: Toxicology, Pharmacology, and Therapeutic Potential*. Edited by Franjo Grotenhermen and Ethan Russo. 2002 Haworth Press.

<sup>34</sup> Grotenhermen, Franjo, Gero Leson, Günter Berghaus, Olaf Drummer, Hans-Peter Krüger, Marie Longo, Herbert Moskowitz, Bud Perrine, Jan Ramaekers, Alison Smiley, Rob Tunbridge. *Developing Per Se Laws for Driving Under the Influence of Cannabis (DUIC)*: Presented at the 17th International Conference on Alcohol, Drugs, and Traffic Safety (ICADTS): August 10<sup>th</sup>, 2004, Glasgow, Scotland. [franjo.grotenhermen@nova-institut.de](mailto:franjo.grotenhermen@nova-institut.de)

preserves safety, and would be consistent with medical treatment plans using other medicines that may impair.

**Registration in the Oregon Medical Marijuana Program should never be sole cause for termination of employment.** Medical use of marijuana within Oregon law should be treated like medical Marinol, medical morphine, and other medications both in and out of the workplace. It is discriminatory to fire an unimpaired worker whose only cause for firing is registration with the Oregon Department of Human Services Oregon Medical Marijuana Program.

Because of the above, HB 2693-1 does not represent sound science or the majority of Oregonians who voted to pass the Oregon Medical Marijuana Act. In other words, the dash one amendments are not acceptable to patient advocates as written. Although we agree that minimizing impairment at work is a good idea, we think that the language in the dash one amendments is a bad idea. The dash one amendments are obviously discriminatory and invite prejudice against a subclass of Oregonians who, by definition, have debilitating conditions.

The best solutions are either to vote down HB 2693-1 with the possibility of using a different bill to address perceived impairment in the workplace; or make the following changes in HB 2693-1:

1. Page 2, line 10 and 11: **delete**, “*including having evidence of marijuana in the person’s system*”.
2. Page 3, line 2: **delete** the word “*require*” and **retain** the phrase “**in any workplace**” that was removed from line 3
3. Page 3, line 3 and 4: delete the entire phrase, “*Preclude or restrict an employer from establishing or enforcing a drug-free workforce.*” and replace this phrase with: **“Registration in the Oregon Medical Marijuana Program will not constitute sole cause for termination of employment.”**

If the House Judiciary committee chooses these solutions for dash two amendments, the patient and disability community advocates may warm toward HB 2693-2.

Thank you for allowing me to submit testimony against HB 2693-1 as written and suggest solutions that are more “patient-friendly” for HB 2693-2.

Sincerely,

Richard Bayer, MD