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5 BRIAN PICKARD

6
7 UNITED STATES DISTRICT COURT
8 EASTERN DISTRICT OF CALIFORNIA
9

10 UNITED STATES OF AMERICA,

11 Plaintiff,

12 v.

13 BRIAN PICKARD,

14 Defendant.

Case No. 2:11-CR-00449-KJM-16

DIRECT EXAMINATION OF CARL
HART, Ph.D.

15
16 I, Carl Hart, Ph.D., declare:

17 I am currently employed as an Associate Professor of Psychology in the Department of
18 Psychiatry and Psychology at Columbia University in New York City, where I have been on the
19 faculty since 1999. Since 1999, I have also been a Research Scientist III-V, Division on
20 Substance Abuse, by the New York State Psychiatric Institute. I am currently the Interim
21 Director of The Institute for Research in African-American Studies from 2013 - 2014.

22 I served in the United States Air Force for four years, from 1984 to 1988, and then went
23 on to earn my Bachelor's in Science Degree from the University of Maryland in Psychology
24 (1991), a Master's of Science Degree and Ph.D. from the University of Wyoming in
25 Psychology/Neuroscience) (1994, 1996). During this period, I also completed predoctoral
26 research at the National Institute of Neurological Disorders and Strokes. After my doctoral
27 studies, I completed three postdoctoral fellowships in the area of human drug abuse research at
28 the University of California - San Francisco, Yale and Columbia Universities.

1 I was honored to be named a Fellow at the American Psychological Association (Division
2 28, Psychopharmacology and Substance Abuse), and was presented with the Presidential
3 Teaching Award at Columbia University in 2008.

4 As a research investigator, I and my co-investigators have received grants for over
5 \$10,000,000 from both private and public entities over the past 15 years. These grants funded
6 over ten research projects for which I was named the principal investigator in more than half of
7 the studies and a co-investigator in the others. Each focused on substance abuse or the effects of
8 specified controlled substances in a controlled setting, including but not limited to drug effects in
9 the workplace, and the effect of THC and Marijuana on HIV-positive persons.

10 In addition to serving in several international, substance abuse-related organizations, such
11 as the United Nations Reference Group for Intravenous Drug Use and HIV, I am also a member
12 of the 18-person advisory council to the National Institute of Health [NIH] called the National
13 Advisory Council on Drug Abuse (2012-present). This committee is tasked by the federal
14 government with advising, assisting, consulting with, and making recommendations to the
15 Secretary of Health and Human Services and the Director of NIDA on matters related to the
16 activities carried out by and through the Institute, as well as the policies involved in these
17 activities. I currently serve on the board of directors for the College on Drug Dependence and for
18 the Drug Policy Alliance. Previously, I was a member of the National Institute of Health,
19 Biobehavioral Regulation, Learning and Ethology Study Section (2006 - 2010, Acting Chair
20 2010), National Institute on Drug Abuse, African-American Researchers and Scholars
21 Workgroup (2004-2011), College on Problems of Drug Dependence's Under-represented
22 Populations Committee (2001-2008, Chair 2003-06), the American Psychological Association's
23 Division 28 (Psychopharmacology and Substance Abuse Div.) Liaison to the Science
24 Directorate (2005-2006). I belong to several scientific organizations including the American
25 Psychological Association, Division 28, Psychopharmacology and Substance Abuse (Member to
26 Fellow, 2000-present), College on the Problem of Drug Dependence (CPDD; Associate to
27 Regular Member, 2000-present), and the International Study Group Investigating Drugs as
28 Reinforcers (Member, 2001-present).

1 I have authored or co-authored several books, including a textbook entitled, “Drugs,
2 Society, and Human Behavior,” with the most recent edition published in 2013 by McGraw-Hill:
3 New York. I also recently published a book entitled, “High Price: A neuroscientist's journey of
4 self-discovery that challenges everything you know about drugs and society,” released in 2013
5 through Harper-Collins: New York. I have also authored or co-authored numerous research
6 papers relating to cannabis which were published in peer-reviewed journals, such as the Journal
7 of Substance Abuse and Rehabilitation,¹ the Journal of Psychopharmacology,² the Journal of
8 Pharmacology Biochemistry and Behavior,^{3 4} Journal of Acquired Immune Deficiency
9 Syndromes,⁵ and the Journal of Clinical and Experimental Neuropsychology,⁶ among others.

10 Additional information regarding my experience and qualifications are listed in my
11 Curriculum Vitae, attached hereto.

12 For the reasons provided in this declaration, and those which may be presented at the

13
14 ¹ Gunderson EW, Hart CL et al. (2014). A survey of synthetic cannabinoid consumption by
current cannabis users. *Subst Abus.* 2014;35(2):184-9. doi: 10.1080/08897077.2013.846288.

15 ² Bedi G, Hart CL et al. (2010). Efficacy and tolerability of high-dose dronabinol maintenance in
16 HIV-positive marijuana smokers: a controlled laboratory study. *Psychopharmacology (Berl)*. 2010
17 Dec;212(4):675-86. doi: 10.1007/s00213-010-1995-4. Epub 2010 Sep 8, finding that “HIV-positive
individuals who smoke marijuana may require higher dronabinol doses than are recommended by the
FDA.”

18 ³ Hart CL et al. (2010). Neurophysiological and cognitive effects of smoked marijuana in
19 frequent users. *Pharmacol Biochem Behav.* 2010 Sep;96(3):333-41. doi: 10.1016/j.pbb.2010.06.003.
20 Epub 2010 Jun 18, finding that “[o]verall performance accuracy was not significantly altered by
marijuana, although the drug increased response times during task performance and induced a response
bias towards labeling "new" words as having been previously seen in the verbal episodic memory task.”

21 ⁴ Gray KM, Hart CL et al. (2010). Tolerability and effects of oral Delta9-tetrahydrocannabinol in
22 older adolescents with marijuana use disorders. *Pharmacol Biochem Behav.* 2008 Nov;91(1):67-70. doi:
23 10.1016/j.pbb.2008.06.011. Epub 2008 Jun 26, finding “oral THC was well tolerated and suggest further
study of this medication in adolescent marijuana abusers.”

24 ⁵ Haney M, Hart CL et al. (2007). Dronabinol and marijuana in HIV-positive marijuana smokers.
25 Caloric intake, mood, and sleep. *J Acquir Immune Defic Syndr.* 2007 Aug 15;45(5):545-54, “for
HIV-positive marijuana smokers, both dronabinol (at doses 8 times current recommendations) and
marijuana were well tolerated and produced substantial and comparable increases in food intake.”

26 ⁶ Vadhan NP, Hart CL et al. (2007). Acute effects of smoked marijuana on decision making, as
27 assessed by a modified gambling task, in experienced marijuana users. *J Clin Exp Neuropsychol.* 2007
28 May;29(4):357-64, finding “[t]hese data are consistent with previous findings that indicated that speed of
performance on tests of executive function, but not accuracy, is disrupted in experienced marijuana users
during marijuana intoxication.”

1 hearing, it is my professional opinion that cannabis has a low potential for abuse, has a currently
2 accepted medical use, and may be safely used under medical supervision. Based on my training,
3 experience and clinical research, as well as upon the body of current scientific research regarding
4 cannabis, I have formed the opinion that cannabis fails to meet the criteria for inclusion in
5 Schedule I of the Controlled Substances Act.

6 I attest to the following in support of this opinion:

7 **Scientific Methodology and the Study of Cannabis**

8 Preliminarily, it is important to explain the scientific methodology involved in studying
9 the effects of any substance to which humans may be exposed, for the value of the results of
10 experimentation is dependent on how well variables unrelated to the subject of the investigation
11 can be controlled.

12 The most reliable studies for determining the causal effects of a particular substance are
13 those which employ the randomized, placebo-controlled, blinded/double blinded clinical model.
14 A placebo-controlled study requires the investigators to administer the drug or placebo to the
15 cohort and assess whether the drug administration was more or less likely to be associated with a
16 clinical outcome than was the administration of the placebo. Ideally, neither the investigators nor
17 the subjects know which group is receiving the drug and which the placebo. Because cannabis is
18 classified as a Schedule I controlled substance under federal law, it is exceedingly difficult to
19 conduct trials using this methodology, which requires federal permission from numerous
20 agencies as well as access to federally grown marijuana.

21 More commonly, therefore, cannabis is studied through Observational Case-Control
22 Trials. These trials may be done comparing cases (e.g., subjects with a history of cannabis use)
23 and controls (e.g. subjects without a history of cannabis use), and assessing whether cases are
24 more or less likely to be associated with a particular outcome than are controls. These trials can
25 identify associations, but are poor predictors of causation.

26 Observational Trials are also reported in the science literature. This involves the study of
27 cases wherein the subjects are using cannabis (or self-report having used cannabis); however,
28 there is no comparable control group (i.e., subjects being administered a placebo).

1 Pre-clinical Research examines the interaction of the drug in an animal or cellular model.
2 While there are no ethical barriers to utilizing this methodology in the study of cannabis, the
3 findings, dosages and route of administration may or may not be applicable or replicable in
4 humans.

5 A Case Study (i.e., the observations of one subject) is sometimes published in peer
6 reviewed literature, and often popular media will report on the experiences of one or more
7 subjects which is referred to as an Anecdote.

8 Finally, many papers involve a summary of previously published literature which is
9 considered a Review. When, however, the review involves a more specific assessment of
10 previously published literature using explicit parameters it is considered a Meta-Analysis.

11 While cannabis has been the subject of each of the methodologies described above, the
12 most reliable evidence of the effects of cannabis on humans is gleaned from the results of human
13 subject clinical models.

14 Because my laboratory at Columbia University has been authorized by the DEA to
15 administer all Controlled Substances to human subjects for scientific and medical study, I have
16 been able to study the effects of cannabis utilizing the scientific methodology which best predicts
17 causation, rather than association, in human subjects.

18 **Pertinent Marijuana-Related Clinical Trials in Our Laboratory**

19 1. The numerous scientific and peer-reviewed articles I have published are largely based on
20 my own clinical and pre-clinical research, including randomized double-blind controlled trials on
21 human subjects where I either personally administered, oversaw, or otherwise participated in the
22 administration of Schedule I, II, III, and IV substances on subjects, including the administration
23 of cocaine and cocaine base (Schedule II), methamphetamine (Schedules II, III), ecstasy
24 (Schedule I), ketamine (Schedule III), Zolpidem (Brand name: Ambien, Schedule IV), alcohol
25 (not scheduled), cannabis (smoked marijuana, Schedule I), Dronabinol (Brand name: Marinol,
26 synthetic THC, Schedule III), and other cannabinoid synthetics such as “Spice” and “K2”
27 (Schedule I).

28 2. My laboratory at Columbia University is one of the few laboratories in the Nation to have

1 federal permission to conduct clinical trials of this nature, and therefore, I have personally
2 observed human subjects under the influence of illegal substances for lawful research purposes.
3 This has provided me with a unique first-hand perspective which informs my discussion of the
4 potential for cannabis use and abuse.

5 3. For example, in two separate human-subject, placebo-controlled, double-blinded trials in
6 2007 and 2010, I and my colleagues performed human-subject clinical trials where we
7 administered high doses of Dronabinol (Brand name: Marinol, Schedule III), a synthetic
8 cannabinoid, to HIV-positive persons who were already marijuana smokers. We determined in
9 both trials that Dronabinol was medically effective and was well tolerated by the patients.
10 However, it must be noted patients consuming Dronabinol consumed some 8 times the current
11 FDA recommended dose in order to achieve the same effect as smoking whole-plant cannabis.^{7 8}
12 Additionally, Dronabinol consists of 100% synthetic Tetrahydrocannabinol (THC), the main
13 psychoactive compound in the cannabis plant, whereas the natural THC consumed from the plant
14 contained only 2.0% and 3.9% THC. The evidence thus suggests that marijuana may be safely
15 administered under medical supervision more easily than Dronabinol and may result in a lessened
16 psychoactive effect due to the significantly reduced THC levels in whole plant cannabis.

17 4. Our laboratory has also repeatedly studied the effect of marijuana use on cognitive
18 abilities, including decision making. In 2007, one study administered marijuana to human
19 subjects in the following THC concentrations (0.0, 1.8, or 3.9% THC) after performing a baseline
20 gambling task. We determined that marijuana disrupted the speed of performance on tests of
21 executive function, but not accuracy, in experienced marijuana users during marijuana

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24 ⁷ Haney M, Hart CL et al. (2007). Dronabinol and marijuana in HIV-positive marijuana smokers.
25 Caloric intake, mood, and sleep. *J Acquir Immune Defic Syndr*. 2007 Aug 15;45(5):545-54, “for
26 HIV-positive marijuana smokers, both dronabinol (at doses 8 times current recommendations) and
27 marijuana were well tolerated and produced substantial and comparable increases in food intake.”

28 ⁸ Bedi G, Hart CL et al. (2010). Efficacy and tolerability of high-dose dronabinol maintenance in
HIV-positive marijuana smokers: a controlled laboratory study. *Psychopharmacology (Berl)*. 2010
Dec;212(4):675-86. doi: 10.1007/s00213-010-1995-4. Epub 2010 Sep 8, finding that “HIV-positive
individuals who smoke marijuana may require higher dronabinol doses than are recommended by the
FDA.”

1 intoxication.⁹ In a similar clinical trial on human subjects conducted in 2010, after the subjects
2 were asked to perform baseline cognitive tasks marijuana was administered in THC
3 concentrations of 0.0, 1.8, or 3.9%. The results were consistent with prior research: overall
4 performance accuracy was not significantly altered by marijuana, although the drug increased
5 response times during task performance.¹⁰ These studies highlight the importance of taking into
6 account the drug-use histories of research participants and examining multiple measures in any
7 investigation of marijuana-related effects on cognitive functioning.

8 **Cannabis and Potential for Abuse.**

9 5. In assessing a substances potential for abuse, the physiological and psychological impact
10 a drug can have on the individual may be considered by study into whether the drug: (1) is
11 physically addictive, and (2) causes damage to the health of the user. Addiction or “dependence
12 liability,” in the medical context, is determined according to the Diagnostic and Statistical
13 Manual of Mental Disorders (DSM), a manual published by the American Psychiatric
14 Association which sets forth common language and standard criteria for classifying mental
15 disorders. The DSM defines addiction as: (1) tolerance to a substance that requires more of the
16 drug over time to get the same effect, (2) withdrawal symptoms without the substance, (3)
17 continued use of the drug despite psychological or physical harm, (4) loss of control or
18 overindulgence, (5) increased amount of time engaged in the behavior to obtain or use the
19 substance, (6) unsuccessful attempts to cut down use of the substance, and (7) reduced
20 involvement in social, occupational or recreational activities due to the drug.¹¹

21
22 ⁹ Vadhan NP, Hart CL et al. (2007). Acute effects of smoked marijuana on decision making, as
23 assessed by a modified gambling task, in experienced marijuana users. *J Clin Exp Neuropsychol.* 2007
24 May;29(4):357-64, finding “[t]hese data are consistent with previous findings that indicated that speed of
performance on tests of executive function, but not accuracy, is disrupted in experienced marijuana users
during marijuana intoxication.”

25 ¹⁰ Hart CL et al. (2010). Neurophysiological and cognitive effects of smoked marijuana in
26 frequent users. *Pharmacol Biochem Behav.* 2010 Sep;96(3):333-41. doi: 10.1016/j.pbb.2010.06.003.
27 Epub 2010 Jun 18, finding that “[o]verall performance accuracy was not significantly altered by
marijuana, although the drug increased response times during task performance and induced a response
bias towards labeling "new" words as having been previously seen in the verbal episodic memory task.”

28 ¹¹ American Psychiatric Association: *Diagnostic and Statistical Manual of Mental Disorders*,
Fifth Edition. Arlington, VA, American Psychiatric Association, 2013.

1 6. Marijuana's dependence liability or risk of addiction is presently disputed within the
2 medical and scientific community. Be that as it may, the most current data indicates just under
3 9% of those who have experimented with cannabis have become dependent.¹² This survey
4 documented that cannabis' dependence liability was *by far* the lowest of the four substances
5 studied therein: nicotine (32%), alcohol (22.7%), cocaine (20.9%), and cannabis (8.9%). The
6 report further noted, "[s]ignificant racial-ethnic differences were observed in the probability of
7 transition to dependence across the four substances," indicating that other factors such as
8 socioeconomic status or cultural differences likely affected the outcome. The survey also
9 determined that "predictors of dependence were common across the four substances assessed,"
10 meaning that many who became dependent exhibited predictors unrelated to the substance, such
11 as psychiatric or dependence comorbidity (the simultaneous presence of two conditions in a
12 patient). Such factors could further negate the already low risk of addiction among cannabis
13 users. In any event, as the only Schedule I substance documented in the survey, as nicotine and
14 alcohol are not scheduled, and cocaine is scheduled below cannabis, cannabis dependence
15 liability is less than half that of cocaine and alcohol, and thirteen percent of nicotine.

16 7. Further, my own research in human test subjects indicates that symptoms of marijuana
17 withdrawal are relatively minor when compared to withdrawal symptoms experienced by those
18 discontinuing use of other substances, including alcohol, many prescription medications and
19 opioids.

20 8. Additionally, any discomfort resulting from withdrawal may be reduced by oral
21 administration of THC and other types of readily available treatments. In fact, one of the
22 research focuses of our laboratory at the New York State Psychiatric Institute, is to test the
23 effects of medications to decrease marijuana withdrawal and relapse. For example, in 2004, I
24 and my colleagues administered oral THC to daily cannabis users who were discontinuing the
25 use of marijuana, the researchers found that such treatment abated that marijuana withdrawal
26

27 ¹² Lopez-Quintero C et al. 2011. Probability and predictors of transition from first use to
28 dependence on nicotine, alcohol, cannabis, and cocaine: results of the National Epidemiologic Survey on
Alcohol and Related Conditions (NESARC). *Drug Alcohol Dependence* 115:120-30.

1 symptoms, which are relatively minor in the first instance.¹³

2 9. In fact, marijuana “addiction” is believed to be a psychological rather than a physiological
3 dependance. Withdrawal symptoms, therefore, do not result in physical pain as is experienced
4 with the secession of other substances such as alcohol and opioids.

5 10. In 1999, a report published by the Institute of Medicine concluded that the dependence
6 liability rate of marijuana was the same as that of anxiolytic drugs (previously referred to as
7 minor tranquilizers) at 9%. The report also concurs with my findings as it provides: “In
8 summary, although few marijuana users develop dependence, some do. But they appear to be less
9 likely to do so than users of other drugs (including alcohol and nicotine), and marijuana
10 dependence appears to be less severe than dependence on other drugs.”¹⁴

11 **Cannabis is Accepted in the Medical Community.**

12 11. Based on my experience as a scientific and medical investigator/researcher with a focus
13 on drug addiction and abuse, and an adviser on some of the most elite drug policy panels in this
14 Nation, it is clear that cannabis is now accepted as having a medical value by myself and the
15 majority of my colleagues.

16 12. In fact, the National Institute on Drug Abuse [NIDA], the foremost governmental
17 research institute for which I served on an 18-person drug abuse advisory board, noted as recently
18 as June 5, 2014, that marijuana has a medical use in treating glaucoma, nausea, AIDS-associated
19 anorexia and wasting syndrome, chronic pain, inflammation, multiple sclerosis, and epilepsy.
20 The therapeutic use of cannabis has, therefore, been embraced not only by private physicians, and
21 scientific researchers, but also by the government researchers whose primary responsibility is to
22 bring the power of science to bear the on this Country’s drug abuse prevention policy.¹⁵

23 ¹³ Hart CL et al. 2010. Neurophysiological and cognitive effects of smoked marijuana in frequent
24 users. *Pharmacol Biochem Behav.* 2010 Sep;96(3):333-41. doi: 10.1016/j.pbb.2010.06.003. Epub 2010
25 Jun 18.

26 ¹⁴ Janet Joy et al. (1999) *Marijuana and Medicine: Assessing the Science Base.* Institute of
27 Medicine. National Academy Press, Washington D.C., p. 98.

28 ¹⁵ Nora D. Volkow, M.D., Ruben D. Baler, Ph.D., Wilson M. Compton, M.D., and Susan R.B.
Weiss, Ph.D. (2014), *Adverse Health Effects of Marijuana Use.* *N Engl J Med* 2014; 370:2219-2227 June
5, 2014 DOI: 10.1056/NEJMra1402309.

1 **Cannabis can be safely used under medical supervision.**

2 13. While I am not a practicing physician, I have administered thousands of doses of
3 marijuana safely to those human subjects participating in the research projects described herein.
4 While no psychoactive substance is benign, the Institute of Medicine has noted: “[E]xcept for the
5 harms associated with smoking, the adverse effects of marijuana use are within the range of
6 effects tolerated for other medications.”¹⁶

7 14. Concerns, however, have been raised regarding the effect of marijuana use on the brain,
8 particularly in adolescents.¹⁷ As discussed below, it is my opinion that the studies upon which
9 this concern is premised do not support the broad proposition presented by the media, and in no
10 way warrant the continued classification of marijuana in Schedule I.

11 15. Researchers at Harvard Medical School recently published the results of an
12 Observational Study conducted on 20 young adult recreational marijuana users (defined as
13 individuals 18 to 25 who smoke marijuana at least once a week but who are not “dependent”)
14 and 20 young adults who did not use cannabis. Based on a single high-resolution MRI brain
15 image the researcher’s found differences between the scans of those who used cannabis and those
16 who did not, and thus speculated that marijuana exposure in young recreational users may be
17 associated with “exposure-dependent alterations of the neural matrix of core reward structures.”¹⁸

18 16. The multiple limitations of that study should have precluded such speculation.
19 Importantly, the researchers could not determine the brain structure integrity of the marijuana
20 users prior to using marijuana. So, it could not be determined whether marijuana was a causal
21 factor. And, the researchers did not assess any behavior in that study, making it impossible to

23 ¹⁶ Janet Joy et al. (1999) Marijuana and Medicine: Assessing the Science Base. Institute of
24 Medicine. National Academy Press, Washington D.C., p. 95, *op. cit.*

25 ¹⁷ It should be noted that neither I, nor my colleagues, would ever recommend or support the use
26 of recreational cannabis in teens, anymore than it would be recommended that this age group drink
alcohol, smoke cigarettes or even consume DXM for recreational purposes.

27 ¹⁸ Jodi M. Gilman et al. (2014) Cannabis Use Is Quantitatively Associated with Nucleus
28 Accumbens and Amygdala Abnormalities in Young Adult Recreational Users. The Journal of
Neuroscience. 16 April 2014, 34(16): 5529-5538; doi: 10.1523/JNEUROSCI.4745-13.2014. [Marijuana
users in the study smoked an average of 11 joints per week. Table 1, Participants.]

1 determine the meaning of any brain differences between the groups.

2 17. Marijuana’s effect on the brain is best evidenced by the “gold standard” of study
3 methodology: a placebo controlled double blinded trial analyzing the behavior and cognitive
4 function of persons who use marijuana, as I and my colleagues have performed numerous times.
5 For example, in one such clinical trial the cognitive abilities of frequent marijuana users were
6 compared with non-users. The study participants were asked to complete certain baseline
7 computerized cognitive tasks, smoke a single marijuana cigarette (0%, 1.8%, or 3.9% (9)-THC
8 w/w), and then complete additional cognitive tasks. The results indicate that overall performance
9 accuracy is not significantly altered by marijuana in the frequent users, highlighting the
10 importance of taking into account the drug-use histories of research participants and examining
11 multiple measures when investigating marijuana-related effects on cognitive functioning.¹⁹

12 18. A recent report has also suggested that marijuana use in adolescents results in a lower
13 IQ.²⁰ Again, it is impossible to attribute causation to what may at best be considered a
14 correlation. Additionally, a report in Proceedings of the National Academy of Sciences suggests
15 that socioeconomics, rather than cannabis use, is responsible for any reported differences in IQ of
16 marijuana users and that cannabis’ “true effect [on intelligence quotient] could be zero.”

17 19. In 2003, researchers affiliated with the Center for Medicinal Cannabis Research at the
18 University of California, San Diego, performed a “quantitative synthesis of empirical research
19 pertaining to the non-acute (residual) effects of cannabis on the neurocognitive performance of
20 adult human subjects.” They reported, “[t]he results of our meta-analytic study failed to reveal a
21 substantial, systematic effect of long-term, regular cannabis consumption on the neurocognitive

25 ¹⁹ Hart CL et al. (2010). Neurophysiological and cognitive effects of smoked marijuana in
26 frequent users. *Pharmacol Biochem Behav.* 2010 Sep;96(3):333-41. doi: 10.1016/j.pbb.2010.06.003.
Epub 2010 Jun 18.

27 ²⁰ Madeline H. Meier et al. (2014) Persistent cannabis users show neuropsychological decline
28 from childhood to midlife. *National Academy of Sciences* doi: 10.1073/pnas.1206820109, abstract
t:<http://www.pnas.org/content/early/2012/08/22/1206820109>.

1 functioning of users who were not acutely intoxicated.”²¹

2 20. Also in 2012, a pair of meta-analyses on the potential residual effects of cannabis on
3 cognitive performance reported, “[a]s hypothesized, the meta-analysis conducted on studies
4 evaluating users after at least 25 days of abstinence found no residual effects on cognitive
5 performance. ... These results fail to support the idea that heavy cannabis use may result in long-
6 term, persistent effects on neuropsychological functioning.”²²

7 21. In effect, in my opinion, cannabis can and has been successfully used as medicine with
8 little to no impact on the general health and welfare of the population.

9 **Conclusion**

10 22. In sum, it is my considered opinion that including marijuana in Schedule I of the
11 Controlled Substances Act is counter to all the scientific evidence in a society that uses and
12 values empirical evidence. After two decades of intense scientific inquiry in this area, it has
13 become apparent the current scheduling of cannabis has no footing in the realities of science and
14 neurobiology. I would so testify if called.

15 I declare under penalty of perjury that the foregoing is true and correct, except for those
16 matters stated on information and belief, and as to those matters I believe them to be true. This
17 declaration signed on the 20th day of June, 2014, in New York City, New York.

18
19 /s/ Carl Hart, Ph. D.
CARL HART, Ph.D.

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25 ²¹ Igor Grant et al. (2003). Non-acute (residual) neurocognitive effects of cannabis
26 use: A meta-analytic study. *Journal of the International Neuropsychological Society* (2003) Jul; 9
(5):679-689.

27 ²² Schreiner AM et al. (2012). Residual effects of cannabis use on neurocognitive performance
28 after prolonged abstinence: a meta-analysis. *Journal of Experimental and Clinical Psychopharmacology*.
2012 Oct;20(5):420-9. doi: 10.1037/a0029117. Epub 2012 Jun 25.

Date Prepared: 01/24/13

Personal Data

Name: Carl L. Hart
Birthdate: 10/30/66
Birthplace: Miami, Florida
Citizenship: USA

Academic Training

B.S. 1991: University of Maryland (Psychology)
M.S. 1994: University of Wyoming (Psychology/Neuroscience)
Ph.D. 1996: University of Wyoming (Psychology/Neuroscience)
Thesis Title: Role of the L-type calcium channel in nicotine-induced locomotion in rats
Sponsor: Charles Ksir
Citation: Hart C, Kisro NA, Robinson SL, Ksir C (1996) Effects of the calcium channel blocker nimodipine on nicotine-induced locomotion in rats. *Psychopharmacology* 128, 359-361.

Traineeship

1994-1995: Predoctoral Fellowship in Neurological Sciences, Clinical Neuroscience Branch, National Institutes of Health / National Institute of Neurological Disorders and Stroke
1996-1997: Postdoctoral Fellowship in Substance Abuse, Department of Psychiatry, University of California at San Francisco
1997-1998: Postdoctoral Fellowship in Substance Abuse, Department of Psychiatry, Yale University
1998-1999: Postdoctoral Fellowship in Substance Abuse, Department of Psychiatry, Columbia University

Military Service

1984-1988: United States Air Force

Academic Appointments

1999-2006: Assistant Professor of Clinical Neuroscience, Department of Psychiatry, Columbia University
2003-2006: Adjunct Assistant Professor of Psychology, Department of Psychology, Columbia University
1999-present: Research Scientist III-V, Division on Substance Abuse, New York State Psychiatric Institute
2004-2010: Affiliated Faculty, The Institute for Research in African-American Studies, Columbia University
2006-present: Associate Professor (in Psychiatry), Departments of Psychology and Psychiatry, Columbia University (**Tenure Granted: 2009**)
2006-present: Director of Undergraduate Studies, Departments of Psychology and Psychiatry, Columbia University
2010-present: Research Fellow, The Institute for Research in African-American Studies, Columbia University
2013-2014: Interim Co-Director, The Institute for Research in African-American Studies, Columbia University

Honors

- 2007: Fellow, American Psychological Association (Division 28, Psychopharmacology and Substance Abuse)
- 2008: Presidential Teaching Award (Columbia University)

Grant Support*Current Funding*

- 2007-2012: Senior Faculty, National Institute on Drug Abuse Grant Award (5T32 DA007294), "Research Fellowship in Substance Abuse Disorders," Direct Funds: \$1,106,140
- 2009-2014: Co-Investigator, National Institute on Drug Abuse Grant Award, "Learning to avoid pain: Computational mechanisms and application to methamphetamine," Direct Funds: \$1,125,000

Past Funding

- 2004-2010: Principal Investigator, National Institute on Drug Abuse Grant Award (5R01 DA03476), "Drug Effects on Behavior: Workplace Implications," Direct Funds: \$2,190,747 (no-cost extension)
- 2005-2010: Principal Investigator, National Institute on Drug Abuse Grant Award (1R01 DA019559), "Intranasal Methamphetamine: A Pharmacotherapy Model," Direct Funds: \$1,942,000
- 2010-2011: Principal Investigator, Open Society Institute Grant Award, "The Global amphetamine-type stimulants problem: What is known and what is needed," Direct Funds: \$100,882
- 2006-2011: Co-Investigator, National Institute on Drug Abuse Grant Award (5R01DA022541), "The Neural Bases of Affect Regulation in Drug Abuse," Direct Funds: \$1,125,000
- 1993-1995: Principal Investigator, National Institute of Mental Health/Society for Neuroscience Predoctoral Fellowship
- 1999-2000: Principal Investigator, Division on Substance Abuse, Columbia University Pilot Grant Award, "Memantine Effects on Methamphetamine Discrimination in Humans," Direct Funds: \$5,000
- 1999-2005: Co-Investigator, National Institute on Alcohol Abuse and Alcoholism Grant Award (5R01 AA012599), "Medications Development for Alcohol Abuse: NMDA Agents," Direct Funds: \$1,860,000
- 2000-2005: Co-Investigator, National Institute on Drug Abuse Grant Award (5R01 DA012698), "THC and Marijuana: Effects in Individuals with HIV/AIDS," Direct Funds: \$1,086,000
- 2002-2004: Principal Investigator, National Institute on Drug Abuse Grant Award (2R01 DA03476), "Drug Effects on Behavior: Workplace Implications," Direct Funds: \$737,478
- 2002-2005: Co-Investigator, National Institute on Drug Abuse Grant Award (5R01 DA010755), "Novel Cocaine Pharmacotherapies: Lab Studies," Direct Funds: \$1,800,000
- 2002-2005: Principal Investigator, National Institute on Drug Abuse Grant Award (R43), "Marijuana Effects on Human Cognition," (Alan Gevins, Ph.D. Principal Investigator), Direct Funds: \$32,000

Departmental and University Service

- 2012-present: Institutional Review Board, New York State Psychiatric Institute
- 2005-2010: Task Force on Diversity in Science and Engineering at Columbia University
- 2005-2010: Office of the Vice Provost for Diversity Initiatives, Subcommittee on Search Culture and Hiring Practices
- 2006-present: Director of Undergraduate Studies, Department of Psychology
- 2006-present: Curriculum Committee, Department of Psychology

Teaching Experience and Responsibilities

- 1992-1994: Teaching assistant: Drugs and Behavior, University of Wyoming,
- 1994-1996: Instructor: Drugs and Behavior, University of Wyoming
- 1999-2003 Course Director: Substance Abuse Postdoctoral Fellows Seminar, Department of Psychiatry, Columbia University
- 2003 Instructor: Drugs and Society, Hunter College, The City University of New York
- 2003-present: Instructor: Drugs and Behavior, Department of Psychology, Columbia University
- 2004-present: Instructor: Topics in Neurobiology and Behavior, Department of Psychology, Columbia University
- 2004-present: Faculty Member, Supervised Individual Research (1-4 pts)
- 2004-2005: Team Taught: Drugs and Society, School of Public Health, Columbia University
- 2005-present: Team Taught: Graduate Level Proseminar, Department of Psychology, Columbia University
- 2006: Team Taught: Neuropsychopharmacology (G9625), Department of Pharmacology, Columbia University
- 2008-present: Team Taught: PGYII Substance Abuse, Department of Psychiatry, Columbia University

International/National Professional Activities*International*

- 2014-present: Editorial Board, Psychology of Addictive Behaviors
- 2011-present: Board of Directors, College on Problems of Drug Dependence
- 2007-present: Board of Directors, Drug Policy Alliance
- 2010-present: United Nations Reference Group for Intravenous Drug Use and HIV
- 2008: Global Conference On Methamphetamine Executive Program Committee

National Committees

- 2012-present: Department of Health and Human Services, National Institutes of Health, National Advisory Council on Drug Abuse
- 2006-2010: National Institutes of Health, Biobehavioral Regulation, Learning and Ethology Study Section (Acting Chair 2010)
- 2004-2011: National Institute on Drug Abuse, African-American Researchers and Scholars Workgroup
- 2001-2008: College on Problems of Drug Dependence's Under-represented Populations Committee (Chair 2003-06)
- 2005-2006: Substance Abuse

Scientific Advisory Board

- 2012-present: Board of Directors, College on Problems of Drug Dependence
- 2007-present: Board of Directors, Drug Policy Alliance
- 2007-present: National Advisory Council, Students for a Sensible Drug Policy

- 2005-2010: Morgan State University, National Institute on Drug Abuse Grant Award (R24DA01980), "The Center for the Study and Prevention of Drug Use", (Fernando Wager, Ph.D., Principal Investigator)
- 2004-2009: California Pacific Medical Center Research Institute, National Institute on Drug Abuse Grant Award (1P50 DA018179), "Methamphetamine Pharmacotherapy Development Center", (John Mendelson, M.D., Principal Investigator)
- 2004-2009: National Health Promotion Associates, Center for Substance Abuse Prevention Grant Award, "LifeSkills Workplace Prevention Program", (Christopher Williams, Ph.D., Principal Investigator)
- 2004: Ad hoc Consultant, Medications Development for Cannabis Dependence, National Institute on Drug Abuse

Published Refereed Articles

1993

1. Hakan RL, Hart C, Eyl C (1993) Specific neurophysiological effects of systemic nicotine on neurons in the nucleus accumbens. *Synapse* 15, 191-197.

1995

2. Ksir C, Mellor G, Hart C, Gerhardt GA (1995) Nicotine enhances dopamine clearance in rat nucleus accumbens. *Progress in Neuro-Psychopharmacology and Biological Psychiatry* 19, 151-156.
3. Pacak K, Palkovits M, Kvetnansky R, Matern P, Hart C, Kopin IJ, Goldstein DS (1995) Catecholaminergic inhibition by hypercortisolemia in the paraventricular nucleus of conscious rats. *Endocrinology* 136, 4814-4819.

1996

4. *Hart C, Ksir C (1996) Nicotine effects on dopamine clearance in rat nucleus accumbens. *Journal of Neurochemistry* 66, 216-221.
5. *Hart C, Kisro NA, Robinson SL, Ksir C (1996) Effects of the calcium channel blocker nimodipine on nicotine-induced locomotion in rats. *Psychopharmacology* 128, 359-361.

2000

6. *Hart CL, Jatlow PI, Sevarino KA, McCance-Katz EF (2000) Comparison of intravenous cocaethylene and cocaine in humans. *Psychopharmacology* 149, 153-162.
7. *Hart CL, Haney M, Foltin RW, Fischman MW (2000) Alternative reinforcers differentially modify cocaine self-administration by humans. *Behavioural Pharmacology* 11, 87-91.

2001

8. Haney M, Ward AS, Comer SD, Hart CL, Foltin RW, Fischman MW (2001) Bupropion SR worsens mood during marijuana withdrawal in humans. *Psychopharmacology* 155, 171-179.
9. Comer SD, Hart CL, Ward AS, Haney M, Foltin RW, Fischman MW (2001) Effects of repeated oral methamphetamine administration in humans. *Psychopharmacology* 155, 397-404.
10. *Hart CL, Ward AS, Haney M, Foltin RW, Fischman MW (2001) Methamphetamine self-administration by humans. *Psychopharmacology* 157, 75-81.

*First-authored articles

11. *Hart CL, van Gorp WG, Haney M, Foltin RW, Fischman MW (2001) Effects of acute smoked marijuana on complex cognitive performance. *Neuropsychopharmacology* 25, 757-765.
- 2002
12. **Hart CL, Haney M, Ward AS, Fischman MW, Foltin RW (2002) Effects of oral THC maintenance on smoked marijuana self-administration. *Drug and Alcohol Dependence* 67, 301-309.
13. *Hart CL, Haney M, Foltin RW, Fischman MW (2002) Effects of the NMDA antagonist memantine on human methamphetamine discrimination. *Psychopharmacology* 164, 376-384.
14. *Hart CL, Ward AS, Haney M, Comer SD, Foltin RW, Fischman MW (2002) Comparison of smoked marijuana and oral Δ^9 -tetrahydrocannabinol in humans. *Psychopharmacology* 164, 407-415.
- 2003
15. Haney M, Hart CL, Ward AS, Foltin RW (2003) Nefazodone decreases anxiety during marijuana withdrawal in humans. *Psychopharmacology* 165, 157-65.
16. Foltin RW, Ward AS, Haney M, Hart CL, Collins ED (2003) The effects of escalating doses of smoked cocaine in humans. *Drug and Alcohol Dependence* 70, 149-157.
17. Foltin RW, Ward AS, Collins ED, Haney M, Hart CL, Fischman MW (2003) The effects of venlafaxine on the subjective, reinforcing and cardiovascular effects of cocaine in opioid-dependent and non-opioid-dependent humans. *Experimental and Clinical Psychopharmacology* 11, 123-130.
18. *Hart CL, Ward AS, Haney M, Nasser J, Foltin RW (2003) Methamphetamine attenuates disruptions in performance and mood during simulated night shift work. *Psychopharmacology* 169, 42-51.
19. *Hart CL, Ward AS, Haney M, Foltin RW (2003) Zolpidem-related effects on performance and mood during simulated night-shift work. *Experimental and Clinical Psychopharmacology* 11, 259-268.
20. Collins ED, Vosburg SK, Hart CL, Haney M, Foltin RW (2003) Amantadine does not modulate the reinforcing, subjective, or cardiovascular effects of cocaine in humans. *Pharmacology, Biochemistry and Behavior* 76, 401-407.
- 2004
21. Haney M, Hart CL, Vosburg SK, Nasser J, Bennett A, Zubarán C, Foltin RW (2004) Marijuana withdrawal in humans: effects of oral THC or divalproex. *Neuropsychopharmacology* 29, 158-170.
22. *Hart CL, Ward AS, Collins ED, Haney M, Foltin RW (2004) Gabapentin maintenance decreases smoked cocaine-related subjective effects, but not self-administration by humans. *Drug and Alcohol Dependence* 73, 279-287.
- 2005
23. McCance-Katz EF, Hart CL, Boyarsky B, Kosten TR, Jatlow PI (2005) Gender effects following repeated administration of cocaine and alcohol in humans. *Substance Use and Misuse* 40, 511-528.
24. *Hart CL, Lynch WJ (2005) Developing pharmacotherapies for cannabis and cocaine use disorders. *Current Neuropharmacology* 3, 95-114.

25. Pace-Schott EF, Stickgold R, Muzur A, Wigren PE, Ward AS, Hart CL, Clarke D, Morgan A, Hobson JA. (2005) Sleep quality deteriorates over a binge-abstinence cycle in chronic smoked cocaine users. *Psychopharmacology* 179, 873-883.
26. Vosburg SK, Hart CL, Haney M, Foltin RW (2005). An evaluation of the reinforcing effects of memantine in cocaine-dependent humans. *Drug and Alcohol Dependence* 79, 257-260.
27. *Hart CL, Haney M, Nasser J, Foltin RW (2005) Combined effects of methamphetamine and zolpidem on behavior of shift workers. *Pharmacology, Biochemistry and Behavior* 81, 559-568.
28. Haney M, Hart C, Collins ED, Foltin RW (2005) Smoked cocaine discrimination in humans: Effects of gabapentin. *Drug and Alcohol Dependence* 80: 53-61.
29. *Hart CL, Haney M, Vosburg SK, Comer SD, Foltin RW (2005) Reinforcing effects of oral Δ^9 -THC in male marijuana smokers in a laboratory choice procedure. *Psychopharmacology* 181, 237-243.
30. Pace-Schott EF, Stickgold R, Muzur A, Wigren PE, Ward AS, Hart CL, Walker M, Edgar C, Hobson JA. (2005) Cognitive performance by humans during a smoked cocaine binge-abstinence cycle. *American Journal of Drug and Alcohol Abuse* 31, 571-591.
31. *Hart CL (2005) Increasing treatment options for cannabis dependence: a review of potential pharmacotherapies. *Drug and Alcohol Dependence* 80, 147-159.

2006

32. *Hart CL, Haney M, Vosburg SK, Comer SD, Gunderson EW, Foltin RW (2006) Modafinil attenuates disruptions in cognitive performance during simulated night shift work. *Neuropsychopharmacology* 31, 1526-1536.
33. Haney M, Hart CL, Foltin RW (2006) Effects of baclofen on cocaine self-administration: Opioid-dependent and non-opioid dependent volunteers. *Neuropsychopharmacology* 31, 1814-1821.
34. ¹Vadhan NP, Hart CL, Roe B, Colley J, Haney M, Foltin RW (2006) Substance use and psychosocial outcomes following participation in residential laboratory studies of marijuana, methamphetamine and zolpidem. *American Journal of Drug and Alcohol Abuse* 32, 589-97.

2007

35. *Hart CL, Haney M, Collins ED, Rubin E, Foltin RW (2007) Smoked cocaine self-administration by humans is not reduced by large gabapentin maintenance doses. *Drug and Alcohol Dependence* 86, 274-277.
36. *Hart CL, Haney M, Vosburg SK, Rubin E, Foltin RW (2007) Gabapentin does not reduce smoked cocaine self-administration: Employment of a novel self-administration procedure. *Behavioural Pharmacology* 18, 71-75.
37. ¹Vadhan NP, Hart CL, van Gorp WG, Haney M, Gunderson EW, Foltin RW (2007) Acute effects of smoked marijuana on decision-making, as assessed by a modified gambling task, in experienced marijuana users. *Journal of Clinical and Experimental Neuropsychology* 29, 357-364.
38. Haney M, Gunderson EW, Rabkin J, Hart CL, Vosburg SK, Comer SD, Foltin RW (2007) Dronabinol and marijuana in HIV+ marijuana smokers: Caloric intake, mood and sleep. *Journal of Acquired Immune Deficiency Syndrome* 45, 545-554.

¹ Papers published with trainees (undergraduates to postdoctoral fellows) in my laboratory

39. Vadhan NP, Carpenter KL, Copersino ML, Hart CL, Foltin RW, Nunes EV (2007) Attentional bias towards cocaine-related stimuli: relationship to treatment-seeking for cocaine dependence. *American Journal of Drug and Alcohol Abuse* 33, 727-736.

2008

40. Pace-Schott EF, Morgan PT, Malison RT, Hart CL, Edgar C, Walker M, Stickgold R. (2008) Cocaine users differ from normals on cognitive tasks which show poorer performance during drug abstinence. *American Journal of Drug and Alcohol Abuse* 34, 109-121.
41. *Hart CL, Haney M, Vosburg SK, Rubin E, Foltin RW (2008) Smoked cocaine self-administration is decreased by modafinil. *Neuropsychopharmacology* 33, 761-768.
42. ¹Perez A, Kirkpatrick MG, Gunderson EW, Marrone G, Silver R, Foltin RW, Hart CL (2008) Residual effects of intranasal methamphetamine on sleep, mood, and performance. *Drug and Alcohol Dependence* 94, 258-262.
43. ¹Kirkpatrick MG, Metcalfe J, Greene MJ, Hart CL (2008) Effects of intranasal methamphetamine on metacognition of agency. *Psychopharmacology* 197, 137-144.
44. Haney M, Hart CL, Vosburg SK, Comer SD, Reed S, Foltin RW (2008) Effects of THC and Lofexidine in a Human Laboratory Model of Marijuana Withdrawal and Relapse. *Psychopharmacology* 197, 157-168.
45. *Hart CL, Gunderson EW, Perez A, Kirkpatrick MG, Thurmond A, Comer SD, Foltin RW (2008) Acute physiological and behavioral effects of intranasal methamphetamine in humans. *Neuropsychopharmacology* 33, 1847-1855.
46. ¹Perez GA, Haney M, Foltin RW, Hart CL (2008) Modafinil decreases food intake in humans subjected to simulated shift work. *Pharmacology, Biochemistry and Behavior* 90, 717-722.
47. Gray KM, Hart CL, Christie DK, Upadhyaya HP (2008) Tolerability and effects of oral ⁹-tetrahydrocannabinol in older adolescents with marijuana use disorders. *Pharmacology, Biochemistry and Behavior* 91, 67-70.

2009

48. Kirkpatrick MG, Haney M, Vosburg SK, Comer SD, Foltin RW, Hart CL (2009) Methamphetamine self-administration by humans subjected to abrupt shift and sleep schedule changes. *Psychopharmacology* 203, 771-80.
49. Vadhan NP, Hart CL, Haney M, van Gorp WG, Foltin RW (2009) Decision-making in long-term cocaine users: Effects of a cash monetary contingency on Gambling task performance. *Drug and Alcohol Dependence* 102, 95-101.
50. Mariani J, Haney M, Hart CL, Vosburg SK, Levin FR (2009) Effects of Research Setting on Observed Depressive Symptoms in Marijuana Users. *Journal of Substance Abuse Treatment* 37, 431-43.

2010

51. Kober H, Kross EF, Mischel W, Hart CL, Ochsner KN (2010) Regulation of craving by cognitive strategies in cigarette smokers. *Drug and Alcohol Dependence* 106, 52-5.

52. Marrone GF, Pardo J, Krauss RM, Hart CL (2010) Amphetamine analogs methamphetamine and 3,4-methylenedioxymethamphetamine (MDMA) differentially affect speech. *Psychopharmacology* 208, 169-77.
 53. Vosburg SK, Hart CL, Haney M, Rubin E and Foltin RW (2010) Modafinil does not serve as a reinforcer in cocaine abusers. *Drug and Alcohol Dependence* 106, 233-36.
 54. Kopetz CE, Reynolds EK, Hart CL, Kruglanski AW, Lejuez CW (2010) Social context and perceived effects of drugs on sexual behavior among individuals who use both heroin and cocaine. *Experimental and Clinical Psychopharmacology* 18, 214-20.
 55. Haney M, Hart CL, Vosburg SK, Comer SD, Reed SC, Cooper ZD, Foltin RW (2010) Effects of baclofen and mirtazapine on a laboratory model of marijuana withdrawal and relapse. *Psychopharmacology* 211, 233-44.
 56. *Hart CL, Ilan AB, Gevins A, Gunderson EW, Role K, Colley J, Foltin RW (2010) Neurophysiological and cognitive effects of smoked marijuana in frequent users. *Pharmacology, Biochemistry and Behavior* 96, 333-41.
 57. Kirkpatrick MG, Haney M, Vosburg SK, Comer SD, Foltin RW, Hart CL (2010) Zolpidem does not serve as reinforcer in humans subjected to simulated shift work. *Drug and Alcohol Dependence* 112, 168-71.
 58. Kober H, Mende-Siedlecki P, Kross EF, Weber J, Mischel W, Hart CL, Ochsner KN (2010) A prefrontal-striatal pathway underlies the cognitive regulation of craving. *Proceedings of the National Academy of Science* 107, 14811-16.
 59. Colfax G, Santos GM, Chu P, Vittinghoff E, Pluddemann A, Kumar S, Hart C (2010) Amphetamine-group substances and HIV. *The Lancet* 376, 458-74.

 60. Bedi G, Foltin RW, Gunderson EW, Rabkin J, Hart CL, Comer SD, Vosburg SK, Haney M (2010) Efficacy and tolerability of high-dose dronabinol maintenance in HIV-positive marijuana smokers: a controlled laboratory study. *Psychopharmacology* 212, 675-86.
- 2012
61. Kirkpatrick MG, Gunderson EW, Perez AY, Haney M, Foltin RW, Hart CL (2012) A direct comparison of the behavioral and physiological effects of methamphetamine and 3,4-methylenedioxymethamphetamine (MDMA) in humans. *Psychopharmacology* 219, 109-22.
 62. Kirkpatrick MG, Gunderson EW, Levin FR, Foltin RW, Hart CL (2012) Acute and residual interactive effects of repeated administrations of oral methamphetamine and alcohol in humans. *Psychopharmacology* 219, 191-204.
 63. Hart CL, Marvin CB, Silver R, Smith EE (2012) Is cognitive functioning impaired in methamphetamine users? A critical review. *Neuropsychopharmacology* 37, 586-608.
 64. Kirkpatrick MG, Gunderson EW, Johanson CE, Levin FR, Foltin RW, Hart CL (2012) Comparison of intranasal methamphetamine and *d*-amphetamine self-administration by humans. *Addiction* 107, 783-91.
 65. Urban NB, Girgis RR, Talbot PS, Kegeles LS, Xu X, Frankle WG, Hart CL, Slifstein M, Abi-Dargham A, Laruelle M (2012) Sustained recreational use of
-

ecstasy is associated with altered pre and postsynaptic markers of serotonin transmission in neocortical areas: A PET study with [¹¹C]DASB and [¹¹C]MDL 100907. *Neuropsychopharmacology* 37, 1465-73.

66. Gunderson EW, Haughey HM, Ait-Daoud N, Joshi AS, Hart CL (2012) "Spice" and "K2" herbal highs: A case series and systematic review of the clinical effects and biopsychosocial implications of synthetic cannabinoid use in humans. *The American Journal on Addictions* 21, 320-26.
67. Rowell-Cunsolo TL, Wu E, Hart CL, Haile R, El-Bassel N (2012) Predictors of drug use in prison among incarcerated Black men. *The American Journal of Drug and Alcohol Abuse* 38, 593-97.

2013

68. Cooper ZD, Foltin RW, Hart CL, Vosburg SK, Comer SD, and Haney M (2013) A human laboratory study investigating the effects of quetiapine on marijuana withdrawal and relapse in daily marijuana smokers. *Addiction Biology* 18, 993-1002.
69. Keith DR, Hart CL, Robotham M, Tariq M, LeSauter J, Silver R (2013) Time of day influence the voluntary intake and behavioral response to methamphetamine and food reward. *Pharmacology, Biochemistry and Behavior* 110, 117-26.
70. Dakwar E, Levin F, Foltin RW, Nunes EV, Hart CL. (2013) The effects of sub-anesthetic ketamine infusions on motivation to quit and cue-induced craving in cocaine dependent research volunteers. *Biological Psychiatry*
71. Dakwar E, Anerella C, Hart CL, Levin FR, Mathew SJ, Nunes EV (2014) Therapeutic infusions of ketamine: do the psychoactive effects matter? *Drug and Alcohol Dependence* 136, 153-57.

In press

72. Keith DR, Gunderson EW, Haney M, Foltin RW, Hart CL (in press) Smoked marijuana attenuates performance disruptions during simulated night shift work. *Drug and Alcohol Dependence*

Book Chapters

2001

1. Hart C, McCance-Katz EF, Kosten TR (2001) Pharmacotherapies used in common substance use disorders. In: FM Tims, CG Leukefeld, JJ Platt. *Relapse and Recovery in Addictions*. Yale University Press: New Haven, 303-333.

2009

2. Kober H, Turza AC, Hart CL (2009) Risk factors for substance use, abuse, and dependence: Learning. In: HR Kranzler and P Korsmeyer. *Encyclopedia of Drugs, Alcohol, and Addictive Behavior*, 3rd edition. Macmillan Reference USA

2010

3. Hart CL, Shytle RD (2010) Potential pharmacotherapies for cannabis dependence. In: B Johnson. *Addiction Medicine: Science and Practice*. Springer: New York

4. Kirkpatrick MG, Hart CL (2010) The Subjective Effects of Cannabis. In: J Holland. *The Pot Book: A Complete Guide to Cannabis*. Park Street Press: Rochester, VT.
5. Marvin CB, Hart CL (2010) Cannabis and Cognition. In: J Holland. *The Pot Book: A Complete Guide to Cannabis*. Park Street Press: Rochester, VT.

Books

2013

1. Hart CL, Ksir C (2005-2013) *Drugs, Society, and Human Behavior*, 11th-15th Edition. McGraw-Hill: New York (**Textbook**)
2. Hart CL (2013) *High Price: A neuroscientist's journey of self-discovery that challenges everything you know about drugs and society*. Harper-Collins: New York

Case Reports/Letters/Commentaries

2002

1. Ginzburg V, Hart CL (2002) Acupuncture for the treatment of cocaine addiction. *Journal of the American Medical Association* 287, 1800.
2. Gunderson EW, Vosburg SK, Hart CL (2002) Does marijuana use cause long-term cognitive deficits? *Journal of the American Medical Association* 287, 2652-2654.

2005

3. Mariani JJ, Hart CL (2005) Psychosis associated with modafinil and shift work. *The American Journal of Psychiatry* 162, 1983.

2006

4. Accordino M, Hart CL (2006) Neuropsychological deficits in long-term frequent cannabis users. *Neurology* 67, 1902.
5. Nordstrom BR, Hart CL (2006) Assessing cognitive functioning in cannabis users: cannabis use history an important consideration. *Neuropsychopharmacology* 31, 2798-2799.

2007

6. Nordstrom BR, Hart CL (2007) Colorblindness: A missed opportunity to address the negative impact of being black in America. *The American Journal on Addictions* 16, 138-139.

2008

7. Mendelson J, Rawson R, Newton T, Galloway G, de Wit H, Dewey SL, Hart CL, Epstein DH (2008) Treatment of methamphetamine dependence. *Mayo Clinic Proceedings* 83, 369-370.
8. Hart CL, Krauss RM (2008) Human drug addiction is more than faulty decision-making. *Behavioral and Brain Sciences* (Invited Commentary) 31, 448-449.

2009

9. Saldaa C, Hart CL (2009) Diacetylmorphine versus methadone for opioid addiction. *New England Journal of Medicine* 361, 2193-2194.

2010

10. Hart C, Powell AC (2010) Determining cognitive deterioration requires multiple tests administered on more than one occasion. *Psychiatry Clinical Neuroscience* 64, 667.

- 2011 11. Member of Writing Committee (2010) The Vienna declaration. *Canadian Journal of Public Health* 101, 271.
- 2013 12. ¹Fan L, Hart CL (2011) A call for more care when investigating the cannabis-psychosis link. *Psychiatry Research* 191, 84.
- 2013 13. Hart CL (2013) Reefer Madness, an Unfortunate Redux. *New York Times* (Op-Ed) July 11, 2013
- 2013 14. Hart CL (2013) Pot Reform's Race Problem. *The Nation* (Op-Ed) November 18, 2013
- 2014 15. Hart CL (2013) How the Myth of the 'Negro Cocaine Fiend' Helped Shape American Drug Policy. *The Nation* (Op-Ed) January 29, 2014

Conferences Organized

- 2007 1. Drug Abuse and Cognition Conference: Neuropsychopharmacological analysis as a tool to understand human cognition. Columbia University

Recent Selected Invited Talks

- 2011 1. American Museum of Natural History, New York, NY
- 2011 2. Muhimbili University of Health and Allied Sciences, Dar es Salaam, Tanzania
- 2011 3. Midwestern Psychological Association Annual Meeting, Chicago, IL
- 2011 4. European HIV Conference, Tallinn, Estonia
- 2010 5. University of Malaya, Kuala Lumpur, Malaysia
- 2010 6. Grand Rounds, Department of Psychiatry, Medical University of South Carolina, Charleston, SC
- 2009 7. Grand Rounds, Department of Psychiatry, University of California – San Francisco, CA
- 2009 8. American College of Neuropsychopharmacology Annual Meeting, Hollywood, FL
- 2008 9. Global Conference on Methamphetamine, Prague, Czech Republic
- 2008 10. Treatment Research Center, University of Pennsylvania, Philadelphia, PA
- 2008 11. Sackler Institute for Developmental Psychobiology, Weill Medical College of Cornell University, New York, NY
- 2008 12. Methamphetamine Form on Capital Hill, Washington, DC
- 2008 13. A Mini Medical School on Addiction, Morehouse School of Medicine, Atlanta, GA
- 2007 14. Behavioral Pharmacology Research Seminar Series, Johns Hopkins University, Baltimore, MD
- 2007 15. Division on Substance Abuse Seminar Series, Yale University, New Haven, CT

Ad hoc Journal Referee

American Journal of Drug and Alcohol Abuse
American Journal of Psychiatry
American Journal of Psychology
Archives of General Psychiatry
Behavioural Pharmacology
Biological Psychiatry
BioMed Central: Clinical Pharmacology
Canadian Medical Association Journal
Drug and Alcohol Dependence
Experimental and Clinical Psychopharmacology
International Journal of Drug Policy
Journal of Clinical Pharmacology
Journal of Clinical Psychiatry
Journal of International Neuropsychological Society
Journal of Neurochemistry
Journal of Pharmacology And Experimental Therapeutics
Journal of Psychopharmacology
Neuroimage
Neuropsychopharmacology
Pharmacology, Biochemistry and Behavior
Psychology of Addictive Behaviors
Psychopharmacology
Schizophrenia Research

Ad hoc Grant Referee

National Institute on Drug Abuse Director's Avant-Garde Grant Review Committee
National Institute on Drug Abuse, Biobehavioral Regulation, Learning and Ethology Study Section
National Institute on Drug Abuse, Extramural Program
National Institute on Drug Abuse, Behavioral Science Track Award for Rapid Transition (B-START) Program
National Institute on Drug Abuse, Intramural Research Program (Served as external reviewer for submitted protocols)
The Wellcome Trust, United Kingdom

Professional Organizations and Societies

1999-present: Behavioural Pharmacology Society (Member)
2000-present: American Psychological Association (Member to Fellow)
Division 28, Psychopharmacology and Substance Abuse
2000-present: College on the Problem of Drug Dependence (CPDD; Associate to Regular Member)
2001-present: The International Study Group Investigating Drugs as Reinforcers (Member)
2003-present: Sleep Research Society (Member)
2006-present: American College of Neuropsychopharmacology (Associate Member)
2007-present: Association for Psychological Science (Member)