

## Appendix A

With the publication of both the medical opinion for the COAA “The Canadian Model” and the updated paper on marijuana and the safety sensitive work place: Marijuana and the Safety Sensitive Worker -A review for CLRA, a series of questions have been posed by interested parties. The purpose of this appendix will be to answer those questions clearly and concisely. For a more detailed discussion of the theory supporting the answers the reader will be referred back to the original documents.

### 1. What is the medical model and why is it used for safety sensitive workers?

The medical model approaches the effect of psychoactive drugs from a neurobiological and neuropsychological point of view. It approaches the use of such drugs in a nonjudgmental, medical fashion, accepting that some individuals using these drugs will have a disease state, currently termed Substance Use Disorder. As such, they are best dealt with as individuals who are ill rather than individuals who are guilty of a crime or punished for rule breaking. The model specifically attempts to avoid judgmental stances or positional thinking, and does not concern itself with issues around legality, social order, or criminology. It strives for political neutrality. It is used for safety sensitive workers for the simple reason that psychoactive drugs to a greater or lesser degree, cause impairment neurobiologically and neuropsychologically. Such impairment can lead directly to workplace accidents, adversely impacting safety. If a psychoactive drug can be shown to not impair, or affect safety, it will not be dealt with in this model.

To expand further on the reasoning behind the Canadian approach, compare the language from an excerpt of the minutes of the recent “Meeting of SAMHSA’s CSAP (Center for Substance Abuse Prevention) Drug Testing Advisory Board (DTAB) May 20, 2016”:

*“We ensure the fairness and integrity of the testing programs. We maintain employee privacy and confidentiality. It is a balancing act under the 4th Amendment of the U.S. Constitution. We are doing a search and seizure. This is not a medical test. This is not a fitness for duty test. This is a search and seizure of individuals’ urine so that we can determine whether or not they have illegally used drugs. We are also, in addition to the 4th Amendment balancing, bound by Omnibus Transportation Employee Testing Act. We often call it the Omnibus Act or OTETA.”*

and

*“In preparing these final revisions, SAMHSA considered comments and recommendations made by federal agencies, OMB, and the public. The final oral fluid MG and final revisions for the urine MG will serve to enhance this regulatory program,*

*which is designed to deter illicit drug use in federal agencies and in the federally regulated industries.”*

While the document mentions prevention, treatment and education – its slant is heavily towards interdiction of “illegal drug use”, rather than identification and of ill individuals. The Canadian approach is substantively different than the American, in that we do not tend to use the word “illegal” with respect to substances, we stress the risk mitigation and safety based aspects of this complex issue, and we place tremendous emphasis on the compassionate detection and treatment facilitation of ill individuals.

2. Exactly what are the impacts of THC as it relates to acuity in cognitive, emotional, perceptual processes as they relate to safety?

The answer to this question has been explored in some depth in the preceding paper “Marijuana and the Safety Sensitive Worker -A review for CLRA”. There are several comprehensive review articles referenced in the paper that delineate the cognitive, emotional and perceptual alterations known to occur acutely, sub acutely and chronically with THC. As the paper strives to make clear, it is important to note the high degree of variability from individual to individual in terms of exact effects. What profoundly incapacitates one individual, may not be all that obvious in the next. Notwithstanding that, on a population basis, THC impairs the ability of all workers to safely perform their duties in a safety sensitive work site when compared with workers not using the drug.

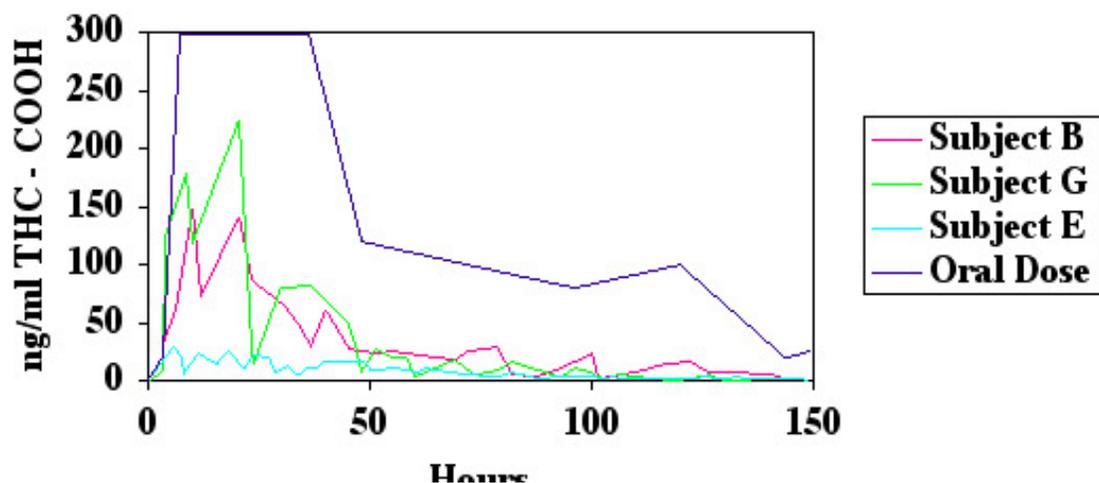
3. As with alcohol, where someone can have a few drinks and appear normal, whereas another person can have a small amount of alcohol and appear inebriated, does this inherent variation of tolerance exist with THC?

As has been previously discussed, this is an absolutely correct statement. When one extensively reviews the literature on THC, one is immediately struck by the high variation of findings between papers, and papers which appear to directly contradict each other. It becomes evident that the effects of the drug can often be subtle and difficult to detect. In addition there is a high degree of variability between individuals. Such variability may be accounted for by such factors as age, sex, dosing both acutely and chronically, mode of administration, concentration of the drug, ratios of THC to CBD, experience of the user, pre-morbid psychiatric disease, concomitant use of other drugs, in addition to other factors still being delineated. This would be an opportune place to find out, however, that a common feature of psychoactive drugs is that they affect the very organ an individual uses to determine whether they are fit, or not: the brain. An impaired brain cannot adequately assess its own level of impairment. A well recognized social phenomenon is that of the drunk partygoer who insists they are “okay to drive”. It is apparent to all those around them that they are not, but they are unaware of their own impairment. In like fashion, an individual acutely or sub acutely impaired on marijuana may be unaware of this impairment as they “feel fine”.

4. What is the significance of the urine screen cut off levels for THC? How do these levels relate to safety? How does THC leave the body? What facts does a business agent need to know in this regard?

This is an extremely important question and widely misunderstood or misinterpreted. The pharmacology of THC is complex, far more complex than that of ethyl alcohol. Whereas ethyl alcohol leaves the body in a linear fashion, THC is stored in various compartments within the body and is highly fat bound. In addition it interacts with receptors to which it is also bound. Consequently, it leaves the body in a complex, nonlinear fashion. The sole purpose of having a urinary (or other body matrix such as saliva) cutoff value is to determine what we are to call a “positive” result. There are potentially confounding factors to the measurement of any drug level within the body (such as the possibility of inhaling second-hand smoke or the possibility of machine/measurement error). These errors happen at very low levels. Consequently, a cutoff level must be set above the low level at which the drug level might be attributable to secondhand smoke, or might be attributable to sampling “noise”. The cutoff level is different for different technologies. For instance, the cutoff level for point of collection testing (POCT) which uses a technique of immunoassay (eg. ELISA) is generally 50 ng/ml - as this technique is not as accurate and measures other forms of cannabinoid molecules not just THC. The cutoff level for confirmation testing (GCMS – Gas Chromatography Mass Spectrophotometry) is much lower at 14 ng/ml because this technology is specific for THC, hence much more sensitive. It must be stressed in the strongest possible terms that these cut off levels have nothing to do with impairment, but are simply biochemical levels above which laboratory science agrees that the drug is present and below which the drug may be present, or the result may be factitious. Because of the nonlinear fashion in which THC leaves the body, the actual value of the level gives little or no information concerning how much drug was used or when it was used, and this is another factor which is commonly misunderstood. It is even possible that an individual may test negative in the evening, and positive the next morning, and subsequently negative the evening afterwards, all without having consumed any more marijuana. This is because marijuana can shed from the body in “spikes”.

**Fig. 1 - Urine Levels of Marijuana Metabolite (One-time Users)**



source: <http://www.ncbi.nlm.nih.gov/pmc/articles/PMC2689518/>

5. Are these cut off rates substantiated as safety-related in places other than Canada? For example by DOT? Europe? Asia?

These cut off levels are not substantiated as safety-related for the reasons given in the above answer. As the position paper briefly noted, there are active attempts to delineate serum blood levels of THC which correspond to levels of intoxication. Two of these were referenced in the paper. It should be stressed that this research relates to blood levels and not urinary levels or oral swabs. At the time of writing, this research should be viewed as highly theoretical and “not ready for prime time”. There are various theoretical reasons why it is highly unlikely that such a test will be legally defensible, or even practical in the foreseeable future. These reasons were discussed in the position paper.

That being said there is the possibility of misunderstanding. When drug testing bodies from other countries stated that “drug X above a certain cut off level is impairing” – they are actually combining two statements. A more accurate (although unwieldy) statement would be: “When drug X is detected above its cut-off level, we may, with certainty, say that the drug is present in the worker, and other research has shown that drug X causes impairment, such that it is unsafe to take the drug and work in safety-sensitive settings. Because of this we can say, for short-hand – “a drug test above this cut-off indicates impairment”. If it is not above cut-off, then we cannot say with certainty that the drug is there, or that the result may be due to trivial second-hand exposure, and therefore we cannot make any statement about safety or impairment.”

6. Is there a general statement that can be made, such as the medically and/or legally verifiable BAC result parameters, where the cut off rate for THC indicates that when a person is above the cut off limit they are deemed unsafe to be in a safety sensitive environment?

No, regrettably there is not. Society in general, and safety sensitive work sites in particular, are extremely anxious that such a statement exist, and for good pharmacologic reasons, at this time and for the foreseeable future, such a statement cannot be made.

7. As the need for THC “prescriptions” becomes less prevalent for legal THC use in Canada, and THC use becomes more normative in the general public, what statements

can be made about age of use onset and longer-term safety considerations, specifically for safety sensitive workers?

As speculated in the position paper, it appears likely that some form of legalization in Canada is imminent, and the issue of “prescriptions” both legitimate, and as a cover for recreational use, may decline somewhat as a result. The most instructive social phenomenon to inform us on the likely outcomes of the increasingly normative use of marijuana can be viewed in the rise (and subsequent fall) of cigarette use in the general population. It generally takes several generations for harms of a recreational drug to be acknowledged by a population. When the drug is strongly reinforcing, as in the case of cigarette tobacco or marijuana, stopping its use can become problematic for some individuals. We also recognize two opposing forces in terms of drug use when studying the example of cigarettes. If cigarettes are attractively packaged, vigourously and ubiquitously advertised, and brands associated with various positive social attributes such as “ruggedness” or “femininity”, sales go up. If cigarette pricing rises through punishing taxation, if their display is curtailed and packaging is made unattractive, each of these factors has been shown to adversely impact cigarette consumption. So, while it becomes obvious that prohibition does not work, and unilaterally declaring a desirable drug illegal rarely dissuades individuals from accessing it, various interventions will influence drug use both positively and negatively. Ease of access, social acceptance, low pricing, the availability of homegrown strains and other modes of administration such as foodstuffs would all be expected to increase marijuana use.

8. Are there generalized trends to be expected in a workforce that will likely contain a population of regular cannabis users (safety and productivity)?

On a theoretical basis, the answer to this question would be yes. The review papers quoted in the previous publication “Marijuana and the Safety Sensitive Worker -A review for CLRA” go into some detail in terms of worker safety as well as some other features in chronic impairment which could reasonably adversely impact productivity and quality of life. As productivity and quality of life were not specifically germane to the discussion of workplace safety, the paper did not go into detail concerning these issues, but the review papers that were quoted as references examine this in much more detail. In particular the papers by Volkow et al [ *“Adverse Health Effects of Marijuana Use”, N Engl J Med 2014 Jun 5;370(231) 2219-2227* ] go into some detail in terms of quality of life factors.

9. With legalization, older safety sensitive employees may return to THC use after decades of non-use. Are there any specific concerns for persons over forty or forty-five years of age returning to use while in a safety sensitive role?

Interestingly, several population studies have recently suggested that marijuana use on a per capita basis is falling amongst youth, while the incidence of usage is increasing in “baby boomers” and older individuals. These findings are preliminary and have not been confirmed in a statistically robust sense yet and therefore cannot be relied upon. The concern of an older worker who has not consumed marijuana for some time returning to use, is that they will be relatively naïve to the drug’s effects. It has been suggested by many researchers that experienced users, who chronically consume, develop coping

techniques for some of the impairment caused by their chronic drug consumption. These coping techniques would not, at least initially, be available to an older worker who was drug naïve. In addition there are newer forms of the drug or modes of administration (oils or extracts, shatter, vaping, more potent strains) with which a newly returning consumer might be unfamiliar. This, in turn, might conceivably result in unintended intoxication, or a time course of intoxication which the worker was not expecting. As such, concern about older workers returning to THC use in terms of decrements in safety is theoretically justified.

10. If asked, by a nonclinical or non-medical medical stakeholder: “THC is a medicine (and/or legal), how can it be harmful in a safety sensitive role when I feel better using it?” How would you respond? Stakeholders may need this example in their jobs when speaking to their constituents.

The position paper “Marijuana and the Safety Sensitive Worker -A review for CLRA” spent some time in the preamble attempting to delineate the phenomenon of “belief systems”. It must be recognized that some individuals have very strong belief systems around marijuana, in particular, and are unlikely to be swayed by logical or scientific arguments. Several of the papers quoted in the review specifically mentioned the fact that individuals were unaware of their own level of impairment, and this is certainly seen in terms of other drugs, including alcohol. It is not at all unusual to have workers arrive at work with blood alcohol levels above .08, and express a great deal surprise at the result, feeling that they were sober and fit for duty. It is not hard to understand, then, how the same effect could happen for marijuana. Ultimately, the answer to “how can it be harmful in a safety sensitive role” is delineated in some detail in the review.

11. Synthetic THC, also known as spice or K2. What is it? Where is it purchased? Is it a concern for safety sensitive workers? How might it be detected?

The issue of synthetic THC is complex and almost merits a separate review paper. It does not appear to be as popular as THC itself, because the effect is quite separate and distinct from marijuana, and often described as unpleasant by users. Basically, synthetic cannabinoids are molecules which act on cannabinoid receptors such as CB1 and CB2. Unlike plant-based forms of cannabinoids they were developed in laboratories, often for the purpose of studying receptor systems or in an effort to develop therapeutically useful drugs without some of the plant impurities or side effects. Some of these drugs have profound psychological effects similar to brief psychotic episodes, and most lack the “mellow” or euphoric sensation of plant THC. They are grossly impairing. Various reports of seized quantities of these drugs show them to be adulterated with a wide variety of other substances, making an accurate description of the exact effects of any particular brand difficult. The simplest way to describe them is psychotomimetic, and absolutely contraindicated in a safety sensitive work site. Because of the wide variety of molecules making up these substances, some of them have “slipped under the radar” in terms of legality, and drug legislation has yet to catch up with the rapidly changing and developing world of backyard chemistry. As such they can be sold on the Internet in some jurisdictions. They are also marketed in a “grey market” such as convenience

stores and gas stations in some regions. In terms of detection, these drugs are not detected by typical panel five or panel ten testing as the structure of the active ingredient is different than delta nine tetrahydrocannabinol, and its metabolites. They can only be detected if specifically tested for which necessitates a high degree of suspicion.