

The primary focus to begin with PJFCET was the illegal storefronts. As we close those storefronts, and conducted enforcement actions against them we shifted our focus obviously to the online space. And now in the last few months, we've really shift their focus to where the illegal cannabis is coming from, and that is these illegal cannabis production sites. This site here is actually authorized under Health Canada under the personal and designated production regulations. And it's authorized for approximately 1600 cannabis plants. As you can see, we're going to be well in excess of 1600 plants, more like an excess of 20 thousand plants. This is typically what we find around the province of Ontario with their illegal production. Commonly we find a great deal or a great number of workers that are working on the site, some of them migrant workers. What's sad is that they typically are living in very squalid living conditions. The other thing to keep in mind is all of this is not regulated. There's no inspection here to know what type of pesticides. In a lot of cases we're finding illegal pesticides being used where that wastewater gets dumped and the impacts of that, you'll see there's a significant mold issues around here, those those types of factors. But that's where we're working with the Ontario fire marshal. They come in, do inspections to look at things like legal electrical, even right down to building code violations. We work with the Ministry of Environment who come out and have a look at things like where the wastewater is going because these are the things that impact the municipalities and the communities around them. One of our recent projects style investigations that we conducted over a number of months. At the conclusion of that, I believe it was five or six illegal production sites. We seized over a 100 thousand plants. What was even more startling was we seized over \$2 million in Canadian currency between the sites just lying around loose. So that just speaks to the sheer volume of cash that's generated from here. We're not targeting those individuals that are growing through their own personal use. This is not for personal use. These are large-scale permanent networks that are using this to fund a rather criminality. Whether that'd be synthetic drug trade, whether there's human trafficking. There's a lot of other concern when you look at the sophistication and how organized this is just one arm of their criminality and they use it because they think it's less risk. You just heard the OPP provincial enforcement team tackling the illegal cannabis market posted on January 2021. Welcome to the Forensic Tox podcasts.

This is Dr.Sanela Martic, faculty member in the Department of forensic science at Trent University. This podcasts showcases the role and importance of cannabis in legal cases. Specifically, these three Canlii cases illustrate how crime scenes and the lab testing come together. Each case is unique and describes clearly challenges associated with toxicological testing and data interpretation but a common thread for all podcasts is the THC. That's the main actor. Let's listen and reflect on these three cases together. Canlii case 2016, ONCJ 585, the evidence of Dr.

Daryl Mayers. Dr.

Mayers testified as an expert witness. He's a forensic toxicologist who has been employed by CFS for several decades. He holds education in toxicology with advanced degrees and he's very experienced in the pharmacological and toxicological aspects of various drugs and poisons. Dr.

Mayers was qualified to give expert evidence in the area forensic toxicology, focusing on absorption, distribution and elimination of drugs, alcohol and similar volatile substances in the human body. And the impairing effects of drugs, alcohol or similar volatiles on the human body and the ability to operate a motor vehicle. So let's get to the accident. Dr.

Mayers actually tested urine samples provided to him by Constable Grison at the hospital at 415 PM. On the day of the accident, the urine sample contained two chemicals, the THC and carboxy THC. Now THC, of course, is a principal psychoactive ingredient in cannabis. The carboxy analog is inactive, and carboxy analogue can be present in urine for weeks after ingestion of cannabis. And when one finds carboxy THC along with THC, cannabis was probably ingested within the last several hours. However, Dr. Mayers could not be more accurate than that about the time of ingestion, Dr.

Mayers testified that it is not possible to calculate the concentration of THC in the blood with only the concentration measured in the urine. What is required is the blood concentration, which would provide an opinion as to the effects of the drug, including potential impairment, if any, on an individual at that given time. And Dr.

Mayers wrote in his report, the detection of drug metabolite in urine sample is indicative of prior drug exposure or administration. Urine findings cannot be used to determine the effects, including impairment of a drug on an individual at a given time, since they do not necessarily mean that at the time of the incident, there was a blood concentration of a

drug or drug effects. Next point by Dr. Mayers in his report is tetrahydrocannabinol, THC is the principal psychoactive constituent of cannabis products such as Marijuana and hashish.

Effects that occur after use of this drug may include mild euphoria, relaxation, alter time perception, motor incoordination and decrease the ability to concentrate. And the inactive metabolite carboxy THC, demonstrates a much longer time course compared to the parent compound THC. Due to slow release, its subsequent metabolism of THC from tissue stores ends. Dr. Myers in his report. Now, Dr.

Mayers was asked to expand on the point too, that was just quoted to you. And so Dr.

Mayers further testify that the effects of THC on one's ability to drive is a lot more complicated than it is the effect of alcohol. In addition to blood concentration, it is necessary to know the time it was last ingested. Thc has a rapid response rate. Users feel its effects very rapidly, but most studies showed that the effects diminish within several hours to a point that a person's ability to operate a motor vehicle would not be impaired. The effects will diminish in some persons more rapidly than others. And so it is hard to determine the THC effect on an individual's impairment without knowing the timeline of ingestion. Furthermore, Dr.

Mayers testified that there is a significant difference amongst persons in the speed at which the THC is excreted from their bodies, the half-life, as Dr. Mayers refers to it, of the THC in the body varies among different persons and it could be 20 hours or as long as 60 hours. The time frame over which the drug's effects are lost varies among persons. It is also affected by the potency of the drug being used and how it is used or administered. Dr.

Mayers was asked if THC causes body or eye tremors. Dr. Mayers carefully noted that he had never encountered anything that's suggested that body or eye tremors was indicative or not indicative of cannabis ingestion. So, ultimately, Dr.

Mayers was asked about his opinion as to whether cannabis and it's ingredient THC could have an impact on the ability of an individual to operate a motor vehicle. He replied that it was certainly possible. And there is a lot of data in the literature that supports that position. There is also data that counters that view, but in his opinion, that is a result of a study design, hence, it might not be applicable. He testified that unless one knows the concentration of THC in a persons blood and the time of ingestion, it was very difficult to be definitive about the effects on the ability of a person to operate a motor vehicle. A person who has ingested the drug may have difficulty keeping a car in its lane or in reaction time if it is present in the relevant concentration and was ingested at the appropriate time. So, Dr. Mayers was given a hypothetical situation in which an individual ingests 0.4 grams of marijuana early in the day and was tested for their motor skills between 2:00 to 03:00 PM on the same day, Dr. Mayers was asked if it would be reasonable that that person would show little or no signs of impairment. So Dr.

Mayers responded that it would be reasonable and that he would not expect such a person to be impaired by 11 AM or noon. It was his evidence that outside a four-hour window following ingestion, it is unlikely that a person would be impaired by cannabis, although it could be detected in the urine. That ends the evidence presentation of Dr.

Daryl Mayers, in the Canlii case 2016 ONCJ 585. Let's consider the R. v. D.A.H. 2016 ONCJ 585 Canlii case, where evidence was presented by Dr.

Daryl Mayers. Let's consider these points. THC parent drug and its metabolite carboxy THC, were detected. No other THC metabolites was detected. And no mention of Gluc THC metabolites or their detection. Let's consider these points. In this case, THC redistributes into fat and tissues, and hence it is slowly released from the body over a period of weeks or months. What does that tell us about the volume of distribution or VD of THC itself? Would it be a high value or low value? Is THC a protein binding drug? And if so, if THC and protein make a complex, how would that affect the concentration of THC in a biological fluid? Does THC exhibit high affinity for proteins? Is that something that we need to consider? We know that only free drug or unbound drug can cross the blood-brain barrier and induce effects. And we also know that often the protein bound drugs cannot do that, and it's very hard for us to detect protein bound drugs in the biological fluid. Let's consider these points. The half-life was mentioned. What is the half-life? What does that refer to? Likely the concentration of the drug, but it's time-dependent. So half-life for the THC was stated to be between 20 to 60

hours. That is quite long, but that tells us that in the 20 to 60 hour time period, of course depends on individual, the concentration of the THC will drop by 50%. Hence, likely it or its metabolite will be present in fluids over a long time period. As I mentioned, the half-life for a drug varies between individuals. Why is that? Does it have something to do with the way that our body metabolizes the drug? Does it have something to do with the enzymes that are involved in phase one, phase two reactions. Let's consider that. Canlii case R. v. Hyper Light? 2017 ONCJ 371 case. Daniel, A hyper light, stands charged that he operated a motor vehicle when his ability to do so was impaired by alcohol or drug, on September 26th, 2016, at the City of Burlington. Toxicology results: Dr.

Mayers testified that the test of Mr. Hypolite's urine detected carboxy tetrahydrocannabinol, carboxy THC, but not tetrahydrocannabinol or THC. And he explained that the carboxy THC is an inactive metabolite of THC. THC is the major psychoactive compound in cannabis products such as marijuana and hashish. The detection of the carboxy THC indicates prior use of or exposure to a cannabis product. The presence of the THC itself in the urine is not significant because THC is not eliminated from the human body by that means. The presence of the metabolite indicates prior use of cannabis. Dr.

Mayers testified that the effects of cannabis may include mild euphoria, relaxation, alter time perception, motor incoordination, and decrease the ability to concentrate. In short, it can impair a person's ability to operate a motor vehicle. But the results of the urine testing cannot be used to determine the effects including impairment of a drug on an individual at a given time, since they do not necessarily mean that at the time of the incident there was a blood concentration of a drug or drug effects. Blood testing will be much more informative in that regard. Dr.

Mayers testify that marijuana can continue to affect a person for six hours following use. However, it will take much longer to clear the THC out of a person's body. In addition to THC and metabolite of THC, there was also codeine and hydrocodone, according to Dr. Mayers, Dr.

Mayers states codine is a drug prescribed for treatment of mild to moderate pain. Effects that occur after use of this drug may include dizziness, drowsiness, and stupor. The effects of codeine depend on the concentration within the blood and the tolerance of the individual to the drug. Hydrocodone is a drug prescribed for the treatment of mild to moderate pain and the suppression of cough. Effects that occur after use of this drug may include euphoria, dizziness, drowsiness, and sedation. The effects of hydrocodone depend, of course, on the concentration within the blood and the tolerance of the individual to the drug, ends Dr.

Mayers. So he pointed out that the hydrocodone in the urine could simply be a metabolite of codine. Both codeine and hydrocodone could impair a person's ability to operate a motor vehicle. Dr.

Mayers also states that codeine has a short half-life of only two to four hours. In addition to these drugs, there was ketamine in the urine. Dr.

Mayers wrote in his report stating ketamine is used clinically for its analgesic and anesthetic properties, and it is also used recreationally for its hallucinogenic and euphoric properties. Effects that occur after use of this drug may include feeling of euphoria, sedation, lack of coordination, out of body experiences, dizziness and blurred vision. The effects of ketamine depend on the concentration within the blood and the tolerance of the individual to that drug, ends Dr. Mayers. In short, this drug too could impair ones ability to drive. Dr.

Mayers testified that ketamine, unlike codeine, could remain in the person's body for maybe up to 24 to 30 hours. In addition, Dr. Mayers found methamphetamine in the urine. Dr.

Mayers states methamphetamine is a central nervous system stimulant primarily used as a drug of abuse. Effects that occur after use of methamphetamine may include excitation, euphoria, and increased risk-taking behavior. Amphetamine is a pharmacologically active metabolite of methamphetamine. Speaking of cocaine, there was cocaine found in the urine too. Dr.

Mayers continues in his report, cocaine is a central nervous system stimulant, primarily used as a drug of abuse. Benzoylcegonine or BE inactive breakdown product of cocaine that can form both in the body and in the collection tube

during storage of the sample, the effects of cocaine use may include excitation, euphoria, increased risk-taking behavior, hallucinations. A crash phase may follow a cocaine high, during which time individuals could suffer from exhaustion, extreme fatigue, while the onset and duration of a cocaine crash cannot be predicted, it has been reported to last for up to 24 hours after use, and thus well beyond timeframe for any detectable levels of cocaine to be present in the blood, ends Dr. Mayers. In this case, Dr.

Mayers testified that cocaine would not impair a person's ability to drive a motor vehicle after the passage of one hour. There is no reason to believe that Mr. Hypolite was using cocaine during the time that he was actually driving. The drive would have covered more than an hour. So it is a non factor with regards to causing any impairment while he was driving a motor vehicle on this date. It is a significant factor, however, in my later assessment of Mr. Hypolite's reliability as a witness. End of Canlii case R. v. Hypolite 2017 ONCJ 371. Let's consider this case, R. v. Hypolite 2017 ONCJ 371. So let's consider these points that are specific to the case. In this particular case, the drugs were mixed and those are in question, which is often the case with drug users who combined illicit and licit drugs to achieve the high. It is important to consider not only THC, for example, and its metabolite, but also other various drugs and metabolites. And it's important to try to estimate which of these drugs could have, or maybe in context could have contributed to an impairment at the time of the incident, again, we find that the carboxy THC metabolite is present rather than the parent drug THC, as was the case in Canlii case #1. Note that in this case, case #2, Dr. Mayers could speak to the prior use of cannabis, but cannot provide a timeframe exactly or how intoxicated one may be at the time of the incident. So it's very hard to correlate the concentration of cannabis and its metabolites in biological samples to the actual concentrations at the time of the incident, and then it's very hard to extrapolate how intoxicated one might have been. This is much more easily done with ethanol, for example, as you will find in other chapters. This is a challenge with many drugs including THC, as I said, unlike with alcohol, where blood alcohol concentration measured can be used to estimate amount of alcohol consumed. Even breathalyzer tests could be used to make that assumption, and likelihood of intoxication at the time of incident could be very much precisely determined. What else is unique about this case? Note that other drugs were here detected. We had codeine and hydrocodone, both present in the sample. Hydrocodone is a metabolite of codeine. Ketamine was also found, methamphetamine as well. Cocaine was found and likely its metabolite benzoylcegonine, along with the THC, of course, and its metabolite. So which drug was causing impairment or contributed to the impairment? That's the key question and it's very hard to answer. Let's summarize Dr. Mayers' testimony in the case #2. Number one, the THC and cocaine are unlikely to have contributed to the impairment and two, the ketamine, codeine, and hydrocodone are likely contributors to the impairment. Hence, Dr. Mayer was able to provide some conclusions and some interpretation of the data to help this case. Canlii case R. v. Altobelli 2018 ONCJ 718. Case: shortly after midnight on September third, 2017, Mr. Altobelli was moving his motor vehicle from a parking spot on the street to the designated parking lot at his apartment across the street. He came to the attention of the police after short investigation during which he admitted to alcohol consumption, at some point earlier in the evening. He was arrested for operating a motor vehicle, while his ability to do so as impaired by alcohol or drug. A search incidental to the arrest lead to additional charge of possession of cocaine. He was ultimately given the breathalyzer test, which resulted in the blood alcohol content readings of 40 milligrams and 31 milligrams of alcohol in a 100 milliliters of blood. He was also subjected to an evaluation by the drug recognition evaluator, DRE, forensic toxicology aspect of the case. In this case, Ms.

Betty Chow, who's a toxicologist at the CFS, was an expert on the absorption, distribution and elimination of alcohol and controlled substances in the human body. Ms. Chow, attested Mr.

Altobelli's urine sample in accordance with the standardized testing protocol. She also tested the specific drugs, given the information received about the investigation. The test detected the presence of alprazolam, which is a central nervous system depressant. Side-effects of ingesting alprazolam can include drowsiness and impaired coordination. She also detected tetrahydrozoline, a CNS depressant. It is a topical decongestant and a vasoconstrictor, and is available as an eye drop, and for topical nasal application. Side effects associated with its use may include drowsiness, tremors, and blurred vision. Ms. Chow noted that if that substance was being taken properly as eye drops, that would not create an issue. She also detected the presence of carboxy tetrahydrocannabinol, carboxyl THC, which indicates exposure to sometimes prior to the testing, exposure to THC, that is. So with respect to each of the substances, Ms Chow was able to detect them, but she was not able to comment on the concentration thereof. Mr. Altobelli's bloodstream may have in order to timing of ingestion of the substances, the urine results simply indicate that those drugs were taken at sometime prior to the testing. For example, the alprazolam, if taken by tablet, would be taken within days of the urine sample. With

respect to the presence of a carboxy THC, cannabis would have been ingested within the previous month. Tetrazoline is eliminated by the body quickly, and would have been taken within a day of the urine sample testing. So, Ms. Chow did review the forms generated by the DRE. She did not detect the presence of inner critic? analgesic, which is old terminology for opiates. However, there are so many narcotic analgesics that is impossible to keep up and test for them all. For example, the CFS testing that Ms.

Chow used involves checking for 50 narcotic analgesics. They are hundreds of additional narcotic analgesic compounds, which would not be detected by the urine testing that she carried out. What about cannabis in this case? Well cannabis is typically smoked. The onset of its effects occur within minutes. Peak effect is generally 30 to 60 minutes thereafter ingestion, and the effects lasts for approximately four to six hours. Commonly effects include euphoria and relaxation. They are side effects which include decreased ability to concentrate, disorientation of judgment of time and space, redness of the whites of the eye, eyelid tremors. Pupils can range from normal to dilated with high doses. Decreasing coordination, body tremors and twitching. Cannabis can impact blood pressure by increasing it. But that observation is somewhat controversial because long-term use of cannabis can actually lower blood pressure. It can also increase the heart rate and there is some potential for an increase in body temperature. However, long-term use of cannabis can lower all three of those measures. So, with respect to narcotic analgesics, one must factor in the tolerance of the individual ingesting the drug if taken daily in regular dosage for pain, for example, there would be probably few impairing effects. However, recreational use of the same drug ingesting through, for example, snorting, smoking or injecting would cause side effects which include a decreased level of consciousness. This class of drugs, that is narcotic analgesics, can decrease blood pressure, heart rate, and body temperature. The timing of the effects depends on the method of administration, but the effects on the body are felt fairly quickly. So, if one combined ingestible cannabis would a narcotic analgesic, both drugs could depress the body system, but they work independently to slow brain function. With respect to combining a blood alcohol content of 30 to 40 milligrams with cannabis, if enough, cannabis was ingested to impact the body, it would increase the level of impairment.

So, in Mrs. Chow's opinion, if alcohol was the only substance being ingested, a blood alcohol content of 50 milligrams per 100 milliliters of blood produces impairment of ability to operate a motor vehicle. Of course, Ms. Chow commented on the other drug, alprazolam, which is a drug prescribed for the treatment of anxiety and panic disorders. Effects that occur after the use of this drug may include lack of muscle control, drowsiness, loss of consciousness, and dizziness. Effects of the drug depend upon the concentration in the blood, and the tolerance of the individual to the drug. If being used regularly, how are and as prescribed, Ms. Chow expects limited side-effect. End of Canlii case R. v. Altobelli 2018 ONCJ 718. In the case R. v. Altobelli 2018 ONCJ 718, Canlii case, case #3 3in this podcast, what we see is the another example of THC being a drug or a metabolite of interest here in the center of the case. Takeaways are that as expected, the carboxy THC metabolite was detected in urine and not the actual parent drug. And what you see is this very common thread among the three cases where THC itself cannot be directly detected, but its metabolite is indication of its presence in the body. What are other drugs that were found in the urine in this case? In this case, in particular, unlike other cases, the DRE or drug recognition expert's report was used and the toxicologists, Ms. Chow, was asked to compare her findings with the DRE. Let's compare the DRE report with the toxicology report in this case. The DRE stated that the narcotics, specifically the narcotic analgesics, were detected by using DRE testing and likely these kinds of drugs cause the impairment. But the toxicologist' report presents no such chemicals in the urine. So the toxicologist did not find any narcotic analgesic in the urine. In contrast to the DRE report. So what is the discrepancy for the two reports? Between these two reports, for example, there are many chemicals which fall into the category of narcotic analgesic. And so the question is, what is the toxicological screen? So the scientists uses very standard validated methodology and toxicology screen only involved in checking for, let's say 50 narcotic analgesic compounds, but not more. So if the narcotic analgesic use in this case is one of those 50 then the toxicologists would be able to detect it either test. However, they are only testing for 40 chemicals, so is it possible that they're excreted has excluded other possible chemicals of interest or other types of narcotic analgesics. It is very possible. In this case #3, you see that sometimes the DRE and toxicology reports do not always agree, and there are technical reasons for that disagreement as its case in this story where standard urine testing was limited to compounds tested and excluded potentially other illicit or licit drugs. Here we are at the end of the podcast on cannabis. I hope you enjoy that travel through Canlii cases and reflections along the way. Thanks for listening.