

00:00:00:29 MS. CATIE DREW: Thank you for coming to the third installment of our DEA Museum Lecture Series. My name is Catie Drew. I'm the Education Coordinator for the museum. I would like to introduce Ms. Jill Head. Hill is a Senior Forensic Chemist at DEA's Special Testing and Research Laboratory in Dulles, Virginia.

00:00:21:25 She received her B.S. degree in chemistry from Virginia Tech and an M.S. in Forensic Science from John J. College of Criminal Justice. In 2004, Ms. Head joined DEA at the Special Testing and Research Laboratory where she is the laboratory's training officer and coordinator of the DEA forensic chemists seminar.

00:00:44:13 During this time, she has presented information on marijuana on hundreds of chemists from state and local laboratories around the country. Prior to joining DEA, she worked at the Virginia Division of Forensic Science Laboratory as a forensic laboratory specialist. Please join me in giving a warm welcome to Ms. Jill Head. [applause]

00:01:10:08 MS. Jill HEAD: Thank you, Catie. Good morning. Thank you all so much for coming. I'm going to be speaking this morning about marijuana. Since that's the topic for this museum lecture series. Now, marijuana, like most other drugs, follows trends, trends in how the drug evolves. Also in how the drug is abused.

00:01:39:21 And some of you may or may not have heard of these synthetic cannabinoid materials or Spice K2. And I'm going to be talking about those later in my presentation after I discuss marijuana and some of the chemistry about marijuana. But I want to speak about the evolution of marijuana, its history and its current trends of abuse from my perspective as a forensic chemist.

00:02:07:12 About six or seven years ago, I stated doing research on marijuana and the marijuana plant. And what I learned was a lot about the forensic analysis and the chemistry within the plant, a little bit about the botany.

00:02:25:217 But what was very interesting to me was that there was a lot of information out there, both in scientific journals, but also in drug user websites. And there is a huge amount of information that's available on the Internet regarding marijuana, how to grow bigger plants, how to grow plants with a higher drug content.

00:02:55:16 And this is being used by the drug user to make plants that have higher and higher drug content. And the marijuana plant is evolving like some of the more synthetic materials.

00:03:09:26 So I'm going to begin with a brief history

about marijuana. The scientific name is *Cannabis sativa linneaus* or *Cannabis sativa* L. And it has a very long history of multiple different uses. It's been used historically for the fiber in the stem which we know is hemp.

00:03:34:08 It's also used, the oil from the plant and from the seeds are used in materials like paints and varnishes. And then, of course, it's been illicitly abused for its hallucinogenic compound which is delta 9- tetrahydrocannabinol or THC. That's secreted in the marijuana glands.

00:04:01:00 It has a very long history. The first documented harvesting of hemp was by the Chinese over 8,500 years ago. And it was only until about 1,000 years ago that we have the first documented records of marijuana being used for drug consumption.

00:04:23:07 So before I can talk about the potency or the amount of drug content in a plant, I need to sort of talk a little bit about the wide range of the plant and why some plants have a higher concentration of THC than others.

00:04:41:23 One of the big reasons is that marijuana is what is called dioecious meaning that it has male and female plants. And they're born on separate plants. So separately we have males and females. The male plants have a much lower drug content than the female plants. They're also much

taller. They tend to be taller and have longer stems than the female plant. That makes them ideal for harvesting hemp. Because the hemp comes from the fibrous stems.

00:05:21:19 The female plants, on the other hand, are shorter and stockier than the male plants are. And they have a much higher THC content than the male plants. So the plants that are used for smoking or for drug abuse are most likely female plants. Because they have the higher THC content.

00:05:48:19 So besides the difference between male plants and female plants, there are a huge number of other factors that can affect the THC content in a plant. Plants can be grown outdoors. We've seen a large number of really sophisticated marijuana grow houses where they are using grow lights, purchasing a lot of equipment. And they're able to produce really high amounts of THC in lots of plants in some of these operations.

00:06:25:17 Also, hydroponic grow operations where only water is used to grow the plants. And then plants are grown outside and inside. And all of these factors can affect the way that the plant looks and also the amount of THC that is present in the plants.

00:06:53:06 Even though there are differences in maybe how

tall a plant is ... because it can grow anywhere from four to sixteen feet tall. It can have a different number of leaflets. This is a photo of the marijuana leaf. And it's a very stereotypical photo of what a marijuana leaf looks like with the seven leaflet.

00:07:12:14 The marijuana plant has what's called a palmate form which means that several leaflets arise from the same point. So you can see in the center, there's a center point where all the leaflets are coming out. And it has the seven leaflets around that center point. But it can be anywhere from five to eleven leaflets. And it's almost always odd in number. As the plant grows and matures, it grows more leaflets around each leaf.

00:07:46:21 So each leaflet contains features on all marijuana plants. It has hairs ... I'm going to talk a little bit more about those later ... veins and serrated edges. Now, these three characteristics are obviously not unique to the marijuana plant. But as a forensic chemist, these are the things that help me to identify that a substance is marijuana.

00:08:17:14 So the marijuana plant, I just said, contains hairs. And it actually contains three different types of hairs. One in particular is called glandular hairs. And the glandular hairs produce the resin which is a sticky mixture,

like a brownish, amber colored sticky mixture that contains cannabinoids.

00:08:42:27 Cannabinoids are the compounds in marijuana, one of which is THC. So THC is a cannabinoid. So the glandular hairs secrete the THC. The female plants are literally covered or can be literally covered by these glandular hairs. The male plants, however, contain very few glandular hairs. And because they typically lack glandular hairs, they have much less resin and therefore much less drug content.

00:09:24:01 In addition to THC, which we know is the psychoactive component of marijuana, it contains more than sixty other different cannabinoids. So most of the cannabinoids that are present in marijuana don't have any hallucinogenic or psychoactive effect at all. Some of those are cannabidiol, cannabinal. And these are present in different concentrations in most plants.

00:09:56:11 In addition to the more than sixty cannabinoids, fresh marijuana actually contains more than 400 other compounds or other components. So when people are smoking marijuana, it's not just THC that's being absorbed into the bloodstream, but it's these more than 460 other components that are also being inhaled and also being absorbed by the body.

00:10:24:29 Some are hydrocarbons, alcohols, aldehydes which are all just different types of chemical compounds. Two that I want to mention in particular are terpenes and phenols. I wanted to mention these because these two are what give marijuana its characteristic smell.

00:10:44:22 So terpenes are just a group of compounds or chemical compounds that give marijuana its characteristic smell. In a much smaller concentration, the plants also contain phenols. But as that concentration of phenols increases, the odor of the marijuana actually changes. And it's referred to as skunk marijuana. Because that's exactly what it smells like. And that's because of the high concentration of these other compounds.

00:11:18:21 As the marijuana plant grows and matures, the concentration of the cannabinoids and the THC changes as the plant changes. So when the plant is first being grown, the drug content and the THC content is very low. And then as the plant grows, the amount of THC present in the plant increases. And as it reaches maturity, it's at an all time high.

00:11:51:26 So the relative amounts of the cannabinoids change throughout the plant's lifespan.

00:12:03:05 Even though the THC content continuously increases, the relative concentrations between the different parts of the plants also changes. The leaves actually only contain about one percent THC, maybe about one to four percent THC.

00:12:21:19 So there's not actually a whole lot of drug content in the leaves. It's the flowering female tops or the female flowers that contain the highest THC content. And there can be anywhere from four to twenty-four percent THC in these flowering tops.

00:12:42:22 Now, the stems, seeds and roots, on the other hand, have the lowest amount. So there's virtually ... there's very, very little drug content in the stems, seeds and roots. So the photo I have here is a photo of one of the female flowers which contains the highest amount of THC.

00:13:06:15 Okay. As I mentioned when I first started speaking to you about the evolution of the marijuana plants. And the vast amount of information that's present on the Internet, not only in forensic and science journals, but in drug abuse websites. And this is a photograph of High Times Magazine. And it's actually the issue that's coming out next month.

00:13:38:02 And I want you all to be aware that they are

very much watching what we are doing as an organization. And every month, there's at least one article that references DEA, ONDCP, the drug czar and what DEA is doing on the war against drugs.

00:14:03:26 And so, they're watching us. So I find it very important for me to sort of watch what they're doing as well. Because there are some really intelligent people that are growing plants, that are synthesizing other drugs. And we're constantly playing this cat and mouse chase game of trying to catch up to the evolution of drugs and how they're abused.

00:14:29:02 So in the July High Times issue, there are two articles specifically regarding how to grow your own marijuana plants. There's one on starting your own hydroponic garden, your own hydroponic grow operation. And there's also an article, The Beginner's Guide to Breeding and How to Breed and Clone Marijuana Plants to Get the Highest Drug Content Possible.

00:15:00:27 So these are ... this is why we're seeing the plant and the plant potency increase so much. Because there's just so much information out there to allow people to do it themselves.

00:15:16:14 In addition, there's also been some advances

in smoking devices. You're probably most familiar with what a bong is and what a pipe looks like. And now we're seeing things called vaporizers. So the use is also significantly changing.

00:15:36:25 So I just wanted to show you a couple of pictures of some different types of grow operations. This is an indoor grow, kind of a little bit more sophisticated with grow lights. And it's obviously producing a large number of marijuana plants.

00:15:56:20 This is ... looks pretty sophisticated. But this is a hydroponic grow. But it's just in someone's bathtub. So maybe they read that High Times article where they were showing you how to start and develop your own hydroponic grow in your house.

00:16:14:03 And then those first two grow operations may produce more plants, higher yields and higher drug content. But we are still seeing kids that are growing, you know, one seed in a closet in their dorm room. So these are plants that still have relatively low drug content.

00:16:39:11 The University of Mississippi has a project ... or they conduct research called The Marijuana Potency Monitoring Project. And what they do is they have laboratories, including DEA, submit samples of marijuana to

their laboratory to analyze. And they quantitate it or they determine the amount of THC present in all of the marijuana samples that are submitted.

00:17:08:07 So these are samples that have all been seized. From the 1970s ... I don't know if you can ... I'm pretty sure you can't see the dates on there. But it goes from about the late 1970s, early '80s through 2008. And what we're seeing is a more than two time increase in the potency, the average potency, of the marijuana plant.

00:17:37:05 So in the 1970s, the average THC amount in a plant was only about three or four percent. And that was on average. Now we are seeing more than ten percent. These statistics unfortunately only go until 2008. But it is continuing to increase to more than ten percent by average.

00:18:05:05 From 2005 through 2009, DEA also saw a tremendous increase in the amount of marijuana that was being seized. And in 2009, the amount of marijuana that was seized was well more than all of the other major drugs of abuse combined.

00:18:27:10 So this is a huge amount of marijuana that's being seized in the United States. And what that means to me particularly as a forensic chemist is (1) that we still have a huge marijuana abuse problem in this country, but also,

that that is a ton of evidence that's being submitted to the laboratory for analysis.

00:18:52:27 So some of the types of evidence that we see in our laboratory are, of course, plant material. And we see things like marijuana flowers, the female buds, stems and leaves and seeds, all different types of plant material. Also different types of smoking devices. Some of them quite elaborate and actually quite beautiful, made of blown glass.

00:19:25:10 We also see hash and hash oil. Hash is the compressed resin of the marijuana plant. And so there's no other plant materials that are present. It still contains little pieces of plant fragments that we can still identify. But the THC content of hash is much higher on average than that of just the plant material.

00:19:55:06 Hash oil is the extracted cannabinoid and the extracted THC from the marijuana plant. So that contains an even higher percentage of THC. We also on occasion receive food products containing marijuana. It can include brownies, cookies, candies, chocolates. It's kind of a messy type of analysis. But we can absolutely still identify the THC in these food products.

00:20:29:28 And then most recently, within the last year and a half, two years, we've been talking a lot now about

these synthetic cannabinoids. And we're starting to see samples of these come into the laboratories. So towards the end, maybe in a few minutes, I'm going to be talking a lot about what these are and how they're different from THC.

00:20:58:02 So I'm just very quickly going to go through our analysis and what we do as a forensic chemist to identify the plants. And the big question is what are these synthetic cannabinoids? Are they marijuana? Can they be distinguished from marijuana? And I'm going to answer that question towards the end of my presentation.

00:21:20:05 So the first part of our analysis as a forensic chemist is to do what's called a microscopic examination. So all we're doing is we're taking a piece of the plant material and we're looking at it under a microscope. And we're looking for characteristics of the marijuana plants.

00:21:38:04 I had spoken a lot about the glandular hairs that secrete the resin. And we see these when we look at the plant material under the microscope. What we're actually looking for is something called a cystolithic hair. Now, there are other plants that contain these types of hairs on them. But all marijuana contains them. So therefore, it's an important part of our analysis. Because if we don't see them, then it can't be marijuana.

00:22:08:17 The second part of our analysis is something called a ducanoid Levine test. And this is just a color test. So we take a piece of plant material. And we perform this color test. And if there is a THC and cannabinoids present, then we're going to see a blue violet color change like what I have here in this photo.

00:22:32:21 The third and final part of the analysis is something called a separation technique. And what we use this for is to identify the THC present in the plants. So I have here two different types of the separation techniques that we can conduct. One is called gas chromatography, mass spectrometry. And the second one is called thin layer chromatography.

00:22:58:23 And this is two pictures of the data that result from these two tests. Now, they obviously look very different. But the result is the same, that from both of these we can identify the THC.

00:23:20:24 So I had mentioned going through the analysis ... or I'm sorry, the evidence that's submitted to the laboratory, that we get plant material. But occasionally, we also get marijuana seeds. And with marijuana seeds, we can't conduct our microscopic examination. And we can't conduct the ducanoid Levine test,

right? Because there's no plant material there for us to analyze.

00:23:50:14 So marijuana seeds are listed under schedule one of the Controlled Substances Act. And what it says is all parts of the cannabis sativa L, whether growing or not, and the seeds thereof are controlled under schedule one.

00:24:04:20 However, it does not include the sterilized seed of such a plant which is incapable of germination. So what that means is we have to prove that the seeds can germinate. So we have to grow them. We have to grow them and then we can do our analysis.

00:24:22:02 So we start with seeds. So in this particular case, we had four seeds that we started with. And three of them actually grew. And actually, this was back in February when we had that giant snowstorm out here. and we had locked them up just in paper towels, in a little plastic container and locked them up.

00:24:47:01 And then we were out for a week and a half because of the blizzard. And when we came back, they had all sprouted these really long roots. So it didn't take a whole lot, just water and paper towels. And I didn't even touch them for that entire snowstorm.

00:25:04:05 And what we got is two of the seeds actually grew plants. So we proved that they were capable of germinating. And the photo at the bottom is what it looks like right now. So it's still alive.

00:25:22:07 Cooking with marijuana has become ... has also become very popular. Because it's a way to ingest marijuana and get the drug content without smoking it. It's often added to food products that contain a high amount of fats and oils, things that contain butters and oils.

00:25:47:15 The reason is when the marijuana plant is in a fat or an oil and it's heated, that releases the active component ... it releases the THC ... into something that's going to be readily absorbed into the bloodstream through the digestive tract.

00:26:04:27 So instead of just eating it, if that takes a lot longer and the onset isn't as rapid. So by cooking it and heating it in a fatty substance, that increases the effects of marijuana as well. There's also a lot of recipes online. There's one called the Stoner's Cookbook that has really ... I mean, it's more than cookies and brownies and chocolate and candy. I mean, it's chicken and pasta, really, really elaborate kinds of recipes. I haven't seen any of those in the lab though.

00:26:47:20 There's also synthetic preparations of THC. This is called Marinol which is an FDA approved substance that is used in the treatment for people who maybe have AIDS, epilepsy, cancer, glaucoma. It does contain a synthetic preparation of THC. It's called Marinol, and that's the name of the drug. And then the substance is called gervavinol.

00:27:21:25 These are the three dosage units that it's available in. It's available in 2.5 milligrams, 5 milligrams and 10 milligrams in about 8 millimeter in diameter soft gelatin capsules.

00:27:37:19 But there is only one FDA approved synthetic cannabinoid and that's the Marinol. However, what we've been seeing for the last year and a half to two years is absolutely not FDA approved. But they are synthetic cannabinoids in herbal smoking blends.

00:27:59:12 So for the remainder of this presentation, I'm going to be speaking about what exactly these blends are and how they're different from marijuana.

00:28:16:00 These are the packaging for Spice and K2. How many of you have heard of these Spice and K2 compounds? It's been for the last year and a half to two years very ... receiving a lot of publicity. But Spice and K2 are the brand

names of two specific type of smoking blends.

00:28:46:07 They first were seen in Germany, and then from Germany sort of spread through Europe. And then they were being sold in head shops and being sold on the Internet. Of course, anything that's on the Internet, it's a matter of time before it's around the world.

00:29:05:16 And now they're here in the United States and being sold in our head shops and being sold on the Internet. And they are very readily available. But what exactly are they? First of all, I'll tell you what they're not. They are not marijuana. There is no marijuana present in them. They are also not tobacco or any sort of tobacco products.

00:29:32:14 What they are is a mixture of different types of plants. And they are being ... I'm sorry, synthetic cannabinoids are being added to them. So this is the back of the Spice bag, the little snapshot that I have at the bottom. And I don't think you all can read it. So I'm just going to read it to you.

00:29:54:29 But the Spice Gold contains babene, blue lotus, dwarf, skull cap, Indian warrior, lion's tail, marshmallow, pink lotus, red clover, rose, Siberian, mother wart, vanilla and honey.

00:30:10:27 So as a forensic chemist, I'm not a botanist. There's no way for me to identify these plants. But that's what's listed as the ingredients on the back of the packaging. There was some speculation initially that maybe it's these plants that had the psychoactive effects that people were experiencing when they smoked these smoking blends.

00:30:38:01 But what was come to find out was that there's actually being compounds added to these plant materials. In particular, JWH018, CP47-497 homologs. And there's a lot of discussion about HU210.

00:31:00:22 I'm going to talk about those three in particular. But those three compounds ... well, the first two are sold in powder form. They're all sold in powder forms. But they're powder substances. And looking at these synthetic blends or the smoking blends under the microscope, we don't see any powder at all.

00:31:21:22 So that leads us to believe that these powders of synthetic cannabinoids are being dissolved in some sort of solution and possibly sprayed onto the plant material or somehow mixed onto the plant material.

00:31:45:13 The three compounds, the JWH018, CP47-497 and HU210, all actually have licit uses in research. They are

used to study the effect of THC actually. Because they also bind to cannabinoid receptors in the brain. And they're the same receptors that THC binds to. So that's why they exhibit the same effects as THC. Because they're actually binding to the same receptors in the brain.

00:32:23:22 And I think that Spice and K2 and Pow, these are all names that are very easy to remember. But the chemical names are kind of a little confusing. The JWH018 was first emphasized by a research chemist at Clemson named John W. Huffman. And since he was the first to synthesize it, he got to name it. So hence, the JWH from John W. Huffman.

00:32:53:09 CP47-497 homologs were first synthesized by Pfizer. And there're lots of these different compounds. They were actually synthesized by three chemists working at Pfizer in the 1980s. The last one, which is HU210, was developed in 1988 at Hebrew University and hence the HU for Hebrew University.

00:33:24:07 As for the numbers, it's kind of arbitrary. I mean, maybe they're numbered sequentially based on how many compounds they made before then. Not really sure.

00:33:37:15 Okay. So in December of 2008, a German company called THC Pharma was the first to report the

presence of JWH018 in some smoking blends. So prior to that, people thought that ... or there was a general thought that maybe the psychoactive or the hallucinogenic properties were coming from the plants themselves. But THC pharma actually identified the JWH018 in the smoking blends.

00:34:08:27 In early 2009, at two different laboratories, the University of Freiberg in Germany and the National Institute of Health Sciences in Japan, found the CP47-497-C9 homolog. At this time, Germany decided to ban all of these substances. So Germany was the first to ban them.

00:34:33:26 In early 2009, the Customs and Border Protection Laboratory reported the presence of HU210 in trace amounts in some of the Spice blends. Now, this was important because HU210 is the only substance of the synthetic cannabinoids that is currently controlled.

00:34:59:02 So I'm not going to get too much into chemistry. But there's a lot of questions about why is the HU210 controlled? And are they structurally similar to THC? So I think I came up with a good way to show you why they are not structurally similar and why HU210 is.

00:35:22:09 So this is the structure of Delta 9 THC. And there are three six-sided rings. And I labeled them one, two and three on the structure. This is the structure of JWH018.

And I didn't even know where to begin to put the one, two and three. It does have rings. But none of them together ... are together. And it's a very different looking chemical compound.

00:35:51:05 This is the CP47-497-C8 Homolog. And it does have two of those six-sided rings. But it's completely missing number two. So also not structurally similar. Just to mention, that C8 at the end means that there's eight carbons. So you see that thing that looks like a tail? That's actually a tail of eight carbons on the end. Which is why it's called the C8 homolog.

00:36:22:09 And then this is HU210. Just sort of looking at them quickly, they do look somewhat similar. And they do have the three six-sided rings and the carbons at the end. And that's why HU210 is controlled. Because it has or falls under schedule one of the CSA. Because it is structurally similar to THC and it also has very similar psychoactive effects.

00:36:54:19 So HU210 is a controlled one ... or schedule one controlled substance. And the other synthetic cannabinoids ... I've only been mentioning two. But there's many, many other ones that can be present. They are not controlled under the Controlled Substances Act currently.

00:37:13:07 Kansas, in March of 2010, was actually the first to control or ban these substances. Following Kansas, Kentucky and Missouri and most recently Georgia have also now controlled these substances.

00:37:32:16 Okay. So part of my question as a forensic chemist is, is it different from marijuana? And how can I tell them apart? Am I going to get the same results on my analysis? And on the left here, I have a photograph of the marijuana plant. And then on the right, I have a photo of Spice Gold. And looking at them, it's sort of hard to tell in the photograph. But they look very different.

00:37:59:20 First of all, the Spice Gold is very light and sort of a fluffy kind of material. Also, the marijuana is a green brown leafy plant material. These are pictures of buds. And some of them are a little broken up. But you can still make out the leaf structure in the buds.

00:38:21:19 In the Spice Gold, it's very inconsistent. It's not the same throughout. Because it's made up of so many different plant materials, it's not the same. Because marijuana is just marijuana. But the synthetic blends or the herbal blends are made up of lots of different components.

00:38:42:07 Under the microscope, they look even more different, okay? And there is one thing that was

significantly striking to me when I first looked at them. And that was that the marijuana is green. It's more of a green brown plant material. It's kind of hard to make out the plant material in this photo.

00:39:07:12 But the Spice Gold just looked like hairs attached to stems to me. There's really no plant material that's present. And so the first part of my analysis gave me the indication that there is just there's nothing that is similar between the synthetic cannabinoids and marijuana.

00:39:29:05 The second part of my analysis, which is the ducanoid Levine test, and we talked about that it gives me a purple color change with the marijuana. This is the result of the CP47-497 homolog. And gave me absolutely no color change at all. So again, there's no way using traditional forensic analysis that we're going to mis-identify synthetic cannabinoids with marijuana.

07:39:58:08 So I'd like to just show you some of the different blends and what they look like. Some of the packaging that we've seen. We're currently doing some research in our laboratory on different blends and trying to identify what they contain, the different cannabinoids that are present in them.

00:40:13:15 So this is the Spice. Now, Spice is a brand.

And there's different products within the Spice brand. There's spice gold, spice diamond, genie, Yucatan fire, and then the original spice. And again, the photo of the herbal blend.

00:40:38:00 Now, of course, these blends are being smoked and they are being abused. But on the packaging and in the head shops and on the Internet they're being marketed as an incense blend. So the back of the packaging reads spice is an exotic incense blend that releases a rich aroma when burned. Enjoy the enchanting aroma of spice. Not for human consumption. Keep out of the reach of children. But they are, of course, being used for human consumption.

00:41:10:09 This is K2. And K2 comes in lots of different flavors, although, it's an incense. And I guess you're not supposed to taste it. And this blend just happens to be watermelon. But it comes in mango and orange, raspberry, banana, different flavors.

00:41:32:03 And the plant material itself looks very different from the spice blend. The spice blend was still kind of a green brown plant material. But the K2 has yellow flowers and purple flowers and visually looks very different.

00:41:49:09 Some of the other blends are ... one other is swagger. And this one is in a grape flavor. And the blends

on this one are different from the spice and the K2 as well. This one contains liverwort, demiona, leionitis, blue lotus, red clover and again vanilla and honey.

00:42:13:18 These are just some more photos of different types of packaging. We've got black mamba against spice diamond. There's one called pulse and then one called Pow. So in our laboratory, we've been looking at these different spice blends and trying to identify which of the synthetic cannabinoids they contain.

00:42:43:05 And we're looking for specific ones. And what we've identified is that blends are ... some blends have contained JWH018, the 073 and 250 and then the CP compounds, CP47-497-C8 homolog, and CP318. We have not yet identified any samples that contain HU210.

00:43:08:15 So in addition to the synthetic cannabinoids, we've also identified other compounds present, the ethyl vanillin which may be coming from the sample that contained vanilla. Remember they had ingredients of vanilla and honey, vitamin E, caffeine and menthol. Now, some of the blends that are more spicy I guess have a higher amount of menthol than the others. Does anybody have any questions?

00:44:04:11 Q: On that prior slide, you identified a bunch of cannabinoids. Are those all actual chemicals found

in marijuana?

00:44:12:10 MS. JILL HEAD: None of them are found in marijuana.

00:44:15:24 Q: All right. So they're just analogs.

00:44:15:23 MS. JILL HEAD: Right. These are synthetic cannabinoids. And so they've all been made in a laboratory. None of them are naturally occurring in marijuana or other plant materials.

00:44:32:07 Q: Well, I'm just wondering about that terminology. Because cannabinoid means, doesn't it? A chemical that's uniquely found in marijuana plant? So they're really analogs, synthetic analogs, to cannabinoids. Isn't that more accurate?

00:44:44:05 MS. JILL HEAD: I would agree. I would agree.

00:44:48:03 Q: And the same with HU, whatever the number was.

00:44:51:12 MS. JILL HEAD: The HU210.

00:44:53:00 Q: Because you don't list that on the list there. But I just want to confirm that also. It's not found

in ...

00:44:57:12 MS. JILL HEAD: Correct. The HU210 is also not found naturally in marijuana. None of them are.

00:45:10:23 Q: I have a question. Since early you mentioned the majority of those herbal blend and the synthetic cannabinoids, sprayed it on the plant material. Are you able to see any other type of carry[phon.] material like this type of synthetic material, spray it on blotter paper, similar like LSD or dot, things of that sort?

00:45:35:05 MS. JILL HEAD: Well, it's a speculation. I don't know for certain that they're being sprayed on the plant material. Now, these synthetic cannabinoids or analogs are sold commercially. So I would think that it may be possible to come across them either in their powder form or on some other type of material, like maybe blotter paper if it's being added to a liquid and dissolved. But I haven't heard of that being done. And I haven't seen ... I haven't seen that.

00:46:14:29 Q: Another question is about did you try to burn this type of incense and see whether they have a similar odor or characteristic of like marijuana? Is it possible that the canine can detect this type of herbal material? They can be trained?

00:46:31:05 MS. JILL HEAD: I did read a reference article about drug detection by canines. And I believe that a canine did detect the blend. But it was a much weaker response than with marijuana from the dog. And then there's been other dogs that didn't hit at all.

00:46:59:03 The first part of your question? Oh, burning it. We haven't burned it, no. But they do have a very strong smell. When you first open the packaging, I mean, the K2 watermelon smells very fruity. It smells like watermelon. And the blends with menthol and spice do very much smell like menthol. But we haven't burned it to see what happens. That's a good question.

00:47:28:18 Q: Cameron Statistical Services. I'm familiar with the marijuana program in Mississippi. I've noted that rise in purity over the last twenty, thirty years. And it is quite striking, as you pointed out. I wondered ... and I should probably ask them.

00:47:49:25 I haven't asked them as myself. I don't know if you know whether that ... some of that purity increase might actually be attributable to the selection process, the modality of preparation. So that the people that are producing because of market pressure, not because of necessarily changes in the horticulture.

00:48:03:01 They're changing ... they're becoming more selective about the portions of the plant, the bud and whatnot, that contain the THC. Such that the product being delivered might be coming from a plant that is not significantly more THC intensive, but that the packaging is more selective. Do you know anything about that?

00:48:17:10 MS. JILL HEAD: Yeah, the potency project looks at ... well, first of all, they get samples delivered by all of the DEA laboratories. And I had it on a slide, but I don't believe I actually mentioned that the highest to date amount of THC present or THC detected is 37.2 percent. Which was actually submitted from DEA's southwest laboratory.

00:48:43:26 Now, in addition to the DEA laboratory, state and local laboratories are also submitting samples. And what that does is because DEA handles usually much larger seizures, which maybe the plants were grown in a more sophisticated operation which could sort of skew the results.

00:49:06:12 We now have more of representative sampling because there are smaller seizures being included. Now, as far as the parts of the plants, they measure the different parts of the plant as well. So when they characterize the say ten percent THC in their report which most of them are available online I believe.

00:49:30:18 But in their report, they do designate whether it's cannabis or hash or hash oil. And then whether it's ditch weed. So there are some designations or some separation in their data. But as far as the selection process by law enforcement or by the laboratories, I'm not really sure of the answer to that particular question.

00:50:00:24 Q: I have two questions. I've heard potpourri mentioned a lot ... I have teenage children ... really kind of interchangeably with K2 and spice. Is it actually interchangeable? Or is it a different substance? And then I have a second question as well.

00:50:18:00 MS. JILL HEAD: Is the potpourri a different substance? Or spice and K2?

00:50:21:06 Q: I've heard them ... potpourri used interchangeably with K2 and spice in the same conversation, same kind of dialogue. So I'm wondering is it the same stuff and it's just under a different name?

00:50:35:04 MS. JILL HEAD: It's the same.

00:50:38:06 Q: Because I don't know everybody knows potpourri too.

00:50:38:22 MS. JILL HEAD: The blends are mixtures of plants that are very aromatic. And maybe that's why they're being called potpourri. But it's all the same substances. And even though the spice in K2 and Pow and Swagger all contain different herbal blends and they may contain different synthetic components, they're all still the same thing. They contain different ... specifically different types of synthetic cannabinoids in different plants. But it's still a synthetic, psychoactive material being added to mixtures of plants.

00:51:25:19 Q: And I know that kids think that this is a safe drug.

00:51:28:05 MS. JILL HEAD: Right.

00:51:29:21 Q: Because it's not scheduled and whatnot. Do we know how to tell them why we're seeing the psychotic and really aggressive and hallucinogenic type differences that we see with K2 and spice, potpourri, versus just your average cannabis user?

00:51:48:13 MS. JILL HEAD: Well, the thing about marijuana is that there's only so much THC that a plant can produce naturally. Now, in the herbal blends, there's no control over how much synthetic component is added to it. And so when they ... and there's no quality control of these

substances at all.

00:52:15:25 So just because they're used to getting the same thing every time, maybe they're only using spice golds, that's not to say that four months from now, maybe they added twice as much. And so, it is very dangerous. And also, there has been some research conducted. Although not ... I know that there's still a lot of research being conducted on the potency of synthetic cannabinoids.

00:52:49:06 And some of them are ten to forty times more active than THC is. So even though it's a small amount, they could be getting a much stronger psychoactive effect. Because, (1) the synthetic cannabinoids are more potent on their own. So that means it takes less to get the same effect. And then there's no quality control. There's no way to say exactly how much material will be present on them.

00:53:28:15 Q: I'm with the Virginia State Police. And I was asked by our superintendent to maybe write something up to try and give the legislators whether we need to ban these substances. And I know some other states have done it. But on your website, you only have four of I guess the cannabinoids listed. And I don't have these others.

00:53:48:00 I guess the concern for our legal department is that if we don't list all the chemicals possible when we

write the laws, they'll slip something else in and then that will be legal. And that's not what we want. So I wanted your opinion. Do you think these if I get this list is enough to cover to add to the laws? Or how do we add something that's ever changing?

00:54:15:29 MS. JILL HEAD: Well, let me just put this back up. Please contact me and I'd be more than happy to talk about that with you. But in my opinion, drug use is constantly evolving. And so especially with synthetic materials. I mean, these are things that are not found naturally.

00:54:40:29 So they are also very easily changed. So we're talking about lots of analogs that can be produced. So limiting it to a set group will become in my opinion very outdated very quickly. Because as soon as they're produced, as soon as they're controlled, it only takes so much to change a chemical structure for them to not be controlled anymore. And that's how I feel that this will progress, that they'll just be changed constantly. But please contact me.

00:55:27:05 MS. CATIE DREW: If you have no more questions, I'd like to thank Ms. Jill Head very much for coming to our lecture series. [applause] This is the final lecture for our spring series. Stay tuned in the fall where we will be highlighting DEA in Afghanistan. Thank you very

much. [the rest of the recording is off mike conversation
and not audible]

(END OF TRANSCRIPT)

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