DEA Museum Lecture Series
Deadly Chemistry: The Rise of Synthetic Drugs
Tuesday, March 13, 2012 11 AM

00:00:27 Sean Fearns: Ladies and gentlemen, good morning, and welcome on behalf of all of us here on the DEA Museum Staff, and, a special welcome, too, for those joining us on the World Wide Web.-- my name is Sean Fearns. As we kick off this morning the DEA Museum's Spring Lecture Series, as a courtesy to your fellow audience members, as well as to our esteemed panelists, if you wouldn't mind making sure that either your cell phones, BlackBerrys, iPhones, pagers, and whatnot are in silent mode, we would appreciate that.

00:00:54 Today our topic is another one ripped from the headlines and presented with some history and scientific context: Synthetic Drugs. They have innocuous names like K2, Spice, and Bath Salts, but they are far from harmless. Chemical cousins, perhaps, of natural stimulants and depressants. Where did they come from? What do they do to your body and your brain? How do we address them from both a law enforcement as well as a prevention and policy standpoint?

00:01:26 We will touch on all of these issues with an outstanding panel of experts this morning. First up will be Dr. Ruben Baler. Dr. Baler received his Ph.D. in Microbiology and Molecular Biology from the University of Miami. As a post-doc and Principal Investigator, he worked on the "Genetics of the Biological Clock" at the National Institute of Child Health and Human Development, and at the National Institute on Mental Health. In 2004 he joined the National Institute on Drug Abuse as a health scientist.

00:02:00 Dr. Baler has focused on writing about the neuroscience of addiction, presenting at community outreach events, and teaching teenagers and parents about the brain and the consequences of drug abuse. Dr. Baler is going to introduce some of

the designer molecules, the synthetic drugs making headlines recently, and then put them in context with other drugs of abuse in terms of their neuro-pharmacology and possible health effects.

00:02:28 Second, Special Agent Lisa Pryor. Special Agent Pryor began her career with DEA in 2003. She was assigned to the Washington Field Division Mobile Enforcement Team until 2006, then transferred to the Financial Investigations group from 2006 to 2008. Then to the Diversion group until 2009, and in 2009, the newly formed Tactical Diversions Squad, where in 2011 she was promoted to the group's supervisor of that unit.

00:02:59 Special Agent Pryor earned a Bachelor's Degree in Economics from the College of William and Mary in 1990, and a Juris Doctorate Degree from George Mason School of Law in 1993. She became a member of the Florida Bar in February of 1998. Our third panelist is Staff Coordinator Robert Bell, who received a Bachelor's Degree in Criminal Justice Sciences from Illinois State University, beginning his law enforcement career as a police officer with the St. Charles Illinois Police Department in 1990.

00:03:32 In 1993, Staff Coordinator Bell was assigned to an Illinois State Police Drug Task Force where he served until being hired by DEA out of the Chicago Field Division in 1995. Staff Coordinator Bell's first field assignment was as a Special Agent in the Detroit Field Division. Then in 2006 he was promoted to Group Supervisor in the Milwaukee District Office where he supervised a task force group comprised of DEA agents and a variety of state and local officers.

00:04:03 Last year, Staff Coordinator Bell rotated into DEA Headquarters where he is currently assigned to the Synthetic Drugs and Chemicals section, specifically focused on synthetic designer drug issue. If I could ask you to please hold your questions until the end when we have heard from all three panelists and then we will have some time for the panelists to field a few questions. And we have microphones in the aisles that

they will pass you, so we can both hear your question and have it for the transcript, and for those joining and listening in on the Web.

00:04:33 Ladies and gentlemen, please join me in welcoming our first speaker, Dr. Baler. Thank you.

Dr. Ruben Baler: Is this working? Thank you, Sean. Thank you, Katie, for the invitation. It's a real pleasure to be here. So the first thing I want to do really is to provide (Technical Difficulty). Is it working? Hello? (Technical Difficulty).

00:05:24 Can you turn the one on the desk off? Hello? That's better. Okay, so in talking about synthetic drugs of abuse, what I usually like to do is provide some context so we understand the entire landscape of where these things come from and where is the trajectory -- where can we expect them to go in the future. So the way I developed sort of an understanding, or trying to come up with a way to visualize the map of the landscape of drugs of abuse in general is to go through the following steps.

00:06:01 And you will be the judges of whether or not this way of looking at drugs is useful at all. I begin by listing the drugs of abuse -- substances of abuse -- psychoactive substances in this sort of schedule one through schedule five list, going by color. And this, obviously, is a partial list, just to give you a flavor of the kind of landscape and context that I like to provide.

00:06:26 We list all the drugs in this vertical axis. Then we provide some sort of a context for what happens in the brain. The brain has these pathways of communication between one circuit and the other that provide really the infrastructure for communication and information processing, and ultimately behaviors in the brain. And these pathways really are mediated by different types of neurotransmitters, going from dopamine, serotonin, and glutamine, the major excitatory amino acid in the brain, GABA Inhibitor, one of the opiate receptors, mu cappa, cannabinoid receptors, [unintelligible] receptors, and [unintelligible] receptors.

00:07:04 And this, again, is just a partial list of the pathways of communications that we have in our brains. We can fix that? No. Okay, I won't move. Next we will shift the drugs of abuse to their pharmacological targets in the brain. Some of them will fall, like marijuana will fall there in the cannabinoid receptor spot. We have the GHB, GABA. We have alcohol, the GABA, and so forth.

00:07:33 Next we can change the prevalence or the impact of each of these drugs and changing the diameter of these spots, trying to get some kind of even vague idea of where is the prevalence or the impact of the rate of use in the population. So, we have caffeine, one of the mostly adhered to substances. Most people, I would say, use caffeine on a regular basis. Then we have, of course, alcohol. We have tobacco. We have marijuana, and so forth.

00:08:00 So, the picture is getting more complicated and more nuanced. Then we start making connections within some of these drugs. For example, we know the connections between alcohol and tobacco, how they are used socially. Together they are very powerful cues that in use one to use both in social context. And there are a lot of research studies going on recently that show differentials are emerging more and more frequently.

00:08:26 For example, a very recent paper has made a very nice connection between the use of tobacco in young people and the sensitization of the priming of the brain for the behavioral effects of cocaine, suggesting for the first time -- giving molecular basis to the idea that tobacco really is a major gateway drug to the use of what we would call illicit or harder drugs. It is a paper that just came out. So, what we are getting from drawing these comparisons, listing drugs in this way, in this multidimensional matrix is a much more complex, much more nuanced look at the psychoactive substances, both licit and illicit.

00:09:06 Which really reflects the complexity of the brain. And another thing that comes out of this picture is really all of these empty spaces that become very apparent when you highlight each drug in this way. These empty spaces, of course, have a yin/yang nature to them. On one hand, these are the spaces where investigators will use to develop drugs that can become medications by targeting, by looking similar to drugs of abuse or compounds that interact with these pathways.

00:09:41 All of these empty spaces provide options or opportunities for developing medications that can manipulate the way the brain communicates for therapeutic purposes. Of course, the same, the yang, the other side of the coin is that all of these compounds, all of these empty spaces here also provide the same type of substrate for the development of drugs with psychoactive properties that have an abuse liability.

00:10:07 So, this is the landscape that tends to fill in that negative space in the picture that I showed you before. And this is, of course, the landscape of research chemicals, which is filled with molecules that can interact -- as agonist, antagonist, partial agonist -- with those pharmacological pathways that are used by neurotransmitters in the brain to communicate, to send communication information from one part to another.

00:10:34 For example, there is BZP and MPPP. These are typical research chemicals that have a long history in the medical literature. And really, kind of part of the [unintelligible], they show us the path of how some of these research chemicals find their way into the synthetic drug of abuse landscape. For example, MPPP, or Methyl-phenyl-propionoxypiperidine is an opioid analgesic that was developed many, many years ago by Hoffman-La Roche.

00:11:05 And somewhat less potent than morphine. But it is no longer in clinical use, that is why it is now Schedule 1. But it is still illegally manufactured for recreational purposes. Similarly BZP is an early molecule, I think 1930s. Was developed because of

its antihelminitic properties. Was used to treat worm infections. And it was abandoned because of the side effects, very profound side effects.

00:11:31 And it was revisited in the ‘70s as a potential antidepressant medication. Again, it was rejected due to reports of amphetamine-like effects which now produce a fertile ground for its diversion and use as an amphetamine-like drug of abuse. Of course, we are more interested in the context of this talking in the cannabinoids. For example, this is one area of very active research we don’t know that much about. And if I, of course, the cannabinoids are in the realm, in that region of the landscape of the brain that has to deal with the THC, the chemistry of THC, which is the active compound as you all know in the marijuana plant in *Cannabis sativa*.

00:12:11 And, again, that negative space in the landscape of drugs of abuse is continuously being filled by new molecules that look like THC, that have been developed for research purposes for medications developed, but can be diverted, of course, for illegal purposes.

00:12:28 These are just some of the families that fill that negative space. We are mostly interested in these CR agonist families that look similar, that resemble the THC molecule. They are closely related to the THC molecule, but with substitutions to different groups you would legally compare to different molecule that has very similar properties, sometimes even more powerful properties.

00:13:05 But we should be aware that there are other molecules in this map that don’t necessarily look like THC, but may have very similar properties that may not fall under the authority of legislation, for example. And this is something that we have to always be aware of when thinking about the best ways to go after this problem of ever emerging, more sophisticated compounds.

00:13:30 Just to quickly go through the THC process of how THC impacts those processes of information processing in the brain. Just tell you that the THC story is

somewhat different from other drugs of abuse like cocaine, for example, or stimulants in that it is a retrograde neurotransmitter. Once it is produced somewhere in the neurons of the brain, it travels back and it acts pre-synaptically in the neurons that send -- they are supposed to send -- the message.

00:14:02 So it acts here and it modifies through very complex processes that we don't need to go through. It changes sort of the electrolytes, the balance, all of these channels in the neuron, their chemistry and their electrical properties are changed in a way that will affect the communication with the postsynaptic neurons. Specifically if this is the neuron that has the THC receptor, where THC or similar compounds are bound.

00:14:28 This THC, [secreting a responsive neuron] will affect the dopamine neurons. And the dopamine will now be indirectly affected. And the levels of dopamine, which is sort of the pleasure, the reward, in neurotransmitter in the brain will be highly magnified, enhancing the reward response in this [area]. So, like the GABA which is an indirect pathway, the THC pathway also utilizes a three neuron sort of a structure to mediate its effects.

00:14:59 Now the effects are obviously mediated, and they are very complex, because THC receptors, the proteins on the neurons that bind to all of these compounds, are everywhere in the brain. They are in the hypothalamus concerning appetite and sexual behavior; the basal ganglia which is the deeper parts of the brain where there it is involved in motor control planning; and also determination and inhibition of action; the amygdala, the center of emotions, brainstem. And you can go through the list. THC can affect -- and THC-like compounds can affect -- a wide range of functions in the brain.

00:15:30 And this is why marijuana has so many broad effects. But contrary to the partial action of THC at the cannabinoid receptors, synthetic cannabinoids identified so far, like in Spice products, they have been shown to act as full agonists with increased potency, which leads to longer durations of action, and increased likelihood of adverse

effects. There is just a basic difference in the pharmacology of these products that unlike the THC, which is a partial agonist in this receptor, it has to do with the affinity with which these molecules bind and interact with the receptors.

00:16:06 The compounds, the research chemicals that we have found in Spice, so far, are more potent as you probably have heard because they are full agonists at these THC receptors. They interact with a much more potent constant of binding. The popularity of the synthetic cannabinoids can be traced to a couple of bullets really. The can induce strong cannabis-like psychoactive effects.

00:16:30 They are readily available on the internet. They are still legal in many countries. They are marketed as natural safe substances. And they are undetectable so far by conventional drug screening tests. But we know next to nothing in terms pharmacology, toxicology, and safety. And this is an area where researchers are putting a lot of effort right now trying to understand the broader effects, and the long-term effects of the abuse of these substances.

00:16:56 Nevertheless, we do know many of the adverse effects that can be predicted just from the chemistry of these compounds. The psychotic effects, having to do with anxiety, paranoia, hallucinations, sudden depression. We can definitely take peripheral effects in the gastrointestinal track, the cardiovascular effects, metabolic effects such as lowering of the potassium levels like hyperglycemia and acidosis. Autonomic effects such as fever and pupil dilation, no different from marijuana itself.

00:17:26 And we also know some reports of lethal effects. Some of them -- there were reports of coma and suicide attempts after smoking K2. There were two adolescents that died of coronary ischemia after ingestion of K2. One teen reportedly committed suicide due to extreme anxiety. And also worth mentioning is the fact that there is non-cannabinoid ingredients in the Spice that have been identified like odesmethyltramadol which is an opioid agonist, which when used in combination with katrom, as in the mixture known as Krypton, may have lethal consequences as well.

00:17:57 So it is not just Spice as you are all aware of that contains THC-like compounds. But there is a whole range of components in these [unintelligible] mixtures that need to be investigated as well, and are probably compounding the ability of our scientists to really identify, to correlate active ingredients with behavioral and health effects.

00:18:20 So the second one that I just want to pinpoint, because we don't have much time to go through all of these research chemicals., just the beta-ketones which are related to cathinone and belong to the family of MDMA, ecstasies and amphetamines. These are, of course, the Bath Salts, the key active ingredients of which are mephedrone, mephylone, and MDPV. Now all of these really relate to cathinone derivatives which have this genetic structure. The Rs stand for the substitute of moieties or species in the basic cathinone structure.

00:18:57 Cathinone-4 is the principal active constituent of khat, the khat plant, and is responsible for the stimulant amphetamine-like effects. That is why it is sometimes called "natural amphetamine." Again, going back to the idea of this vast negative space in the landscape of drugs as they impact different receptors in the brain, we have a very long list of chemical structures that are related to this family, most of which obviously came from the research literature, and they have the potential to be beneficial or compounds that can be used for therapeutic purposes or for research purposes.

00:19:32 But, also, on the other side can also be experimented with for recreational purposes, of course. Some of the ones that we are more interested in are these methcathinone, for example, which is kind of a hybrid between methamphetamine, this dimethyl group here. And the cathinone with this carboxyl group here, so this hybrid moiety. And methylone related to MDMA and MDPV, which is another derivative of this compound.

00:20:04 Just very quickly go through the pharmacology and what happens in the cell when it is exposed to amphetamine. Amphetamine, different from cocaine or from THC. The effects of amphetamine on a neuron response and synaptic interactions really happen differently at different doses. When we are talking about low doses of amphetamines, we know that amphetamines can act on catecholaminergic synapses.

00:20:29 Like cocaine, for example, they can block the transporter which is the reuptake molecule that squelches this response of the neurotransmitter, bringing the neurotransmitters back into the pre-synaptic neurons, so to shut off the response. So, amphetamines at low doses like cocaine can shut off this turnover, this shuttling back of the neurotransmitter, whether it is dopamine, noradrenaline, or serotonin.

00:20:56 And by blocking this reuptake, they can significantly increase, exaggerate the monoamine levels in the synaptic space, whether it be dopamine, norepinephrine, or serotonin. Now, note that at low doses, these vesicles that are filled with neurotransmitters are not affected by the amphetamine-like molecules. That happens when you get to higher concentrations of amphetamines. In addition to the blocking of the reuptake mechanisms, we now have -- the stimulants have a direct impact on the vesicles which are empty, are damaged, and they sort of burst into the synaptic space, emptying their contents there.

00:21:34 And further increasing the level of dopamine, norepinephrine, or serotonin, depending on the specific pharmacological properties of the compound. So, if we look at just two -- mephedrone and methylone, and I am just about to finish here -- what are their pharmacological properties? And this is an animal system. If we look at what happens to dopamine or serotonin when you apply these drugs, either mephedrone or methylone in these cells, in these culture systems, in this animal, sorry.

00:22:07 So, at low doses, we will see an increase in dopamine. And at higher doses we see a further increase in dopamine. But if you compare it to what happens to the serotonin, the increases -- look at the scales here -- are much bigger. Both

mephedrone and methylone have a significantly more powerful effect on the serotonin release than on dopamine. And this correlates with their effects on behavior and measurements of local motor activity.

00:22:35 So, in terms of mephedrone and methylone, these are two drugs that look more like MDMA than like amphetamine. And this has to do with the types of catecholaminergic receptors that they interact with, and transporters that they interact with.

00:22:50 In terms of MDPV toxicology, there is a case report that I would just like to leave here just to finish. There was this 25-year-old man who injected Bath Salts and developed severe agitation -- this is a recent paper -- hyperthermia, tachycardia. In spite of aggressive dialysis he progressed to multi-organ system failure due to rhabdomyolysis, cardiac injury, hepatic injury, and renal failure.

00:23:10 He ultimately recovered after prolonged hospital course. And a comprehensive toxicological test revealed MDPV as the only chemical substance. So, of course, we can only touch upon very few of these drugs. There is, as you saw, an infinite array that is a huge space for molecules that need to be very carefully looked at for both the positive and negative aspects; many of these, as I mentioned, compounds have research and therapeutic potential.

00:23:36 So it is a very fine line that we are walking here trying to take full advantage of the pharmacological properties of the compounds that fill out this space, while preventing their divergence and abuse by people who would like to experiment with whatever comes their way. I don’t want to take any more time. I will stop here, and we are going to take questions later on. Thank you very much for your attention.

00:24:07 Sean Fearns: Thank you Dr. Baler. Please now welcome Group Supervisor Lisa Pryor.

Lisa Pryor: Good morning. As just mentioned, I am the group supervisor of the tactical diversion squad in the Washington, DC office.

00:24:32 During my portion of this panel I am going to talk about Bath Salts and Spice from an investigative perspective. In my group, there is no lack of leads related to the diversion and abuse of pharmaceutical drugs. And we have been confronted here lately with the ever increasing abuse of these two designer drugs. We are very, very ultra, ultra busy, and sometimes we run around like our head is on fire, but we make it work.

00:25:08 What I am going to do is try to share some information that we received in the field regarding these two drugs. And I would like to start out with a bit of a shocking story regarding Bath Salts. This is the arm of a 34-year-old woman who walked into a Louisiana emergency room in August of 2011 because her right arm was swollen and she had a puncture wound.

00:25:34 The doctors gave her a shot of antibiotics and that helped her with the swelling, but they were puzzled because two days later she still had the infection. And she did eventually admit that she had injected Bath Salts at a party the night before she came to the emergency room. So, they decided they had to cut open her arm and operate.

00:25:57 And I did have all the screenshots of the operation. I didn't want to gross you guys out before lunch, because this is pretty bad. But what happened was they cut open her arm and all they could find was dead flesh and muscle. And then they had to end up actually cutting further up her arm in order to get to healthy tissue. And what freaked me out about the whole report was they actually could see the flesh and muscle dying before their eyes. She had contracted a flesh-eating virus from the injection.

00:26:28 They didn't know whether or not she actually contracted it from the needle or the Bath Salts, but they were concerned, and I guess rightly so, because this type of

thing could increase in terms of this happening, if you are going to inject something like Bath Salts into your body. So, it is really not…it is a bad way to get a high from injecting something like Bath Salts into your body.

00:27:02 Bath Salts are also known as “Research Chemicals.” It is also known as “Plant Food.” It has been marketed as all three of these things, but it seems to be more popularly known as Bath Salts. And as Dr. Baler stated, it is a synthetic cathinone. It is typically snorted, smoked or injected. And it has similar effects as he stated before as cocaine and methamphetamine, and MDMA -- ecstasy.

00:27:33 Users of Bath Salts have said that “good trips” on this stuff brings a euphoric feeling and it tapers off into a type of stimulation. “Bad trips” bring a whole host of negative side effects. And you can get on the internet and find all types of these negative side effects. I’m not sure why people would -- it seems to me that the negative effects outweigh the good trips.

00:27:56 But seizures, hallucinations, you have chest pains -- all types of negative side effects from taking this stuff. There are a number of stories. If you get on the Internet and look up some of the things that people are saying on blogs about using Bath Salts, the bad trips. Some of the examples include a 21-year old Louisiana man who slashed his neck and shot himself after using Bath Salts. A Missouri man who fired shots inside his home because he was hearing things in his walls, because he was having hallucinations.

00:28:33 And a Kentucky woman abandoned her 2-year-old son along an interstate after hallucinating that he was a demon. So, there are a whole host of just bad stories related to Bath Salts. And it seems to me that the bad stories outweigh the good.

00:28:52 In 2010, poison centers around the United States received about 302 calls concerning Bath Salts. And in October 2011, poison centers fielded about 5,625 Bath Salts calls. And that is 18 times the amounts received in all of 2010. It is starting to

be brought here to the US from Asia -- China and India -- and they also have been used several years in Europe. But they actually have legislation to ban this drug.

00:28:24 As stated by Dr. Baler, the most common chemicals found in Bath Salts are MDPV, methylone and mephedrone. It's typically sold in 250 to 500mg packages. The packages are sold for about $25 a package; $25 to $50 a package. And there is a whole host of names that Bath Salts go by. You might have seen some of this. If you look up on the Internet, there are tons of names that this stuff is marketed under.

00:29:55 In my group, we are most familiar with -- we have been able to actually be familiar with a few of the names of the Bath Salts. "White Girl," and we were able to actually talk to in our investigations and find out the best way, or not the best way, but how these things are used to get the best high. "White Girl" is good for cooking like "Crack" cocaine and smoking because it is coarse.

00:30:23 "Eight Ballz " is also a good brand to cook like "Crack" cocaine. "Tranquility" is better if smoked in powder form. And "NRG" is not a good brand to cook, and apparently most people put it in their mouths because it tastes like vanilla. Now they come in a lot of different packaging. You might have the fancy packaging like up on the upper left there. You might have the street baggie like on the right. Or you might get an industrious drug dealer who wants to repackage the drug and make their own labels and sell it that way.

00:31:00 Either way you are going to have on a lot of the packaging the words "Not for human consumption" on the package. And, drug dealers do this so they can try to skirt the Federal Analog Act which is section 21 U.S.C. Section 813. And that section allows chemicals that are substantially similar to a controlled substance in Schedule 1 or Schedule 2 to be treated for the purpose of any federal law as a Schedule 1 drug if it is intended for human consumption.

00:31:35 So, what they are doing is trying to -- if they think that they can put “Not for human consumption” on their packages, then they are in the clear with regard to the Federal Analog Act. That is not true. A lot of the times you will find that depending on how it is purchased -- if you get it over the internet or if you do a face-to-face deal with a dealer, they will, if you get a good undercover in, they will actually tell you how to ingest the drugs to get the best high. So then you have that whole “Not for human consumption” doesn’t even work anymore.

00:32:10 On October 21 Administrator Leonhart issued an order to temporarily place mephedrone, MDPV, and methylone into Schedule 1 of the Controlled Substances Act. It makes it illegal for dealers to continue to manufacture, distribute, and possess Bath Salts containing these chemicals.

Herbal Incense, or Spice as what we know it by.

00:32:36 Spice, which is a synthetic cannabinoid as explained by Dr. Baler, is a mixture of herbs and spices that resemble potpourri. They are sprayed with a chemical that is similar to THC, which is the psychoactive ingredient in marijuana. It is typically smoked. And it is also used to get that euphoric feeling like you get with Bath Salts.

00:33:00 The adverse effects include the same -- basically the same effects that you would get on Bath Salts which is that anxiety, the panic attacks, the paranoia, agitation, all the same things that Bath Salts provide. In November of 2008, the Customs and Border Protection Agency first became aware that Spice was infiltrating the United States. Poison control centers nationwide received fewer than 15 calls regarding Spice and similar products in 2009.

00:33:29 And in 2011, poison centers received over 5,700 calls related to Spice on October 31 of that year. So you can see the increase of the use. JWH-018, and if you look on the Internet you will see it is called Jdub. This is the most common chemical

found in Spice. It is typically sold in 3-5 gram packages. It costs about $30 to $50 a package. And it has, just like Bath Salts, a whole host of names.

00:34:00 Spice is actually a brand name. K2. Wicked X. Head Trip. Zero Gravity. Just like Bath Salts, dealers of Spice try to use that “Not for human consumption” trick as well. On March 1, 2011, DEA temporarily placed five chemical components found in herbal incense into Schedule 1 of the CSA. And those are the five.

00:34:33 Now these can be purchased from, Bath Salts and Spice -- brick and mortar establishments that cater to drug users like head shops, convenience stores, gas stations. And they also have been offered over the internet as such sites at AliBaba.com, Amazon.com, and Ebay.com. And the Ebay, Amazon, and AliBaba, they have been monitoring their sites and pulling it basically because of the issues that these drugs have caused. But what we have found is, or what we have heard is -- and I haven’t seen this -- is that drug dealers are now going to be using barcodes to offer these products.

00:35:09 They are going to be -- instead of putting the pictures, because it used to be that if you pulled it up on the Internet you could see the picture and you could order it. And I haven’t seen this yet. I don’t know how they are going to do it, but apparently they are going to be using barcodes to offer these drugs instead of putting the pictures out there. And they think this will be -- they can hide the fact that they are selling Spice and Bath Salts and they won’t be pulled from the sites.

00:35:36 There are many investigative efforts being conducted regarding these two drugs on a federal, state, and local levels. There were two labs found in Maryland and Virginia that were capable of producing large amounts of Spice. And in the DEA New York Field Division, a Bath Salts Task Force was formed. And it has been successful in seizing a large amount of Bath Salts and arresting a major distributor of the drug.

00:35:59 Traffickers will continually make adjustments because they make chemical changes so it will stay -- they can actually offer the drug and keep it legal. But as we know, harmless does not mean safe, and so we have to really continue investigating the stuff and get stricter legislation, educate our children so they can stay away from these drugs. And that's it for me.

00:36:27 Sean Fearns: Thank you, Special Agent Pryor. And now I would like to welcome up Staff Coordinator Robert Bell.

Robert Bell: I was feeling semi okay about my bio until I heard the other two, but I guess we all have to do what we can with what we have got. Good morning. I appreciate the opportunity to speak about the synthetic designer abuse issue facing teenagers and young adults today.

00:36:55 Dr. Baler and GS Pryor did a great job addressing the designer drug issue from scientific and law enforcement perspectives. I hope to provide an overview of the issue discussing why designer drugs are of a serious concern: where they are made; difficulties they pose to law enforcement; resistance to controls; and the status of efforts to control. Synthetic drug trafficking and abuse are so concerning because many of these drugs are extremely powerful, unpredictable, and dangerous.

00:37:25 The people distributing and selling designer drugs are targeting teenagers and young adults as customers. The abuse of designer drugs has resulted in violent acts and a log jam of emergency room admissions for organ failure, seizures, drug-induced psychosis, and deaths, including suicide. And we don't know what the long-term health effects are. Designer drugs are, for the most part, unregulated in source countries and here in the US.

00:37:52 Synthetic cannabinoids, or as you have heard them called this morning -- Spice, K2, or Herbal Incense -- are probably the most widely abused class of synthetic designer drugs by teenagers and young adults, followed by synthetic cathinones or Bath

Salts. In excess of a decade ago, scientific researchers began developing a large number of synthetic cannabinoids and cathinones hoping they would serve legitimate medical purposes.

00:38:20 However, the scientific community pretty quickly determined that the undesirable effects caused by Spice and Bath Salts far outweighed potential medical benefits. None of these substances have been approved for human consumption. And any time someone uses uncontrolled or unregulated substances, the effects are unknown and can be very dangerous.

00:38:44 Synthetic drugs sold today are not just limited to the classes of Spice and Bath Salts. Drugs of other classes or categories have been and continue to be designed, manufactured, and sold over the internet, at retail stores, and in back alley deals. Some of the classes of synthetic designer drugs are, as you see, the cannabinoids, or Spice, K2, Herbal Incense, which tend to be smoked.

00:39:09 The Phenethylamines, which cathinones, or Bath Salts, fall under, which tend to be snorted. And then a whole host of other classes that have some classes under them, from the Phencyclidines, to Tryptamines, to Piperazines, N-Ring Systems, and Ecgonine Derivatives.

00:39:28 Adding to our concern is the prevalent abuse among kids and young adults. Results of a recent National Institute on Drug Abuse, or NIDA, study where Dr. Baler is employed showed that about 1 in 9 high school seniors, or 11%, have tried Spice. This is an alarming number, nearly on par with marijuana use among high school seniors. Where do synthetic designer drugs come from? Most of them are synthesized in East and South Asian countries with minimum or no government regulations or controls.

00:40:01 In most cases, false customs declarations are completed and drugs are smuggled into the US in bulk powder form and mislabeled packaging. The Spice

compounds are then laced on smokable plant material prior to being sealed in candy wrapper typed packaging to appear harmless and to appeal to kids. The substances are further distributed to retail businesses that market these powerful and dangerous drugs to kids and young adults as so-called legal and safe alternatives to illegal drugs.

00:40:35 The thing about Spice is, of the hundreds of possible chemical compounds or combinations, there is no consistency in purity or potency. The DEA Special Testing Laboratory has found variations in substances contained in identical retail packaging. Some synthetic cannabinoids are weaker than THC, the psychoactive compound in marijuana as we have already heard this morning. Some are as strong as THC. And some are many times stronger than THC.

00:41:02 To make matters worse, oversight, quality assurance, and scientific research are not part of the equation. The people preparing Spice for sale often hide behind the term research chemicals. However, these peddlers are not doctors, pharmacists, scientists, or academics. They are simply drug dealers who arbitrarily prepare the Spice products for marketing, smoking, and even mix and match any of the numerous compounds together.

00:41:30 In a recent unfortunate incident in South Carolina, a young man smoked a Spice product containing a mixture of several cannabinoid compounds. The concoction caused organ failure resulting in his death. And I would like to just flip through a real quick series of slides to make these points. These photographs are from a DEA case in Wisconsin. And this horse trailer is used to transport -- or was used to transport and store chemicals and supplies necessary to produce and prepare Spice products for wholesale distribution prior to their retail sale.

00:42:12 And I don’t know about you, but when I see these images, they aren’t exactly what come to mind when I think about research, and scientific study, and medical use. Maybe not what comes to mind to Dr. Baler, and not what his lab looks

like. This is a photograph of some plant material, benign plant material prior to it being laced with the actual cannabinoid drug.

00:42:36 One kilo of something called JWH-081, a cannabinoid powder. Probably fresh over from Asia. And this is the lid of a garbage can labeled AM-2201, which is an analog cannabinoid that hit the market to replace JWH-018 after it was controlled. The problem with AM-2201 is that it is perhaps 10 or 15 times stronger than JWH-018.

00:43:05 You also might be able to see that 4-MEC is written on this garbage can lid which is a cathinone. So, the question is, what drug is in this garbage can? Is it 2201, 4-MEC, others, a mix? And no one knows what will happen when they are all mixed together, how powerful they might become.

00:43:27 If Spice is bad, synthetic cathinones or Bath Salts are worse. Bath Salts are extremely powerful drugs that have stimulant and hallucinogenic effects. The chemists and pharmacologists of DEA's Drug and Chemical Evaluation Section tell me that Bath Salts have a pedal to the metal effect on users causing strong stimulant and hallucinogenic effects, often resulting in paranoia, along with radical and violent behavior.

00:43:42 Many Bath Salt users piggy back dosages, often causing temporary drug-induced psychosis. Some of the scientific community have called Bath Salts the worst of stimulants and hallucinogens -- cocaine, methamphetamine, ecstasy and PCP.

00:44:10 Over the past three years or so, the distribution and abuse of designer drugs have spread across the US like wild fire. Much of the rapid proliferation of synthetic designer drugs can be attributed to their availability on the internet and open access at retail stores like gas stations, convenience stores, liquor stores, and smoke shops.

00:44:31 If you can just back up. This is a photograph of a retail store. The shelves at a retail smoke shop where the shelves are just packed with a variety of synthetic drugs for sale. Just walk in off the street and there they are. What is DEA doing to combat the synthetic designer drug problem? We have temporarily scheduled or controlled about five Spice compounds and three Bath Salt compounds upon concluding that they cause an imminent hazard to public safety. DEA is working to temporarily, or permanently rather, control these eight substances. However, merely controlling these eight drugs will not sufficiently address the problem from an enforcement perspective.

00:45:14 There are hundreds of possible chemical combinations of these drugs. Since 2009. US law enforcement authorities have encountered approximately 117 different drugs or compounds from seven structural classes of drugs. As you can see, trafficking and abuse of synthetics designer drugs is a very difficult issue. But at the same time, it is fairly easy to understand.

00:45:37 This slide shows the structure of methylone, a synthetic cathinone or Bath Salt, which is controlled. If a carbon molecule is added to methylone, then butylone is formed. And butylone is non-controlled. And you can see the red line -- that is the carbon that is added. And it is really this simple. But there lies the difficulty for law enforcement and prosecutors.

00:46:02 Short of comprehensive legislation, investigators and prosecutors must rely on the Analog Statute which is cumbersome in its current form. Therefore, a legislative remedy is being considered. The US House and Senate are keenly interested in the synthetic drug issue and are discussing multiple pieces of introduced legislation seeking to address the problem. The Department of Justice supports a legislative fix to this issue, and we remain hopeful that this legislation will pass in the coming months.

00:46:33 Passage of good legislation would be the single most important development to stem the wholesale and retail sale of synthetic designer drugs. And just

to be clear, DEA does not target children, and does not make a practice of targeting users for federal prosecution. Our enforcement efforts focus on the distributors, who exploit children and young adults for profit without regard. In light of the risk to the health and safety of teenagers and younger adults, some individuals and groups continue to voice concerns about controlling designer drugs.

00:47:06 The spirit of these concerns is not wrong, but the basis is unfounded. The expressed fear is that legitimate, scientific, and medical research cannot take place if designer drugs are prohibited as Schedule 1 controlled substances with no accepted medical uses. In reality, there is a well-established mechanism to ensure that all legitimate requests by the scientific community to research Schedule 1 controlled substances can take place.

00:47:31 And DEA has approved many Schedule 1 research registrations. As of last month, there were 581 active Schedule 1 research registrations. In fact, of the eight Spice and Bath Salt compounds that have been temporarily controlled as Schedule 1 controlled substances, DEA already has approved 41 research registrations facilitating legitimate scientific research.

00:47:57 DEA will continue to approve Schedule 1 research registrations in response to legitimate requests for legitimate scientific research of controlled substances and those prohibited in the future. Still, others have expressed concern that the passage of legislation controlling synthetic designer drugs would unduly impede commerce.

00:48:17 Our response is the DEA is not against people making a living. What we have a problem with is people making money at the expense of kids' health and safety. Thank you.

00:48:32 Sean Fearns: Thank you very much, Special Agent Bell. Let me ask Dr. Baler, Special Agent Bell, Special Agent Pryor to come back up to the podium. And

at this time we will have microphones available to ask about ten or so minutes' worth of question and answer. And, again, if you could just hold on until the microphone gets to you before you ask your question, and make sure you identify who you would like to ask the question to.

00:49:15 Unidentified Audience Member: This is [unintelligible] with the Office of Diversion Control. My question is for Robert Bell. Since the majority of those powder materials, synthetic cannabinoids as well as the cathinone is imported from foreign country to the United States, so is there currently any ongoing collaboration with other countries trying to stop the importation or smuggling of those chemicals into the United States?

00:49:45 Robert Bell: Yes. there is some collaboration with other countries. The United Nations, the INCB, as well as some of the European nations specifically. Probably the first thing we need to do is take care of business here in our country though and pass good legislation so that we are able to enforce these products here. And then continue to work with some of the countries where the products are made to try to effect regulations and controls there at some point.

00:50:15 So that is slowly but surely -- the United Nations, INCB, is trying to get together treaties and agreements amongst a number of countries including some of the countries where they are manufactured to introduce controls.

00:50:39 Unidentified Audience Member: I believe we first saw the emergence of synthetic drugs in Europe, but since most of these chemicals are being produced in Asia, are we also seeing addiction rates and use of these drugs in Asia as well. Do you know? Thank you.

Robert Bell: My best understanding is that there does not tend to be a lot of use in Asia as of yet. Our best information is that the compounds are primarily manufactured there and then distributed across the globe.

Unidentified Audience Member: Thank you very much. Here is a question for Agent Pryor. In the course of the drug world, the USA government has changed many times the strategies of the American agencies in change of fighting drugs.

00:51:41 Sometimes these agencies, between them and the DEA, have rejected these changes of strategy. For example, in the late ‘70s the government decided that the main focus in the drug war should be heroin instead of cocaine and marijuana. And a few years later, this decision proved to be wrong.

00:52:03 The Columbian cartels emerged and started to send hundreds of tons of cocaine to the USA. My question is, do you think the current government policies address correctly the traits of the [future] like synthetic drugs?

Lisa Pryor: Yes, I do. I think these designer drugs here -- like I went over the negative effects and some of the deaths that actually occur with using the Spice and the Bath Salts.

00:52:37 I think we are headed in the right direction in terms of legislation, and trying to keep young children and young adults from using these types of designer drugs, in my opinion. Yes.

00:53:00 Unidentified Audience Member: Thank you. This is a question I guess for either Special Agent Pryor or Bell. It has to do with sentencing for distributors. Now that the drugs have received the Schedule 1 classification, will sentencing coincide with that? I think for awhile there, sentencing was for manufacturers and distributors on the same level as I think marijuana.

00:53:38 And so now it has been increased. Have you seen any recent increase in the enforcement efforts towards sentencing, increasing the sentencing, for distributors and manufacturers?

Lisa Pryor: I can kind of answer part of that based on what I have received from Chief Counsel with regard to it.

00:54:00 And the answer I got is we are still converting, and I guess Mr. Bell can correct me, the drugs into marijuana for sentencing. This is the answer I have gotten recently. I don't know if you know any different.

Robert Bell: That's correct. The marijuana conversion is used for sentencing.

00:54:28 And because the law is ill-defined in this area, there are no specific sentencing guidelines set yet for these specific compounds.

Unidentified Audience Member: A question for Special Agent Pryor or Bell. Since the emergency scheduling, are you still seeing these products in head shops and retail stores? Or has the method of distribution changed at all?

00:55:02 Lisa Pryor: What I have seen recently -- I will address the Internet as well as head shops. I actually went on to try to find some Bath Salts on the Internet, on the sites I talked about. They have pulled a lot of the stuff -- not to say it is not still being sold on the Internet. They have pulled it so it is not so obvious. In terms of head shops and gas stations, all they are doing is changing the chemical compound, and they will put it in a different wrapper and call it something else.

00:55:34 It is the same. It might be slightly different, like Mr. Bell was saying, but dealers and traffickers are going to continue to, and they have said this, to just change the chemical composition and sell it if it is legal.

00:55:57 Unidentified Audience Member: I have a question for Dr. Baler. The increased use of the synthetic cathinones, do you believe that this may lead to increased uses of other drugs such as methamphetamine?

Dr. Ruben Baler: The quick answer is that I obviously don't know. It is going to be very different for different people. It is like the trajectory for any drug -- some people will enter a vicious cycle of drug abuse and they will need something more powerful they can find, or other drugs.

00:56:31 The appeal of these drugs is that they are so easily available. So, it depends what we are talking about. So, for young people, that is very attractive that they can so easily and cheaply get these drugs. Now, in the long-term we know that these compounds, these stimulant-like molecules change the brain. So one of the changes will lead to long-term persistent, not necessarily reversible, but persistent changes that lead to things like dependence and addiction.

00:57:00 And very likely in vulnerable individuals to a life-long career of addiction.

Unidentified Audience Member: Thank you.

00:57:26 Unidentified Audience Member: Hi. This question is for Dr. Baler also. I was curious in terms of treatments when people go into the emergency room when they have ingested these compounds. Are you aware of any kinds of antagonists, or any kind of treatments that are available to counteract some of the stimulant effects of these drugs?

Dr. Ruben Baler: Unfortunately, the lessons that we have to go by in this area are the lessons from addiction to marijuana, or the addiction to stimulants in general. And we don't really have pharmaco-therapies for any of these, for cannabinoids addiction or stimulants addictions. They are mostly based on therapeutic support, behavioral therapy, detoxification, and healthy lifestyle.

00:58:10 These fuzzy areas, if we can call it fuzzy area, of many different modalities of behavioral therapies. I would assume -- there is no research to back this up -- that

many of these drugs in their pure state would call for similar therapeutic approaches. The problem is that these compounds are so impure, they have so many things and so many mixtures, that really it is almost impossible to predict where it is going to be -- the presentation of these patients.

00:58:38 And what kind of impairments, behavioral and physical, they will have. They might need very specific targeted therapeutic approach. But, in general, I can predict -- it will be an educated guess -- that whatever therapies we have, mostly behavioral therapies for marijuana addiction and for stimulant addiction, should be the basis for any therapy that will be developed for these new types of synthetic drugs.

00:59:18 Unidentified Audience Member: Can we expect additional Spice drugs to be added to the Controlled Substances. Because I know the ones now that have been legalized and issued, drug code numbers are being added to manufacturers and importers on their registration.

00:59:39 Robert Bell: I'm not sure…you are referring to?

Unidentified Audience Member: Spice.

Robert Bell: To rate in Spice, but you are asking about registrants actually important Spice products or cannabinoids legally?

Unidentified Audience Member: Yes.

Robert Bell: Yeah, that does not currently happen. Everything that is coming in is mislabeled. Is either uncontrolled or could be controlled under the Analog Controlled Substances Act.

01:00:09 Or, might be caught under a state law, or under one of the federal temporary controls. So, your question also is do we expect adding additional cannabinoid substances to the controls?

Unidentified Audience Member: Yes.

Robert Bell: Yes. At some point if we need to, but quite honestly we are a little bit of a wait and see what congress is going to do in terms of acting with some broad legislation that may preclude us doing that.

01:00:36 Unidentified Audience Member: Okay.

Unidentified Audience Member: Does the presence of these drugs in your system show up on a drug test of any kind?

Dr. Ruben Baler: They wouldn't in a conventional test, but of course there are very high sensitive tests that could be run to detect these substances. That is the way we measure them in the lab.

01:01:14 But they are not part of any standard battery of drug detection tests currently that I am aware of.

Sean Fearns: If we don't have any more questions, I want to thank our panel, Dr. Baler, Special Agent Bell, Special Agent Pryor. If anyone has any questions to ask them after we have concluded this program, please feel free to do so. I would ask Museum Education Coordinator, Catie Drew; we have a small presentation for each of you for your time today.

01:01:46 And again, we thank you all for joining us. If you want to mark your calendars, the next of our lectures in the spring program will be held back here in the

auditorium on April 24 at 11am EST. We are going to be talking about Cross-Border Drug Tunnels. Thank you all very much for being here today.

End of recording.