

Just the Importance of Identifying Emerging Drug Threats

Introduction [00:00:05] Now, this is recording, RTI International Center for Forensic Science presents Just Science.

Voiceover [00:00:25] Welcome to Just Science, a podcast for justice professionals and anyone interested in learning more about forensic science, innovative technology, current research and actionable strategies to improve the criminal justice system. In episode three, Just Science sat down with Amanda Mohr and Dr. Alex Krotulski from the Center for Forensic Science Research and Education to discuss the analytical and interpretive challenges associated with emerging drug threats. The Center for Forensic Science Research and Education, otherwise known as the CFSRE, oversees a collaborative effort to better understand emerging drug threats. CFSRE researchers Amanda Mohr and Dr. Alex Krotulski are working on a project called NPS Discovery, a model for monitoring, responding, and forecasting emerging novel psychoactive substances. Listen along as our guests return to Just Science to discuss NPS Discovery, analytical challenges associated with novel psychoactive substances, and the value of community partnerships. This season is funded by the National Institute of Justice's Forensic Technology Center of Excellence. Here is your host, Paige Presler-Jur.

Paige Presler-Jur [00:01:37] Hello and welcome to Just Science. I'm your host, Paige Presler-Jur with the Forensic Technology Center of Excellence, a program of the National Institute of Justice. Our topic today is a discussion of novel psychoactive substances as emerging drug threats and how they represent significant analytical and interpretive challenges to forensic and clinical toxicologists. We hope this discussion will provide ideas and guidance for communities such as those with the Bureau of Justice Assistance Comprehensive Opioid Stimulant and Substance Abuse Program funding, working to strengthen the collection and sharing of data across systems to understand and address the impact of illicit substance use and misuse. Here to help us with the discussion is Dr. Alex Krotulski and Mandi Mohr from the Center for Forensic Science Research and Education. Welcome, Alex and Mandi.

Amanda Mohr [00:02:34] Hello, how are you?

Alex Krotulski [00:02:34] Hello. Thank you for having us.

Paige Presler-Jur [00:02:36] I'd like to start hearing from both of you about how the Center for Forensic Science Research and Education oversees a collaborative effort for the identification, prevalence, and trends of new synthetic drugs.

Alex Krotulski [00:02:49] So our efforts really span a whole host of different areas, both scientifically and on the sort of trends and dissemination side. We have a whole bunch of different data sources that feed into our programs. We have seized drug data that comes from crime labs or other law enforcement agencies around the country where we're able to identify drugs in the street level supply or even some drugs entering the country. We have a large data set of toxicology data, both post-mortem toxicology data and DUID data. And recently we've been trying to sort of ramp up our efforts on the clinical toxicology side as well, partnering with institutions around the country that are seeing patients that are presenting to emergency departments with some sort of adverse events suspected to be associated with some of these new drugs. So as part of that, we have a whole website that we now host and is sort of open access for anyone to come to use. We have a whole bunch of analytical reports, trend reports, public health alerts. And if people want to access

our website, they can come to www.cfsre.org or www.npsdiscovery.org and they can see all the different reports we're putting together on all the different research we're doing.

Paige Presler-Jur [00:04:08] That's great. Can you tell us what brought you both to your current research and how you became dedicated to the dissemination of information surrounding the impact of novel psychoactive substances? Because that is so important to a cutting-edge topic.

Amanda Mohr [00:04:22] This really started back in 2013 when NPS, so novel psychoactive substances, and emerging drug threats were kind of on the radar. After the big wave of the JWH substances in late 2008, there were new substances coming into the US, so we started trying to track them by monitoring recreational users at electronic dance music festivals. So we did that for a few years and that was really kind of our first jump into novel psychoactive substances, or also known as NPS. We found some really valuable information using people that were consuming these substances. And as we started to look for resources about what was emerging and what was up-and-coming, a lot of what we are finding is either that it was lagging - there was a big delay in what was being reported and how that was getting out to laboratories - or it was coming from places like Europe, which are a good source of information, but trends don't always translate across the ocean. So we were looking for a way to see for ourselves what was happening here in the US and then also to make an impact in getting that information out as quickly as possible to the laboratories and the forensic science community, so they could implement it into their own workflows.

Paige Presler-Jur [00:05:41] That's great. And you've both been on the podcast before during the season titled Drugs. The episode covered your NIJ-funded research that was titled Evaluating Trends in Novel Psychoactive Substances Using a Sentinel Population of Electronic Dance Music Festival Attendees. Do you have any updates for listeners or any other awards that you've been working on since then?

Alex Krotulski [00:06:03] So that funding that we had originally for looking at NPS in these EDM music populations, we have had funding actually twice for two, two-year periods so over a four-year period. And after that we shifted gears a little bit looking at synthetic cannabinoids. But now we're back looking at really NPS as a whole. And we have two exciting funding opportunities that we have been awarded for starting in 2021, one of which will be funding really the discovery and dissemination of NPS information that we get at our laboratory and then we also have a funding opportunity where we are looking at NPS in DUID populations, as well as some of the other drugs that may be prevalent in DUID cases but may not be looked for in laboratories.

Paige Presler-Jur [00:06:50] So much has happened since that Just Science episode. I want our listeners to know that for the purpose of this discussion, we are considering novel psychoactive substances, or NPS, as emerging drug threats that communities are facing. So as we get started, can you tell us more about NPS Discovery and how it is helping the forensic and clinical toxicologist combat the emerging drug threats crisis?

Alex Krotulski [00:07:17] So we launched our NPS Discovery program now about two or three years ago, really as a response to this void of information and really information sharing relating to NPS drugs and then their adverse events or anything that's sort of related to their use in recreational populations. We developed NPS Discovery and sort of expanded it into this new cyclic model where we first start out with gathering intelligence information. So there's a lot of information out there, whether it be from the United States

or from other countries around the world about new drugs that are emerging. Sometimes we hear about these drugs on drug use forums. Sometimes we hear about them because they're emerging in some sort of area and are identified at some crime lab. We try to compile all that information to know really what the universe of NPS substances is. Next, then we sort of deploy our surveillance programs. So for us, our surveillance programs really go through the analysis of several different areas, as I talked about before, whether it be seized drug samples, toxicology samples for a whole bunch of different projects. We use those surveillance programs to discover new NPS. Sometimes we're the first to find them. Sometimes we are finding them after they're reported somewhere else. We keep all that information together. Once we detect a new NPS, we then shift to our monitoring phase where we try and figure out, OK, well, how many times are we actually seeing this substance? So we don't just like to know that we've seen the substance. We want to know how many times we're seeing it, how often we're seeing it, what's the geographical distribution? Is it only in seized drug samples? Is it only in toxicology samples? Are they mostly post-mortem toxicology samples? Are they ante-mortem toxicology samples? Getting all that information together so we can have some sort of concerted response. That's really the most important aspect of all this, getting that information out, compiling it all together, having some meaning to the data so that way it can be used in a timely and sort of actionable manner. And then lastly, we move into our forecasting phase where we try to look at what we've seen in the past and try to connect that back with our intelligence and maybe try and predict what the next new substances could be emerging on the drug market.

Paige Presler-Jur [00:09:30] That's fascinating and I'm sure so helpful in the forensic and clinical toxicology fields. How would you say that emerging drug threats are impacting communities that are working to support individuals with substance use disorder?

Amanda Mohr [00:09:44] Since we've hit the COVID pandemic, I think a lot of attention has been shifted away from substance use disorders and the opioid epidemic. But this is something that hasn't gone away. It's something that's still very real and something that we need to focus still concerted efforts on addressing. And one of the things, as Alex has mentioned, that we're trying to do with NPS Discovery is provide resources to laboratories to identify these substances in their casework. So just putting out alerts of, hey, this is something we're seeing. We've seen it in a few cases. This is where we're seeing it at, and this is what we're finding it with. Not only that problem, but also putting out information of here's what the spectrum might look like. One of the big challenges for laboratories in particular is getting access to these analytical standards to confirm these substances. But at least if you have something you can look at and cross-reference, maybe something that you've seen in your casework, it can give you sort of a clue and provide you with information about how you might need to proceed. That all in turn comes back to once you know what the problem is, you can start addressing it. But if we don't know what the problem is or what the scale of it is, you don't know what type of resources you need to devote to it. So I think that's what our big effort is, is addressing the problem and really identifying how big of a problem it is so that people can use our information to then work in smaller subsets to address it.

Paige Presler-Jur [00:11:06] And what are the major analytical challenges involved with novel psychoactive substances?

Alex Krotulski [00:11:12] Yeah, I think that really each laboratory probably has their own challenges just based on what their workflows are and what instrumentation they have. But I think at, really at a high level, one of the biggest challenges for many labs is really the

difference between targeted and non-targeted testing. So if labs are looking to discover a new NPS, it's really not possible through the use of targeted methods where you're only looking for a subset of compounds. So really, to combat these emerging drug threats or these NPS, you need to have non-targeted methods, you need to be prepared well in advance to discover new substances that aren't within your library. It needs to be something that maybe can be done retrospectively. So going back and looking through your data files, if you're acquiring them on high resolution mass spec system and you're archiving that data, going back and trying to figure out when a substance first emerged. Another big challenge right now, especially with the NPS opioids, is sensitivity. As we go through more iterations of these new substances, typically they're getting more potent over time - think about something like carfentanil. Some of the newer NPS opioids, things like isotonitazene and buprenorphine. They're usually present at very low levels, sometimes sub nanogram per mL levels. So that really requires increased sensitivity, sensitivity that's not really there on GC/MS platforms. That is really pushed towards more of the LC/MS platforms and really the newer age LC/MS platforms that have that higher sensitivity. And lastly, as Mandi mentioned before, reference standards are always going to be a big thing. In forensic science, we need reference standards for comparison to be able to confirm and report out our results. So that will always be a challenge for us.

Paige Presler-Jur [00:12:54] Can you tell our listeners how the Center for Forensic Science Research and Education has worked to mediate these analytical challenges?

Amanda Mohr [00:13:02] Sure, we've used kind of a variety of approaches. As Alex has kind of alluded to, we're using state-of-the-art instrumentation and that comes along with working with various vendors to get collaborative agreements, to get access to these high-res analytical platforms. And then through using that, we've developed sort of a forward and a backward approach. So moving forward, we're getting sample extracts of things that are coming into the laboratory that are ready to be discarded and running them on our high-res platforms to see if there is emerging substances. We do a pretty rigorous updating of our library, so we're always staying on top of trying to acquire new standards. If we get wind of something that might be coming down the pipeline, we're seeing if we can acquire that standard. If not, at a minimum, adding the accurate mass to the library so that, you know, we might get a hit for it. And then on the back end of that is what's known as data mining. So looking back retrospectively of data that's already been acquired to see if any of these new or emerging substances were identified. If so, how far back are we seeing them in the case work?

Paige Presler-Jur [00:14:10] What impact would timely access to case reports and reports of adverse incidents of impairment or toxicity have on clinical diagnosis and treatment, substance abuse, and forensic investigations?

Alex Krotulski [00:14:21] We think that there's certainly room for a lot of impact and that's really in a lot of different areas, as you mentioned. So, I mean, first is really just a better understanding of treatment. And that's why we've partnered with several different clinical institutions around the country, because you have these, whether they're emergency room physicians, clinical toxicologists or people at poison centers, they are interested and really understanding how to better treat these individuals when they do present to an emergency department. Having reports on what substances are actually being used and causing these adverse events is very important. I think we forget a lot of times in, at least from a forensic toxicology perspective, that there is this whole population of users who are using NPS, but they're not ending up either in some sort of incident where law enforcement is involved or they're not ending up in some incident where they're now a post-mortem

investigation. So it's really important. Some people may say that understanding and knowing those drugs is more important to treatment and some may say it's not. But our perspective is that really knowing what those substances are can help potentially impact treatment and future work. Second is really the collection of more accurate statistics. So right now, we certainly know we're within an opioid epidemic in the United States. Some people will say we're maybe either starting or in the midst of a benzodiazepine epidemic in the United States. But without having accurate reporting, we really don't know if some of those deaths are being miscategorized. If we're not looking for the right substances, if we're not making sure that our testing scopes are up to date, if we're not including the collection of these NPS from different reports, our statistics may be skewed a little bit. And we want to obviously have the best statistics for CDC and other government agencies or state and local agencies to use. Another aspect when it comes to forensic investigations is really discovering that true cause of death. So medical examiners, if they're using laboratories, they're not testing in-house for these new synthetic drugs, they may be missing causes of death. And it may be just one case or maybe hundreds of cases. It all depends on what drug it is and how prevalent that substance is in their community. But they want to make sure that the medical examiners are accurately, sort of correlating these causes of death with these substances that are being used. And lastly, sort of go to a different population, is the public health side of things. Public health agencies are certainly very interested in these new synthetic drugs. If they know what these substances are, they can tailor their messaging or their reporting to drug users and to their communities about the substances that are out there. Maybe they can develop special messaging about the dangers of new synthetic opioids or other new synthetic drugs that are appearing in their community. And that can really have a really big impact down the line. But it all starts with having that information and having those reports and really having it in a timely manner, in a manner that's accessible to everyone.

Paige Presler-Jur [00:17:16] Can you share with us examples of how analyzing for NPS has impacted a community's ability to identify the drugs on their streets?

Amanda Mohr [00:17:25] Sure. I think the kind of case in point for us happened back in 2018. It was over the weekend and on Monday morning we incidentally had to be or were sitting down having breakfast at a meeting. And there was all these news reports coming out of the city of Philadelphia that there were hundreds of people overdosing in Kensington, which is an area that has high rates of drug use. And it was kind of being attributed to a product known as Santa Muerte. So we started doing some digging, reached out to some of our colleagues in various agencies. And what we were hearing is that people are flocking to this product because it was rumored to be the last pure heroin in the city. But again, it was resulting in all these overdoses and a few deaths. So through some law enforcement, we are able to track down a product. So they had recovered some seized material at a decedent's home. So they brought it to our facility. And within twenty-four hours we returned a result back to them and were able to identify that it was not only heroin in that product, but fentanyl as well as a synthetic cannabinoid, 5-fluoro ADB. So with that they were kind of able to triage it. They knew what they were looking for. Clinicians in the city then knew that they were not only dealing with opioids, but synthetic cannabinoids so they could adjust their treatment protocol. And that happened really quick. So again, within twenty-four hours, we were able to kind of get that information. So it goes back into our, the importance of timely information, getting that out and letting people know what's on the street. From a user's perspective, I'm assuming the large majority of those people that thought they were buying pure heroin had no idea that it was being cut with a synthetic cannabinoid.

Alex Krotulski [00:19:06] In addition to Santa Muerte, we had another incident involving synthetic cannabinoids that happened up in Connecticut, sort of similar to the story that Mandi told. This usually involves a large number of people who are flocking to one area, who are looking to get their hands on some sort of drug product because there is some sort of either positive review or something about it that the users want. And in this case, it was users up in New Haven that were flocking to this park to get this new product of synthetic cannabinoids. And in doing so, these individuals were using the substance. This resulted in many overdoses and really a very scary scene up there for law enforcement and for emergency medical services and clinicians, as you had all these different people coming down with these very adverse effects from synthetic cannabinoids. Sometimes people can be combative. Sometimes people can almost be in a state as if they've been using opioids where they're more asleep or almost unconscious. So it can be very unpredictable. In this case, we actually had clinicians from a hospital up in New Haven reach out to us and asked us to do testing because they really wanted to know what substances were in these toxicology samples that they had collected. They were urine samples and serum samples. And for hospitals, they don't test for synthetic cannabinoids. So without reaching out to us to do that testing, they would have had no idea what substances were present. So they sent us samples. We were able to turn around those results for them, let them know what synthetic cannabinoid it was. In a number of cases, I think they sent us about 30 or 40 cases to test. We were able to get them those results back. So that way they could have an answer for what was going on in this very strange and very, almost frightening scenario.

Paige Presler-Jur [00:20:53] Are there partnerships needed so communities working to address the substance abuse crisis can utilize forensic tools for the detection and characterization of emerging drug threats?

Amanda Mohr [00:21:03] So, yes, I think that is one of the biggest opportunities within this problem, is getting everybody to start working together. There are so many different agencies spanning from all the way at the federal government, all the way down to the municipal level, but getting everyone talking and sharing those resources and information is the biggest obstacle. So I think when you're looking at the state level or within the local level, there's opportunities for law enforcement to work with our crime laboratories. A big indicator sometimes for us is what's found at the scene, so if there's some sort of pill packet or pills or any sort of paraphernalia that can be recovered, that's often a big, important key that helps us to kind of pursue. If we see there's a heroin packet, some sort of stamp, we can go down all kinds of rabbit holes trying to figure out what it is. But if we didn't know there was a heroin packet there, then you're just kind of left in this big open field so it can really help narrow the focus. I think one other important thing that we've really started to stress is the importance of the toxicology sections working with the drug chemistry sections. So the drug chemists oftentimes will see what's on the street before it becomes a problem within post-mortem cases. So keeping that dialogue open, having pathologists involved in that. Resource sharing within large organizations. So there are several different professional organizations. So getting out and presenting at those meetings of what you're finding in your laboratories and then again having that dialogue all the way up at the federal level. So it's important for what people are seeing at the state level to communicate that up through the federal level and vice versa. So what's being done at the federal level is coming back down to the states. I think that really is going to be one of the pathways out of this area of the epidemic that we're in. One of the other important prongs of this is for the communities to all come together. We don't know what's out there if we don't have samples to test. So doing comprehensive testing and pursuing these leads is very important for us to be able to, like we said, identify these substances

and know what the problems are. So without the samples, either post-mortem that aren't tested comprehensively or even ante-mortem, another really great set of rich data that I think has been underexplored is coming from the hospitals. So getting all these different agencies to work together collaboratively to do the testing, I think is really important when you're talking about developing partnerships.

Paige Presler-Jur [00:23:34] The CFSRE is doing such a good job working with practitioners and local communities. How has the work of your division, NPS Discovery, within the CFSRE impacted the forensic community?

Alex Krotulski [00:23:47] As we've mentioned before, through our efforts and information sharing and rapid dissemination, we've really tried to make sure that the work that we're doing is having an impact within the forensic science community. We're really happy to report that we feel like we are making an impact and agencies, whether it be federal agencies or local agencies, are starting to pick up on our information and use it really to their benefit. One of the really big success stories that we've had is the use of our information in DEA scheduling. Our organization does not have a formal partnership with DEA. However, we have worked very closely and shared that information so that way DEA can use our information from toxicology testing when they're trying to evaluate whether a new substance needs to be scheduled or not. So one of the pieces that they're evaluating is really the toxicity, whether or not it's been implicated in post-mortem death investigations. So with our work and looking for these substances, confirming them in death investigation casework, reporting those results out either through the open access reports on our website or through the scientific literature, DEA is able to pick up on that information and use it and cite it in their scheduling actions. So we've seen that twice, now, just this past year with isotonitazene, which was an emerging NPS opioid which emerged late in 2019, but scheduling happened really around the Q2 point of 2020. And then second was bupropion, which emerged in the summer of 2020 and DEA just scheduled that substance in Q3 of 2020, or maybe Q4, but right around that time. We're happy to report that. We feel like that really is a great showcase of how our information can be used by federal agencies and we're happy to provide that information. We certainly have very many success stories on the lab level. Our information, whether it be new drug monographs that have analytical data or whether it be our trend reports are disseminated to labs throughout the country. We're able to use that information to identify new substances. We've heard stories of labs saying, oh, I had a new substance in my lab and we were able to use your analytical data to compare to see if that new substance we see matches the substance you previously reported. We've heard stories from labs who are using our trend reports that say now that we know what's prevalent in the United States, we're able to tailor our method developments. We're able to update our scopes appropriately, and the NPS world can be very large and very daunting at times. So when you're trying to develop a method and you're looking out there and you see, oh, there's a hundred fentanyl analogs, do I need to develop a method for all of these? If you have information like these trend reports, you're able to use that information to maybe tailor your method developments and what might be important to your lab on either a screening side or a confirmation side. And then we've had some success stories as well internationally. So just in the NPS arena, there are several different players internationally, groups like the European Monitoring Centre for Drugs and Drug Addiction, which is abbreviated EMCDDA, as well as the World Health Organization. Those two agencies put out reports for the European Union, and really for the world, on the assessment of new substances. So EMCDDA and WHO both put out two different reports- one's a critical assessment report and the other one's just an initial report on the substance - but both those organizations are using our information to include in those reports so that way other labs

around the world know how many times that substance has been identified. They know how many times it has been seen in post-mortem casework, maybe how many times it's been seen in DUID casework. And they're able to pair that up with the other information that they get from the European Union and from other countries around the world for things like potency and toxicity on the pharmacology side or information on the drug seizure side and are able to really put a comprehensive report together for laboratories who are looking for that information or for scientists who are looking to learn more about these substances.

Paige Presler-Jur [00:27:47] What is next for the Center for Forensic Science Research and Education's efforts to combat emerging drug threats?

Alex Krotulski [00:27:53] We have got big plans and we are so excited. I know I mentioned previously that we have funding that is beginning from the National Institute of Justice in January of 2021. We've got great big plans to expand NPS Discovery really to encompass a whole bunch of new aspects, a whole bunch of new data sets. And we are excited to get that work done. So as I mentioned before, under our certain different areas of NPS Discovery, under our intelligence arm, we are looking forward to doing some more work on drug use forums, whether it be things like Reddit and Bluelight. We know there's a lot of information out there from users who are using these substances. They may be going online and searching for new NPS and then going straight to Reddit to ask if anyone else has used them or they may be reporting what some of their positive or negative reactions are to the substances. So there's a whole world of information there that we are excited to explore. Another aspect of our intelligence gathering will focus more on some of these drug patents from pharmaceutical or research literature. So we know that sometimes these new substances that we see are not necessarily new at all. They may have been previously reported or previously synthesized for therapeutic purposes, but maybe never marketed. So we're going to try and ramp up those efforts in the future. Under our surveillance arm, we are going to continue expanding our library databases to include new drugs. We'll continue sample mining going forward and looking at new substances that emerge within forensic toxicology samples to really get a better picture, as Mandi mentioned before, of the timeline of these substances and how long their life cycle lasts from first detection to last detection. So we will be continuing to do that and hopefully doing that for many years to come. Under our monitoring arm, we are hoping to continue to produce our trend reports, as well as some other important reports that may come from our monitoring initiatives, whether it be in forensic toxicology samples or clinical toxicology samples. As I mentioned before, we are ramping up our clinical efforts as well. And as we get more and more clinical partners, we'll be able to get a better idea of how these substances or what substances are emerging within that clinical population. Next, under our response arm, we are very excited to start producing what we are calling NPS toolkits. So these toolkits will be able to be used by laboratories that will be open access. So the information that goes into the tool kit will hopefully be all the information that a lab needs to assess a new NPS. It will have information about analytical methods. We will run drug standards on our triple quad systems here, as well as our other analytical systems. So a toolkit will have all that analytical information and data in it. So if a lab is looking to create a new method for NPS, hopefully it can expedite that process. There will be additional information included in there about the substance, some background information on the substance. If any potency or pharmacology data is available for the substance. There will be recommendations based on quantitative ranges if we do have quantitative data for the substance. We're really excited about these NPS toolkits and we're hoping that these will really be or really expedite the labs process for developing NPS methods and hopefully relieve some of that burden that can be associated with developing these new methods.

And then lastly, we do hope to get, as I mentioned before, we are trying to forecast what the next new substances are. We are going to continue doing that and hopefully maybe create an advisory board for some of the leaders in the NPS arena to see what we can come up with and maybe see if we can actually get ahead of these new substances. When you look at synthetic cannabinoids, if you look back, there certainly was an opportunity to predict the next new substances that were emerging. We're hoping that we can do some of this to try and get ahead of NPS trends before they get to us.

Paige Presler-Jur [00:31:58] Those are exciting efforts of the CFSRE and so impactful for the forensic and clinical toxicology field. Is there anything specific for 2021 that you'd like for listeners to be on the lookout for?

Amanda Mohr [00:32:10] So one of the really exciting opportunities specifically devoted to NPS is the NPS conference. We were supposed to host it here in the US in 2020, but unfortunately that did not happen. It was online, but we are excited to be hosting that probably in the late summer of 2021 in Washington, D.C. so you can keep your eyes peeled for that. We'll have information on all of our social media channels, as well as our website about that conference. So if NPS really gets your wheels going, this is definitely a conference you want to attend.

Paige Presler-Jur [00:32:42] So what would you both like to see in the future in terms of your work impacting how communities face issues with emerging drugs?

Alex Krotulski [00:32:50] I think one of the most important things is going to be accurate testing and accurate reporting. Accurate testing, meaning laboratories have the appropriate methods in place when samples are coming through their laboratory, working with their state and local partners. Hopefully we see a lot of great partnerships between public health and public safety because that's very important. I'm really hoping that the testing that is done and the reporting that is out there is very accurate so that way we can create better statistics and really understand the NPS picture as a whole. And then the second thing that I am looking forward to, I guess you could say, or hoping that we come to some resolution on in the near future, is naming conventions for NPS. I know that there's currently a working group with RTI and CDC looking at sort of the taxonomy or the naming conventions that are associated with NPS. But sometimes that can be a little bit hard to communicate within the NPS arena if you're using different names. There's so many different synonyms. So I'm hoping that the future will have some resolution to that naming.

Amanda Mohr [00:33:58] And I think for me personally, one of the biggest things that I would like to see is that our contributions and the work that we do provide some solution, whatever that may be, that people are taking the work that we do and integrating it so that it becomes part of the solution. I think NPS has a long future ahead of it, but I'm hoping through NPS Discovery and our work that we're doing at the CFSRE, that we provide opportunities for people to either stay current or provide information to other agencies that then can provide funding to again come back and be part of the solution, to curbing this big problem that we have here in the US.

Paige Presler-Jur [00:34:37] We're running near the end of our time together. Are there any final thoughts that you'd both like to share with our listeners?

Alex Krotulski [00:34:44] So I think I would just like to remind the listeners that the NPS market is a very fluid and dynamic market. The substances that we are seeing six months

ago or a year ago are not the substances that we're seeing today. So it does take some effort and some sort of patience sometimes. Maybe if you're trying to discover what new substances you may have in your jurisdiction, I would just remember that a method that you developed a year ago or even two years ago may not be relevant today. And you really need to keep up with trends and keep up with the national and maybe even international perspectives when it comes to NPS and how they're affecting our different communities.

Amanda Mohr [00:35:23] I think I would just add that we're all in this together. So, again, everyone being collaborative, working across agencies, across jurisdictions, finding resources to help you do the testing or whatever it may be. There are a lot of opportunities and resources available. So you can always reach out to us and we'd be happy to provide any information that we have. And then the last thing that I think we owe a big thank you to is to NIJ for supporting our research. Without their funding, NPS Discovery would have never got started and would have never got off the ground. And we are very excited to integrate that funding into a new cycle and see where we can go next.

Paige Presler-Jur [00:36:04] I'd like to thank our guests today for sitting down with Just Science to discuss novel psychoactive substances as emerging drug threats. It was impactful to hear about upcoming solutions for the significant analytical and interpretive challenges that NPS pose to forensic and clinical toxicologists. The efforts of the CFSRE will benefit all communities working to address the substance use crisis. Thank you both for being our guest today.

Amanda Mohr [00:36:32] Thank you so much for having us.

Alex Krotulski [00:36:33] Yes. Thank you so much for having us. And shout out to all listeners out there. Thank you so much for logging in to hear us talk.

Paige Presler-Jur [00:36:40] If you enjoyed today's conversation, be sure to like and follow Just Science on your podcast platform of choice. For more information on today's topic and resources in the forensic field, visit forensiccoe.org. I'm Paige Presler-Jur and this has been another episode of Just Science.

Voiceover [00:37:01] For more information on this research topic, check out episode three of our Drug season, Just Electronic Dance Music Festivals. Next week, Just Science interviews Bonnie Dunn, co-director of the West Virginia Healthy Grandfamilies Project, about a free initiative that provides information and resources to grandparents who are raising one or more of their grandchildren. Opinions or points of views expressed in this podcast represent a consensus of the authors and do not necessarily represent the official position or policies of its funding.