

Just Seized Drugs and Toxicology Portfolio

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

Voiceover [00:00:22] 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 one of our 2021 NIJ R&D and Beyond Mini Season, Just Science sat down with Dr. Frances Scott, a physical scientist in the Office of Investigative and Forensic Sciences at the National Institute of Justice to discuss the seized drugs and toxicology research and development portfolio. With the introduction of new and more complex substances every year, forensic laboratories need access to the most cutting-edge technology to stay on the forefront of the opioid epidemic. Dr. Frances Scott oversees NIJ's seized drugs and forensic toxicology R&D portfolio in a concerted effort to provide the latest quality research to the public. Listen along as she discusses the addition of the research for publicly funded labs program, the complexity of toxicology analysis, and the NIJ's research portfolio and the discipline of seized drugs in this episode of Just Science. This season is funded by the National Institute of Justice's Forensic Technology Center of Excellence. Here's your host, Dr. Jeri Roper Miller.

Jeri Roper Miller [00:01:31] Hello and welcome to Just Science. I'm your host, Jeri Roper Miller with the Forensic Technology Center of Excellence, a program of the National Institute of Justice. Today, our guest is Dr. Frances Scott. She's a physical scientist in the Office of Investigative and Forensic Sciences at the National Institute of Justice or NIJ. She oversees the seized drugs and forensic toxicology under OIFS General Forensics portfolio, as well as the research for publicly funded labs program. Dr. Scott, welcome to our podcast.

Frances Scott [00:02:06] Thank you, Dr. Roper Miller. It's great to be here.

Jeri Roper Miller [00:02:09] So according to your bio, you received your bachelor's degree in chemistry from the University of California, Davis, and your doctorate in physical chemistry from George Washington University. Can you tell the listeners a little bit more about what played in your West Coast, then the East Coast academic and professional path to NIJ?

Frances Scott [00:02:31] Absolutely. So I grew up in California and I've always been a true crime fanatic. I've always been really interested in forensic sciences. When I was a sophomore in high school, I took my first chemistry class, and that's when I discovered that I did actually like science. That went well together, so I knew I wanted to study forensic science. I went to UC Davis, as you said, pretty near where I grew up. When I was getting ready to be done with my bachelor's degree, I had the opportunity to have a really interesting internship at the Sacramento County District Attorney's Lab within their seized drug section. I was looking to do my graduate work, but I wanted it to have that forensic science feel to it. George Washington University, of course, has a forensic science program, at that time the Masters of Science in Forensic Science, an excellent chemistry program, an excellent pharmacology and medical school. I applied to GW and I really tailored my graduate program to my interests so I took classes in the med school, and classes within the College of Forensic Sciences, and classes in chemistry. I had advisors across all of those different areas so that I could really get that exposure and that knowledge base so that I could go forward and practice forensic toxicology.

Jeri Roper Miller [00:04:05] OK, a little more dating here. Remind us how long you have been in the role of the program manager for seized drugs and toxicology at NIJ.

Frances Scott [00:04:14] I've been at NIJ for thirteen and a half years, but I actually spent the first year or so within what was then the Office of Science and Technology. And then I moved over to what is now the Office of Investigative and Forensic Sciences to manage seized drugs and toxicology. That's probably been at least twelve years.

Jeri Roper Miller [00:04:37] One of the changes in the Office of Investigative and Forensic Sciences program is the addition of the research for publicly funded labs. Can you tell us roughly when and why this program began and how it has evolved over time?

Frances Scott [00:04:51] Yeah, so that program was the brainchild of our then director of the Office of Investigative and Forensic Sciences. It started around 2015, and we really wanted to get at some of the questions that weren't necessarily the underlying science questions of forensic science, but more the process questions. The example he liked to give was, well, if you're going to swab a gun for DNA, why does this lab swab three places, and this lab swab 10 places? What's the science behind that? What is going to yield an acceptable positivity rate and a low enough type-one, type-two errors? That was sort of the where it began and it has evolved through the years. One of the biggest changes we made recently was to allow the applicant to not be the publicly funded lab. Previously, the lab itself had to apply. What we did was to change that within the last couple of years so that, for example, a university or a not for profit research organization can partner with a publicly funded lab, because one of the things that we know without a doubt is that our publicly funded labs tend to be really stretched for resources and many of them just do not have the staff or the financial resources to dedicate to doing this type of research. In fact, that was some of what we were trying to combat, right. In the toxicology world, if you have to just kind of kludge on yet another method every time there's new analytes that you're looking for, and you never have the time to kind of go back and wrap all the methods together, then that ends up taking you longer to do every single case. We wanted to help those labs with those resource issues by doing things like, is there a better way to do this? That's why we've allowed the academic institution to sort of take the lead on that, and partner with the lab to give them what they need.

Jeri Roper Miller [00:07:01] I know every year the OIFS hosts its Forensic Science Technology Working Group or TWG. How have the priority research needs identified by NIJ, with input from its TWG, changed over the last 10 years?

Frances Scott [00:07:16] That's a great question. You know, in some ways, the needs haven't changed that much. I mentioned the limited resources. And when we're talking about our technology working group, or TWG, these are practitioners within the field of interest, the disciplines within forensic science that we're interested in. They're letting us know what they need to do their jobs better every day. And some of those things haven't changed and may never change in that we're always looking for how to do more with less, for how to do more with what we have, whether that's our staff resources or whether that's the evidence of physical evidence that we're investigating. Looking for better ways to do every step of the process has continued to be a need. I went and looked at needs from seven or so years ago, and it's startling how many of those are still our needs today that were identified in the meeting that we just had a month or two ago. So we're always looking at things like that. We're looking at ways to bring technologies that are used in other fields into the forensic science realm if that is reasonable. We're looking for new

ways to approach samples. We're looking at different kinds of casework samples. In the case of forensic toxicology, we may be looking at some alternative matrices and how to really get the most out of that or be able to make reasonable interpretations based on drugs found in hair or in saliva or in sweat. And within the drugs world, you know, we're trying to identify some of these emerging novel psychoactive substances that may be changing from week to week to month to month, while at the same time making sure that both our lab personnel and our law enforcement personnel are safe in going about their duties.

Jeri Roper Miller [00:09:16] NIJ has traditionally hosted the Forensic Science R&D symposium with support from the FTCoE at the annual meeting for the American Academy of Forensic Sciences. However, due to the circumstances of Covid-19, the decision was made that the R&D symposium should be completely virtual this year. This led to one of the most attended symposiums on record with over six hundred attendees. What does that mean to you as a program manager?

Frances Scott [00:09:46] It was extremely exciting to me as a program manager to see that level of engagement, and in some ways we weren't surprised. I think that's part of why we made some of the decisions that we made around how to hold the symposium this year. I keep mentioning limited resources and I'm going to do it some more. There's not always going to be the funds for lab personnel to travel to the American Academy of Forensic Sciences meeting wherever it's going to be. It's necessarily going to be somewhat limited, although we're very fortunate that we can broadcast the symposium. I think there was more equity to it in that everybody is partaking of it virtually this year. There may have been more availability of just that work time even for scientists to interact with that. The other thing is that having a couple of different tracks meant that people didn't necessarily have to run from room to room, or they didn't maybe have some overlapping meetings that they would normally have so that more folks were able to interact with that.

Jeri Roper Miller [00:10:55] Along with the high attendance, the event showcased more awards than ever before and had a special poster session even, and that was incredible. Today, listeners can view that archive of the presentations and the poster session in its entirety. I just want to let them know that they can get to the archive by going to www.forensicCOE.org. Based on the abstracts NIJ received for considerations, and the questions received from the audience this year, were there any common themes that stuck out in your mind?

Frances Scott [00:11:30] Yeah, I mean I will confess I paid more attention to my own session than to all of the sessions within the symposium, but I think that I already mentioned alternative matrices and that certainly is always a hot topic. Novel psychoactive substances continue to be a hot topic across both drugs and toxicology. Within the toxicology portion of things, the increasing legalization of marijuana has led to a call for fieldable roadside tests like a breathalyzer for alcohol that would allow for the detection of marijuana, but also impairment from marijuana in a driver. In the case of a DUID, driving under the influence of drugs case, and also that use of increasingly more advanced technology to do some of the things that we've done for years. Using high resolution mass spectrometry to do our screening rather than a color test or rather than a GCMS, if we can bring that into the realm of both drugs and toxicology, that seems to have some real advantages for folks, while at the same time being a difficult hurdle in some ways to implement.

Jeri Roper Miller [00:12:49] That's great. Here's a philosophical question for you. Our avid listeners and myself, of course, are all ears. Can you tell us a little bit about the impact of forensic evidence, specifically drugs and toxins, on either forensic science or the criminal justice system as a whole?

Frances Scott [00:13:09] Sure. Well, I think that for one thing, these increased technologies that we're talking about, sometimes that can get real interesting from a philosophical point of view, because we're able to detect things down to tinier and tinier amounts in, for example, the body than we've ever been able to before, or, for example, an incredibly trace amount of drugs on something. It does lead to more of that question around interpretation. What does that mean if there's this tiny, tiny amount? What can we say about that either from a toxicological or from a drug point of view? Then there's also just the impact of that evidence on the criminal justice system as a whole. Like I mentioned, DUID, I've talked about drug facilitated sexual assault. The more understanding, the flip side of that, being able to identify these increasingly small amounts of drug could really mean the difference in a drug facilitated sexual assault case. If we're able to identify something, for example, in one of those alternate matrices like hair, or we have some work that's going on with one of our grantees right now that actually is looking at blood in a new way to try and lengthen that detection window of how long that drug can be detected in the body. If we're able to identify a drug weeks or months after a sexual assault has taken place, that could mean the difference between that victim getting justice or not.

Jeri Roper Miller [00:14:39] Yeah, sure. So the analytical noise, the old timely question of do you really want to interpret it or do you not?

Frances Scott [00:14:47] Absolutely.

Jeri Roper Miller [00:14:48] Over the past several years, NIJ has conducted outreach to the broader scientific community to connect with researchers whose work has a nexus with Forensic science. Can you tell us a little bit more about the impact that outreach has had on forensic science proposals that NIJ receives?

Frances Scott [00:15:07] Yeah, I think that we're getting proposals from an even broader base of entities than we ever have before. And I think we're getting some really outstandingly novel solutions. Part of the reason that the technology working group is set up the way it is and the reason that we publish the needs is we try to be very solution agnostic so we don't dictate the solution. We say what the need is, and that really leaves the door open to these novel solutions that we might not have thought of, or those who are real close to the forensic science field might not have thought of. I think that we've really expanded both the base of applicants and grantees that we're getting, but also the types of solutions to these problems that we're getting.

Jeri Roper Miller [00:15:53] Are there any pearls of wisdom for new research investigators that are considering funding with NIJ?

Frances Scott [00:15:59] The number one pearl of wisdom is to please make contact with a forensic science lab. The benefit of talking to an actual operational forensic science practitioner, cannot be overstated. And in fact, that's why we set up a page on our website to try and help connect those operational labs with the academic researchers who have the opportunity and the means to apply for some of these grants, but really do need the guidance of the forensic practitioners to help them answer the right question, because it's

nothing worse than seeing a really awesome proposal from a science point of view that is, in its current form, not likely to have any impact on the forensic science world for a variety of reasons.

Jeri Roper Miller [00:16:49] That's really great input. So all you researchers, new ones especially, listen to that. Do you find that the broader scientific community has an interest in the challenges for forensic science practitioners and what they're facing?

Frances Scott [00:17:04] Absolutely. We have begun to have a symposium at Pittcon which is the largest analytical chemistry conference in the nation, maybe the world, don't quote me, I'm not their PR person, but we have done that for four years. I think that has really expanded that pool of folks who know about what the challenges the science practitioners face. I think a lot of the feedback that we've gotten is, oh, OK, that's a science problem. I'm a scientist. I have some ideas about that. I think it's just making that connection or making that transparent to those, that broader scientific community where they can really see that - yeah, the things that I'm working on are really relevant and applicable to these challenges. So, yeah, and everybody loves all the crime shows, so everybody wants to do something at the end of the day that's going to be applicable and relevant. Forensic science is a great place to be able to have some of that real immediate impact.

Jeri Roper Miller [00:18:09] So what is next for the seized drug and forensic toxicology portfolios? Any striking technology developments or hot research trends that you haven't already given us in some of the earlier questions, or some other collaborations between your forensic science service providers and the academic research, perhaps?

Frances Scott [00:18:32] Well, I say go look at our new updated operational needs for sure, because I might forget something, but I think it's, to recap some of the ones that I've already mentioned, alternative matrices are always going to be a thing. Hair, oral fluid, sweat. I saw a presentation on tears, so I'm a little scared about how one gets that sample, but hey, that's another alternate matrix. High resolution mass spectrometry as a screening method I think that's coming up. Automated techniques. I think a better understanding just of these NPSs in general, geographically within different populations like post-mortem samples or DUID drivers. I think that's going to be of a lot of interest. I think the field-side testing for impairment from a tox point of view, as well as, say, testing methods for in the field in the case of large drug seizures or a clandestine laboratory where some of these drugs might be being made or processed for sale, because some of this is not necessarily a production, but perhaps cutting down your kilo of fentanyl to a level that maybe won't kill everybody. You need to know how to be able to test that safely. I think those are just a few of the things that are next for our portfolio.

Jeri Roper Miller [00:19:57] Foundational research and some of the other disciplines has really been brought to the forefront. Are there any foundational research topics that you feel would benefit your portfolio?

Frances Scott [00:20:12] I think there's always need for more tox research. The pharmacokinetic, pharmacodynamics information - we need to know what metabolites we're looking for and we need to know what the impact of the drug and its metabolites are in the body. Simple as that. As more drugs come on the scene, we may have a decent idea, but we may need to know more about that. I think that pharmacology of different methods of ingesting those drugs. Vaping is huge and marijuana edibles are huge. So what's the impact of those different methods of ingesting that drug? I think within both the

drugs and tox, another piece of foundational research that's really helpful is white box or black box studies to really understand the error rates of these different detection methods. We're used to saying this is this drug, but what we need is to have a better understanding of is, like you were talking about earlier, Jeri, how far down into the noise before we're not going to interpret this or make this call. That's another really important foundational area that is always going to be beneficial to both drugs and tox.

Jeri Roper Miller [00:21:32] Well, we're running near the end of our time together. Are there any final thoughts you'd like to share with our listeners?

Frances Scott [00:21:40] I just want to encourage everyone who might have any interest or any scientific researchers out there to take a look at the various portfolios and really see where what you're working on could really fit and benefit our forensic science practitioners and the criminal justice system as a whole.

Jeri Roper Miller [00:21:59] Well, that's all we have time for today. I'd like to thank our guest, Dr. Frances Scott, for sitting down with Just Science to discuss NIJ's R&D portfolio, specifically seized drugs and forensic toxicology, as well as the research for publicly funded labs program. Thank you so much, Frances, for providing us with your insights today.

Frances Scott [00:22:21] Thank you, Jeri. It's great to talk about subjects that are near and dear to my heart.

Jeri Roper Miller [00:22:27] I'd also like to thank you, the listeners, for tuning in today. If you've 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 forensic.colleague. There you will find additional webinars, guidance, documents, reports and conference information. And also, please follow the Forensic Technology Center of Excellence on Facebook, Twitter, and LinkedIn, or sign up for our newsletter for resource release dates. I'm Jeri Roper Miller and this has been another episode of Just Science.

Voiceover [00:23:08] Next week, Just Science sits down with Dr. Gregory Dutton, a physical scientist in the Office of Investigative and Forensic Sciences at NIJ, to discuss the impression, pattern and trace evidence research portfolio. 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.