Just Another Method for Detecting Fentanyl Transcript

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

Voice over [00:00:24] 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.

Voice over [00:00:38] Whether you're a scientist, investigator, first responder, lawyer or just an avid forensic fan, we're talking about the topics that matter to you. The 2020 R&D season of Just Science will feature some of the research presented at the National Institute of Justice's Forensic Science Research and Development Symposium. The R&D symposium, held in conjunction with the American Academy of Forensic Science seventy second annual scientific meeting, showcased some of the exciting projects currently being funded by NIJ grants. In Episode 1 of the 2020 R&D season Just Science. Interviews Dr. Ling Wang, postdoctoral associate at Florida International University, about the detection and quantum station of fentanyl mixtures by surface enhanced Román Spectroscopy and Kemo Metrix. Opioid abuse has grown considerably in the last few years. New fentanyl analogs appear in street drugs at an alarming rate. Researchers like Dr. Wang are working to create alternative screening methods to detect the ever evolving fentanyl compounds in today's seed's drugs. Listen along as she discusses graduate programs, the nuances of analyzing fentanyl and her work in the Detection and quantum station of emerging drug compounds. In this episode of Just Science, this season is funded by the National Institute of Justice's Forensic Technology Center of Excellence. Here is your host, Dr. Megan Grabenauer.

Megan Grebanauer [00:02:13] Hello and welcome to Science, I'm your host doctor Megan Grebanauer, with the Forensic Technology Center of Excellence, a program of the National Institute of Justice. Today our guest is Dr. Ling Wong. She is a post-doctoral associate and Dr. Bruce McCord's lab at Florida International University. Ling. Welcome to the podcast.

Ling Wang [00:02:32] Thank you.

Megan Grebanauer [00:02:33] So I wanted to start just a little bit of your background. I know you're currently a post-doc at NYU, but where did you complete your undergraduate work?

Ling Wang [00:02:40] My undergraduate major is applied chemistry in Jiangsu Polytechnic University.

Megan Grebanauer [00:02:46] OK. But it wasn't applied chemistry. That's what you studied prior to grad school?

Megan Grebanauer [00:02:49] Yeah. Because the school were to focus on their industry chemistry part. This is just like, OK, I feel OK. Chemistry is not only academic one. It's be something the used to in the future. OK. I said OK. Applied chemistry, would be better, is pure chemistry.

Megan Grebanauer [00:03:05] So you're not so much into the basic science then you prefer the applied aspects of it?

Ling Wang [00:03:10] Yeah. Because you always just wonder. OK. You studied a lot but you finally want to know if they can be real used or not. So this is why apply the chemistry sounds better than chemistry.

Megan Grebanauer [00:03:23] So where did you do your graduate work?

Ling Wang [00:03:25] I work in the Florida AM universities. This is like, ah, I have to apply here. OK. Let me go to some university was a master's degrees to see if I would be good for academic for higher levels or not. Because before I apply for the graduate school, I work in the dye company. So that time is like what you do when you go for the industrial work. You just wonder. OK. Is that's my rest of life or I can do more stuff. But it's like it's not only the education, so you can apply for the higher level of jobs. So, OK, that's choice, though, graduate school, just to see how far and how much knowledge is, I need to know before I can go to the next step.

Megan Grebanauer [00:04:10] So you spent some time in industry then in between your undergraduate and graduate?

Ling Wang [00:04:14] Yes.

Megan Grebanauer [00:04:14] I did the same actually.

Ling Wang [00:04:17] Because they said like this is research. But it's like Do you really like research or not? You never know. So you have to try both ways and just think like, OK. That's a correct way for you or not, if it's yes then what is the next step you want to achieve? It's always been there. You would never know what is correct answers until you've tried the real world.

Megan Grebanauer [00:04:38] So first students out there that might be wondering that same thing. And if a Phd is for them, you talk a little bit about your Phd graduate experience. What what were the academic requirements and the things you had to complete along the way to getting your Phd?

Ling Wang [00:04:52] So every Phd, especially in the science part except the classes you have to do the research. It's not like the undergraduate research like you always have a guider to help you. The most important for the Phd program is you can learn everything by yourself. You may be asks helps, but you have to learn how you find the extra resources, you to find answers for your academic questions and also for the research helps part. So you have someone come from the undergraduate that directly through graduate school. They were the lost in the first to one or two years because like they are not a get the used of why the lab member not help that much. Why no one tell them like what is the next step? So I feel like this is maybe good for like a master's degrees. So you just like someone guide you a little bit, but you can also work independently and you'll feel like, OK, I can stay in the lab like six, eight hours and you would still like that lifestyle and all the good to go ahead as Phd, and I was like it would be too stressful when it's just a jump from undergraduate directly to the PhD program.

Megan Grebanauer [00:06:04] This is a very different style of education at that point, much less classroom and and a lot more Hands-On.

Ling Wang [00:06:10] Yeah. And also it's I think it's depends on the lab your work because Dr. McCord is the great persons, whatever you want him to, just suppose he always think like Oh that's interesting, you can do it. But that's means like you'll have to work independently. Some professors, they would give very detailed a plan that step by step. So you have to think about what's the type of your working style and the select the correct the professor. That's very important for the Phd program.

Megan Grebanauer [00:06:41] I remember doing that when I was looking at different advisors for my Phd program. There were some that like required. You had to be in the lab during certain hours a day and other one is like, I don't care as long as you get the work done.

Ling Wang [00:06:55] Yes. So this is why I was like make sure you understand yourself and just talk with the professors to see the style you like or not. And the good the P.I. or the correct PI would behalf of your program.

Megan Grebanauer [00:07:10] So you're currently doing a post-doc which means you've completed your Phd and you're on your way to establishing an independent research career?

Ling Wang [00:07:17] Yes.

Megan Grebanauer [00:07:19] So what is it you hope to do after you complete your postdoc?

Ling Wang [00:07:22] Actually, I'm doing the DNA typing while for my post doc jobs is totally different to my Phd program. So it would be interesting is like because finally my dream work is always related to the drugs part. And the front. I love. I know. OK. So from the epi genomics part, if the drug users, they were to have special biomarkers. So I'm the one to come from OK, I can work from the seizes the drugs to toxicology finally to the biomarkers for the drug users. Everything related to the drugs. This is my dream, but it's just that take steps to go there.

Megan Grebanauer [00:08:00] Oh, interesting. So, your research interests are really evolving then as you're as you're moving along in the different stages.

Ling Wang [00:08:07] Yeah. Because well, I talk about the drug chemistry. It's always be the seizes, the drugs. When talk about psychology, it's all to become the metabolised. They have a relationship. But you wouldn't be so surprised that like I know like drug users even have the biomarker, the DNA sequences changes after they use the drugs. I didn't know this until like our group begin to work. It was genomics was that error. So I would've feel like, OK, it's still related to the drugs, so I want to work with that one.

Megan Grebanauer [00:08:36] So then speaking about working with the drug is related to drugs. You've done quite a bit of work with fentanyl and fentanyl related analogs. Those can be kind of scary drugs to work with for some folks. Did you take any special precautions when you were working in the lab with these substances?

Ling Wang [00:08:53] I think that like we are a chemist, so we know how dangerous is the substance with a touch. So you're just be very careful just to check off all the MSDS then know what is the project cost you and you get. So for us we use the portable hood that

ought to be only used to for the fentanyl analogs sample operations part. So I will have like a double of the gloves, face masks, and the eye glasses and that would be enough.

Megan Grebanauer [00:09:20] Did you have any safety policies in place? Like you weren't allowed to work on it alone or somebody else had to know when you were working fentanyl?

Ling Wang [00:09:30] When you work with the fentanyl it's required. Someone must also be in the lab just in cases. And you have like also the first aid boxes was next to you. Fortunately, I was didn't to use it.

Megan Grebanauer [00:09:45] So for folks listening that aren't chemists or just heard a lot of the media hype but don't fully understand, what is it about working with fentanyl that requires these extra precautions?

Ling Wang [00:09:56] Would you mind just imagine like the story with hood last year in Baltimore? The conference this time? They said that the local police someone just to open some whitened powder package and send it to emergency immediately. Yeah, this is like they said like, oh, fentanyl is that kind of dangerous because especially if this is a pure fentanyl and if you have the two of them spread into the nose like part it already called it dangerous because fentanyl is like a 100 times more potent than morphine, 10 times more so than heroin. But the some of the copy fentanyl, it would be like ten thousand more potent and the same fentanyl. So it's just that like it you need a maybe like a salt that's kind of size. It already cause you go to the emergency room. So this is like when we talk about the fentanyl works part people just the worry about how safety you can go. So when we select the samples, we try to avoid those most dangerous to drugs part which was the fentanyl and the fentanyl analogs from 10 to 100 times potant than the same morphine. This is the part that we're begin work with and also because it's the what would be the solid that would have been most the dangerous and the liquid you can control the concentration you do. So we'll just that be very carefully to weigh the solids and that dissolve them in the water solution. And this is also we've tried to say that like the later when we do the detections we prefer to use the water samples, not the powder directly.

Megan Grebanauer [00:11:34] Beyond fentanyl as analogs a lot of the other drugs you work with are controlled substances. So what procedures does your lab have in place for the storage and inventory of controlled substances?

Ling Wang [00:11:44] OK. Because what we are we have the DEA license part. So most of the control the substance because we board them as the solids. So they are locked in the safety banking in doctor D'Caprio's offices. Everytime if we needed the solid we need to knock the door, finish all the forms and the just the take the bottle wait a month when need it. And then the rest the mean bottles go back and the dissolve everything in the liquid. And keep in a freezer for the future use.

Megan Grebanauer [00:12:15] OK, so the bulk powders of the drugs are kept locked in a closet or in a cupboard in someone's office. Yeah. But then you can take some out once you make working solutions and have them dilute solutions in the lab to work with?

Ling Wang [00:12:27] This is like in the lab work. You always have the standard solutions, the concentration usually 1 milligram per milliliter and for the dilutions service part because they also want to keep us from the powders.

Megan Grebanauer [00:12:40] So we're here this week at the American Academy of Forensic Sciences annual meeting. And you gave a presentation called The Detection and Quantification of Fentanyl Mixtures by Surfaced Enhance Raman Spectroscopy and Chemo Metrics. That presentation was part of the NIJ Forensic Science R&D symposium. If listeners are interested in watching the archived reporting of that presentation, it can be found on forensiccoe.org or the landing page for this episode. And before we get into the details of your project, are there any other coworkers on this project that you'd like to acknowledge?

[00:13:14] Yes, I have a list here. So first I would send to Chiara the right. She is my level members and she is very interested in the nano materials. So the nano star we use is she like her funding from the articles and the modified the KIPPING agents to make them stable. So she spend a lot of time working with those nano materials. We are more like the application for those nano material directly. OK. And for the Mario vendel don't's and the Sevday Dogra they work me in the summer times just to help me to run some experiences and especially when we work on the reproduce abilities, we just send you the extra operators like from them we can compare to how is the operation affected, the final results and the Dr. Mable we work was the DFT calculation. It's like the quantum physical chemistry. So that's another life and the doctor Harrignton we have the problems of when we do that data analysis for the mixture part. So he gave us the supposed for the Kimmo metric. And then we realized, OK, finally for the SARS it would need either the print separation technicals or the kemo metrics. Otherwise we cannot solve the problems for the mixtures. And my boss, Dr. McCord, he allowed me to do anything I want to do. So he gave me enough free time just to do everything.

Megan Grebanauer [00:14:38] Always a perk. Can you give us a high level overview of the purpose and the goals of this project?

Ling Wang [00:14:45] We talk about the Fentanyl in mixtures because the drug users, they have no idea what is inside. I heard someone say that like it. They will buy those Croll metrical reagents to test her if like when they have the street of drugs they want to be pure or not. However, this is not that kind of sensitive to the fentanyl because it's very triste amongst there. So we will try to heal to detect her. Even the very low percentage or lets say even lower than one percentage of fentanyl in the mixtures. You still can see it. So I want to be safe for the policies offices if they have a cup holder with the suspect a white polder or even for the drug users if they want to buy those hand-hold Romas, they can know what exactly inside.

Megan Grebanauer [00:15:33] Got it? Yeah. So where are you in the project? It's like when did it start and when do you expect it to end? Or has it ended already?

Ling Wang [00:15:41] This is a part time job because the grant officially itself is for the detection for the synthetic cannabinoids. When we work with the KEMO metrics part for the fentanyl cannabinoids part and the was different than nanomaterials. I was thinking like, okay, let's try was some more opioid stuff in the works so cure until it was finished at detection methods and though we only needed the vegetation was the real simplest part because we would build the two models to detect the mixtures and the we need a validator, the percentage of errors. And also if we meet the real samples and it's maybe more completed, there was more components.

Ling Wang [00:16:19] If it still works good on that.

Megan Grebanauer [00:16:21] Surface enhanced Román which is often abbreviated as sers SERS. That's a specialized type of round and spectroscopy.

Megan Grebanauer [00:16:28] Can you talk a little about exactly what Sirrs is and how it differs from traditional Rahmon?

[00:16:33] SERS is to enhance the muncher for the Raman spectrum. So usually for the traditional Ramans it's works really good with the solids, but the one they works with liquid because they diluted too much and the Ramans counting would be too weak and it's not get the signals. So when you add the nano materials it toward accreted, there are interactions between the two nanoparticles. We call it to hot spots. So when the.analyst can come into the hot spots, powder. And that this would be the electoral mechanism field and the way you have. The Romans kelting part it would intense a lot. Actually some of the SERS techical if you have good enough hot spots you can even detected a single molecule. This is important for us because when we want to do the trees detections part, the percentage or the concentration themselves are too low. So if you can go to the sub nanograms of the simplest part, that ought to be enough for seizes the drugs.

Megan Grebanauer [00:17:38] So the method that you're using and you talked about in your presentation uses something called gold nano stars as the SERS substrate. What exactly is a nano star?

Ling Wang [00:17:48] This is like you use the subtlest method you put the gold solution and the silver solution as the mixtures will tricks them for 10 seconds. Add ARAA to make them grow little bit and like a stars shapes and the you added the keeping agents to make them stable. So when prepared them like were you cause to like one minute to prepare one mililiter of it. So it's very simple and easy, and that you only need the full chemicals and the waters so you can get those beautiful and then those stars and thanful Cai, she make them stable at least more than 2 months.

Megan Grebanauer [00:18:28] So once you make them, you can.

Ling Wang [00:18:29] Store them in the room temperature in the dark places. They will be stable at least a two months even after two months it still gather signals, but it's maybe intensity with little decreases but itself that this modify the nano stars works really well.

Megan Grebanauer [00:18:45] So what happens after two months? How do they degrade?

Ling Wang [00:18:47] When they aggregate too much, then they don't have enough hot spots to give the signals. So it's like when we said I would put it the stabilizing agents, we'll just go once to those nano materials not to aggregate together and you would really use it, but the with, the time flowing, those nanoparticles, would just the aggregate together so you don't have those like free zones to do the analogs any more.

Megan Grebanauer [00:19:14] So they start to clump up and then you don't have as much surface area available.

Ling Wang [00:19:17] Yeah to do the reactions.

Megan Grebanauer [00:19:20] What are the advantages of these nano stars over the currently used?

Ling Wang [00:19:25] So usually curently a lot of them use the nano stars and the nano stars like them them said the stars. So you want to have multiple tips so you'll you'll need to get the extra aggregation make the nano particles close to each other and have the interaction phases. But the nano star itself, because they have the tips there, so they already have those hot spots. When you added the aggregate reagents. It can produce multiple hot spots, places. It has higher chance to intrapt those analytes so more analytes you can get the stronger signals you can get.

Megan Grebanauer [00:20:04] So is it that unique geometry of them them that it's what's giving them those special characteristics?

Ling Wang [00:20:09] Yes.

Megan Grebanauer [00:20:09] What kind of sample prep is required to analyze a drug using the sers approach?

Ling Wang [00:20:17] At this point, you only need to make sure the samples can be dissolved. So you can't because we have ninety percentage of the water basis. So even your samples only dissolve that in methanyl or ethanyl or the waters. They can be used directly. So and they drugs they can be dissolved or they can be used for liquid assets.

Megan Grebanauer [00:20:39] So it has to be a liquid. You can't use this method on solids directly.

Ling Wang [00:20:43] This is our next step for the research is how to use the solids directly because I didn't have this idea until I talk with someone this time in AAFS, because usually they were the recommender. They don't want to touch those powder samples. They don't want to do the solid a sample directly. So we were just stir like, OK, is liquid a sample? Would it be easy for people to use and then would it be safer because concentration is much lower? But then now they said they're like, oh, we're still. Do you prefer to do those sort of that sample. So we have to said, OK, we have to prepare everything as the polymer or the surface with those nano materials. And when you add to the powder directly and then you can test them, this is next step. We want to try.

Megan Grebanauer [00:21:29] I know one of the big advantages of using Román for drug screening is that you can actually analyze drugs through the packaging. So you never have to open the container. I know with the sir's approach, you have to get the substrate in there. Right. So does that negate that advantage? Can you still collect the spectrum through packaging?

Ling Wang [00:21:46] The process like. OK. You can just to stroke them, with the bags, the bag itself or to give you like some of the background. And also when you put in this thing, because we work was the same as the drugs. How can you and the one that treats fentanyl is very little, maybe like 1 0 5 percentage from the kilo grams affects. How can you know? Like you used the hand? Who are the Roma is the correct response. You get to the CINCs insights. So this is wise, we're still prefer to use the liquid sample because, well, we have more chance to dissolve everything in the solution. It's not like the solids you try was maybe tense boss there, but you avoid the risk of part and you don't know what exactly in the rest of the packages.

Megan Grebanauer [00:22:29] Once you've dissolved it and you've made your liquid sample, it becomes more homogenous then. Yeah. OK. Is there any concern, though, about if you have to open the packaging to dissolve the sample that you're increasing your exposure risk?

Ling Wang [00:22:46] Yeah, this ought to be little since we have to worry about. This is why just the way with the recommend that if you have to do all of this tester, please wear the face mask. Cause if take goggles and the gloves. It should be OK because I tried to with the photos of the fentanyls and I'm still be here. So I think that if you have enough safety equipment it will be OK. And also because except that that ought to be the real big packages part. If it's like seizes the drugs from suspect or the cast part, they were not be huge amounts. So I thought should it be safe to touch them?

Megan Grebanauer [00:23:23] Is the technique destructive? I mean, once you have major dilution with the stars, can that same solution go on for further analysis?

Ling Wang [00:23:31] It's possible and it's depends on which kind of experiments you want to go ahead.

Megan Grebanauer [00:23:36] So what kind of mixtures have you tested your method with.

Ling Wang [00:23:42] Since we are academic way so we try just like pure fentanyl mixed with heroinand the fentanyl mixed with cocaine. And this is the two main components window is sold in the street drugs.

Megan Grebanauer [00:23:54] OK, so those are the only combinations you've tried.

Ling Wang [00:23:57] Because we ask the crime labs it's has the much higher chances as the pure heroin mixture with the little of the fentanyl. This just like for the stree drugs, they want to lower the costs for the manufacturers.

Megan Grebanauer [00:24:13] And have you tried mixtures using any fentanyl analogs?

Ling Wang [00:24:16] Within the try this one. We just started the fentanyl analogs the benchtop ramen. So this one way funder, you can distinguish them from the moderate end of the week. But within the trial was the portable one because portable one says the signals was already much lowerthan the benchtop one. . Also wondering how is the mic troh working? So we come from the fentanyl only itself and also fentanyl analogs changes so faster. If we just focus too much for different the fentanyl and then looks in the mixtures you maybe it lost the inflammation and the will just to want to make sure if fentanyl as there's selected a special bents or as the war spectrum, the message itself can work since everything can be automatically calculation by the software. So you don't need to worry about it. Which type of analogs be there because they use the war spectrum. It's not that the single one.

Megan Grebanauer [00:25:14] So yeah. Let's talk a little bit more about that, about how how that instrument makes that ID. Are you using a library matching approach?

Ling Wang [00:25:23] We used to sell Mundle Fluster Handmer Romney instruments so they have the lavoro full like heroin and the cocaine. Those traditional drugs. But flow the needle fentanyl. They don't have those Lieberal or you can't use. So for us is like her we

comparedt o was the solid aromas spectral was the similar to, the spectrum. Finally to the so spectral and the to select here the how many bence are still availabile in the political system sound. We want to say OK if we want to use was the potable systems dispense can come from this. Is this single fentanyl. It's like you need the extra experiments from though calculated and as experiment to confirm the works for the political system.

Megan Grebanauer [00:26:09] So you need to have a reference sample of the particular drug that you're hoping to identify in order to build up that library of reference spectra.

Ling Wang [00:26:18] This is a one part and that the other part is like well, working with Kemo Metric. So we want to know was thus selected the fence. They were related to the special functional groups and that their structures. And if finally we can find that this model's even when we meet with the unun Sentinel's, it can't auto a much a cola just to assume what is the chemical structure be there. But it's just that it's it's really treated like a machine learning those things.

Ling Wang [00:26:46] But it's a lot of work to do in the future.

Megan Grebanauer [00:26:49] Yeah. So as you mentioned, the illicit drug market is constantly evolving and it's new federal analogs come out, other ones fall out of favor. How much work is it? How simple or hard would it be if you did develop this method and be able to positively identify analog, say a new one comes out next week to be able to add that into the algorithm for ID?

Ling Wang [00:27:11] First will have to build the fentanyl analogs laboratory was SES and the Ramen resource part and the so we have to classify their functional groups related to the beds and as M BUETER the models and I hope like if I have chance and the women tried to finish maybe last next to what, 1 2 years. If we can.

Megan Grebanauer [00:27:33] Can you talk a little bit more about the sensitivity of the approach? What's the lower concentration, lower limit of the concentration you can see so.

Ling Wang [00:27:43] Well, I use this and then those stars will just the one to try. We were so surprised this like one would test her and that the calculator, the limited detection is zero point to a find then the up immediately. So it is all right. They being though low concentrations of for this. Is this the drug?

Megan Grebanauer [00:28:02] So is that impacted at all if it's zero point two, five minute gram per mil as a pure solution? As the solution. What if there's other drug in that solution as well? Can it still get down to that low level?

Ling Wang [00:28:15] This is a way calculated it from the PCA result and the POSDA results. It ought to be zero point zero five percentage fentanyl in herioin and the zero point zero one percentage of fentanyl in cocain sample.

Megan Grebanauer [00:28:30] Okay, so you just mentioned that PCA results. Can you explain that a little more for the listeners that are so familiar with common metrix techniques?

Ling Wang [00:28:37] So PCA is the full name is principal component analysis. This is a statistical method to minimize the uncorrelated variables. So it would give you the minimum variables, you can distinguish the group of the single spectrums you watch. And

there well, we use the PCA best part for this Rama Spectral is like you will never have to use a single select the bender to describe your single samples. You can use the war spectrum. They will be virtualized only as one plot. So when you run them, they can be discriminative from the analogs and other drugs part

Megan Grebanauer [00:29:19] So how do you envision this methodology being used? Is this something that would be used in the laboratory as a screening tool? You've mentioned being able to do it with a hand-held Román and you're thinking it might be like a field portable test that law enforcement could use.

Ling Wang [00:29:34] This is always said the like s depends on how far but extreme extreme a company they want to go because everything calculated you can easily used origin or the meth lab. So when the model is ready to use and if the instrument can cut both ways, they'll calculate to the self to work directly. Exam when the instrumental opting the spectrum at that can be calculated by the machine itself, it's not necessary for the human, just the two input of the data and to do calculations and it can be calculated by the software. But it's depends on the company, how they want to install those statistic models into the instrument.

Megan Grebanauer [00:30:16] So it could conceivably be performed by nonscientists like, say, a law enforcement officer.

Ling Wang [00:30:22] So I don't know if you use those portable Rahmah instruments because when they test a samples, they want to just tell you this is heroin, this is cocain this is a mixture. This is already available is for the instruments. Tell you that would b the pure or the mixtures. So it's just a need the extra libraries for the fentanyl analogs information and that the models for the fentanyl mixtures. And I think that's really reasonable to detect that those mixtures.

Megan Grebanauer [00:30:51] And then the end user doesn't have to worry about trying to interpret the wavelength and bands of the robins. Yeah, that's all built in to the software.

Ling Wang [00:30:57] Because when talk about portable Rahman. I've heard of so many people complained about the like baseland correction normalization. This is like you don't have good kemo metric approaches. You have to buy you hand one by one process to do the baseline corrections and if you only maybe have 10 samples, it's ok. But if you have like hundreds of works, you have to finish in one day. It's impossible. So it must have the chemo metrics always help you to minimize the baseline corrections. Normalizations quickly through the running part.

Megan Grebanauer [00:31:35] So what additional steps would be needed right now? This you're doing it in the lab. Eventually you could conceive that it could be done by law enforcement as a portable drug screening option. What's the missing link? What needs to happen in between there?

Ling Wang [00:31:50] So this is the requirements for the validation. And then we also knew that the raw samples. This is the most difficult thing for us because most the crime labs would try to connect. They said a like occurred. It's not easy for them to offer like those control substance outside. So it's sort to be like how far? We can go to apply to get approved to test the raw samples. That's big questions.

Megan Grebanauer [00:32:17] So you add you need to see how it works on the real samples.

Ling Wang [00:32:20] This is my dream. Like I'm mentioning, I'm like the really want to do everything is like apply the chemistry. So I really want to see how is the school part of changes to real life part and then but this gap is so difficult to go.

Megan Grebanauer [00:32:35] So that sounds like something that's been difficult in the research realm. Are there any other hurdles that you've come across in trying to do this research besides access to a genuine case? Samples?

Ling Wang [00:32:45] Yeah, it's understand like it would be like they want to keep people safe or just the like because this is still cases in progress as this thing. But finally, you want to get approval is like it's the most difficult part.

Megan Grebanauer [00:33:02] Did you learn anything surprising along the way?

[00:33:05] This is I'm mentioning the like because our lab already they use the nano materials for synthetic cannobinoids like the JWH. So this part so when I woke was the fentanyl one and I wouldn't be so surprised that this nano stars especially sensitive to fentanyl. Because I tried this. Nano stars. It was as opiates and synthetic cannabinoids even some of the Cosmo's part and that the detection levels ought to be different. So it's sometimes it's like, you know, no, like one of the substrate it be so special for one application.

Megan Grebanauer [00:33:42] That's all we have time for today. I'd like to thank our guests, Dr Ling Wang, for sitting down with just science to discuss her and NIJ funded grant. Thank you, Ling.

Ling Wang [00:33:51] Thank you.

Megan Grebanauer [00:33:51] I'd also like to thank you, the listener, for tuning in today. If you enjoyed today's conversation, be sure to like and follow just science on your podcast platform of choice. And for more information on today's topic in resources and the forensics field, visit forensiccoe dot org. On that website, you'll find additional webinars, guidance documents, reports and conference information. Also, you can follow the Forensic Technology Center of Excellence on Facebook, Twitter and LinkedIn or sign up for our newsletter to hear about release dates on upcoming resources and making rabinow. And this has been another episode of Just Science.

Voice over [00:34:29] Next week, just science interviews Dr. Heather Garbine, associate professor of Anatomy, about a new forensic tool for identifying the species of unknown skeletal remains. 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.