Just Collecting More Evidence from Cartridge Cases

Introduction [00:00:01] RTI International's Justice Practice area presents Justice Science.

Introduction [00:00:09] 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 two of our Case Studies season, Just Science sat down with crime scene technician Brian Turner and Detective Roberto Caceres from the Broward County Sheriff's Office to discuss a new methodology for processing fired cartridge cases. When a cartridge case is recovered from a crime scene, investigators must typically decide whether to swab it for DNA or process it for latent prints. The Broward County Sheriff's Office has developed a promising new technique that involves processing a cartridge case for both DNA and fingerprints, leading to more evidence available in shooting cases. Listen along as Brian and Detective Caceres describe what factors affect recovery of evidence on cartridge cases, how the M-VAC and the recovery LFT systems are utilized in tandem to process for DNA and fingerprints, and case examples highlighting the success of this new method. This episode is funded by the National Institute of Justice's Forensic Technology Center of Excellence. Some content in this podcast may be considered sensitive and may evoke emotional responses or may not be appropriate for younger audiences. Here's your host, Jaclynn Mckay.

Jaclynn McKay [00:01:27] Hello and welcome to Just Science. I'm your host, Jaclynn Mckay with the Forensic Technology Center of Excellence, a program of the National Institute of Justice. On today's episode, we will discuss a method developed by the Broward County Sheriff's Office for the recovery of both DNA and latent prints from fired cartridge cases. Here to guide us in this discussion is crime scene technician Brian Turner and Detective Roberto Caceres. Welcome, Brian and Roberto, Thank you for being here with us today.

Brian Turner [00:01:56] Thank you for having us.

Roberto Caceres [00:01:57] Likewise. Thank you very much.

Jaclynn McKay [00:01:58] Brian, would you mind telling us a little bit about your role at the Broward County Sheriff's Office and what your background entails?

Brian Turner [00:02:05] Sure. I'm a crime scene technician. I'm a civilian position within the our crime scene unit. I've been there for about four years now. Prior to that, I also worked for the Broward Sheriff's Office in their biometric identification unit, analyzing fingerprints as an imprint examiner. I have a master's degree in forensic science. Currently enrolled in a doctor of forensic science program at Oklahoma State University. I just started that program, so I'm now pursuing that. I process crime scenes like our sworn counterparts and process evidence and do everything that they do.

Jaclynn McKay [00:02:37] Congratulations and good luck in your degree program.

Brian Turner [00:02:40] Thank you.

Jaclynn McKay [00:02:40] Roberto, same question for you. Would you give us an overview of your role and your background?

Roberto Caceres [00:02:45] Absolutely. So in 2002, I started with the Broward Sheriffs Office as a cadet at the Police Academy. 2003, I finally graduated and went to the road patrol operations. And then in May of 2008, I was transferred to the crime scene unit where I have been since. In November, I start my 22nd year and I will have 16 years in forensics. With that being said, currently I am at adjunct instructor at the local police academy teaching the crime scene curriculum of the state, and I am also the Region five Director for the Florida Division of the IAI.

Jaclynn McKay [00:03:24] Brian, after collecting cartridge cases on scene, a crime scene investigator must decide how they are processed. Can you explain why choosing between latent prints or DNA can prove to be a dilemma.

Brian Turner [00:03:36] Depending on an agency's equipment and their capabilities, they may often have to choose whether they're going to swab a fired casing for DNA or use a traditional fingerprinting method such as Cyanoacrylate fuming, or the vacuum metal deposition machine to try to process for latent prints. Because of the size of a fired casing, you're often limited in how much you can process. So if you decide to swab for DNA, you may swab away that fingerprint residue and hinder yourself from developing latent prints. Or if you decide to use, go for latent prints. If you use cyanoacrylate fuming, for example, you can't then go and swab for DNA because now you've kind of locked in that DNA with the super glue.

Jaclynn McKay [00:04:18] What is the typical yield for traditional swabbing methods? And what about latent print processing as well?

Brian Turner [00:04:24] For swabbing methods of fired casings, it's typically yielded less than 1%. Most studies have shown that. A lot of agencies don't even accept swabs because of such a low yield. As far as fingerprints, it's typically also a lower yield as well and don't have the exact number. But again, it's because of the mechanism of of a gun firing. It's going to burn off a lot of that residue that's typically needed for the development of latent prints.

Jaclynn McKay [00:04:50] So you've already kind of touched on this, but because cartridge cases are so small, there's not a lot of surface area for you to get a lot of latent print or friction ridge impressions and DNA. So why are the chances of recovering both DNA and late imprints limited in cartridge cases?

Brian Turner [00:05:09] So a lot of it has to do with the mechanism of the firing of a gun. So when a gun is fired, it produces a lot of heat and the heat's going to burn off your DNA. It's going to burn off your fingerprint residue. And then when that fired cartridge casing is ejected from the firearm, it can land on a surface. And that could also then further inhibit those developments or the recovery of that DNA. If it is, let's say, for example, in a field, there's microbes in the grass that are going to start to feed on that DNA. So that's going to also hinder your development of that DNA.

Jaclynn McKay [00:05:42] Thank you for explaining that for us. Roberto, I'm going to switch to you. Your agency has developed a new method in which you can process cartridge cases for latent prints and DNA. Can you describe this method for us?

Roberto Caceres [00:05:54] Sure. So to process the cartridge casings for DNA, we have in our hands a machine called the microbial vacuum machine. The machine uses a buffer solution which is mixed with kelix beads, and we spin it in a vortex machine. And with that,

we pass it through a filter which will possibly have the DNA that we would need. And then as far as the fired casings, we have a recovered machine that we use where we insert the cartridges into this glass dome that's covered. And then with preset chemicals that are pre measured, once you turn on the machine, it adheres to any of the residues that are on the cartridges and develops the fingerprints that we need.

Jaclynn McKay [00:06:38] What led to the development of this method and how useful is it proving?

Roberto Caceres [00:06:42] We're very busy in our county. And with that being said, we have a lot of cases where we need to process these types of evidence. And these types of evidence now are not only for our casings, other types, but for the most part we have fired casings that we would love to obtain, not only DNA, but also the fingerprint patterns that they possibly could have. We do a lot of research. We do a lot of findings as far as online or even reaching out to other agencies or companies as far as the latest technology that we can find. And with that being said, through obtaining these types of equipments and also doing case studies or even scientific studies using the equipments and stuff like that, we are able to not only validate our equipment but also use it as part of our processing methods for cases.

Jaclynn McKay [00:07:28] Do you have any case examples of where this method has proved useful in an investigation?

Roberto Caceres [00:07:35] Yes, I actually received a case that had five casings from another agency that they had a homicide. They forwarded the casings to me and using the impact machine, I was able to obtain a full profile for a suspect that they at that point, as far as my knowledge gives me, they did not have a suspect in custody or even named. And I was able to, through the methodology, be able to obtain a suspect name that they went on and did actually, in fact, committed the crime.

Jaclynn McKay [00:08:08] That's amazing.

Roberto Caceres [00:08:09] Yeah, it's it's a great methodology, in my opinion.

Jaclynn McKay [00:08:11] So, Brian, I'm going to switch back to you and talk about how this method starts at the crime scene. So can you walk us through if there's anything specific that you do on scene to prep for these processing methods later down the line?

Brian Turner [00:08:27] So the method that we use with the M-VAC system, it's a very sensitive DNA processing. So we have to be extremely careful when we're on scene to not introduce our DNA onto those fired casings because we could end up detecting that instead of the person that use that those fired casings. So we have to wear our proper PPE. So at minimum, we have to wear a mask and face coverings as well as our gloves. We've also switched from picking up the fire casings with the gloved hands to picking it up with sterile instruments like sterile cotton swabs or sterile tweezers, again, to try to prevent any trying to cross-contamination from our gloves to that the surface of the fire casings. We've also, through studies have they have found that we used to collect them in a paper coin envelopes, but the paper envelopes would actually absorb some of the DNA. So we were losing some DNA. So we have switched from the paper envelopes to glassine envelopes, which are like a waxy coated envelope. And this will help us prevent any DNA loss in the collection.

Jaclynn McKay [00:09:24] Switching to those glassine envelopes was is that an expensive envelope? Compared to paper.

Brian Turner [00:09:31] They're about comparable in price.

Jaclynn McKay [00:09:34] So in my previous crime scene days, we tried to take a picture of every head stamp that we found. So when we found a cartridge case, we always try to take a picture of the respective head stamp. So that way, you know, we could properly documented and know exactly, okay, this cartridge case with this head stamp was found at this marker and kind of have our photos to supplement our written notes. And this definitely saved us a few times down the line. But the downside to this is you kind of have to manipulate the cartridge cases a little bit to get it in the proper orientation to take said photo. So with minimizing touching of the cartridge cases and collecting them with the wood ends of swabs or with tweezers, do you take photos at all of the head stamps?

Brian Turner [00:10:18] So we'll take our normal crime scene. Photographs or overalls are intermediates and close ups, but we stopped taking photographs on scene of our our head stamps to minimize our contamination of the fired casings. We actually recently got a new system called the Ballistics IQ, where after we do our DNA processing, we can enter and scan those fire casings in, and it will actually generate a report of all the head stamps. So we can have that as a reference for writing our reports or for our firearm examiners. It's kind of like a preliminary screening for them. So we can do that post DNA processing and still have that information from the head stamps.

Jaclynn McKay [00:10:52] Yeah, that makes a lot of sense. So, Roberto, now that we have the cartridge cases collected and we've transported them back to the lab, what is the next step in this new methodology?

Roberto Caceres [00:11:02] So the next step is to individualize the casings from the scene collection. They will already be in their own glassine envelopes, and we have to separate them by groupings. So, for example, if we have 15 fired casings or fired cartridges on the exterior of the scene and they're relatively within the same grouping, we will group them in their envelopes. We will group and we'll make that group a for example, the rest of the following casings that were found, let's say, inside the house or and even the house can be separated. But let's just say they're in the kitchen area. Those will be group B, And if we find someone in a vehicle that will be group C, And the reason we do that is because collectively, if we have a group of casings, it is safe to say that the shooter was within the same area. Now, if we have two different calibers, we either have two guns from the same shooter or we have two shooters. That's the case within the same grouping. So let's say we have a nine millimeter and we have 40 or 45. What we'll do is we will separate that and make a subgroup. So we'll have a group in a group B within the same group. Once we have that, once we determine that that they're the same calibers, what we'll do is we'll start gathering all of our materials that we need in order to start the M-VACing process.

Jaclynn McKay [00:12:17] When using the M-VAC process. Have you had a case where you've been able to develop a CODIS profile from the M-VAC?

Roberto Caceres [00:12:24] Yes, there has been, yes. Both our casings and the traditional methodologies of the M-VAC DNA collection, which is what we acquired the machine for, which we use the nozzel heads to collect possible DNA from clothing or any other porous surface. But as far as fired casings absolutely, yes, we have.

Jaclynn McKay [00:12:44] You've mentioned that your agency does a lot of research and they're really at the forefront of new technologies coming out. But you also mentioned that another agency submitted cartridge cases to you guys for processing. Is this a technique that you're willing to do for other local agencies, or are you trying to train other local agencies to adopt this technique? Is there any collaboration in that regards?

Roberto Caceres [00:13:09] So let me first start off by saying that the collaboration between agencies, whether they are city, state or federal, is huge in my opinion. The way that we teach, the way that we learn is through collaborative units. And with that being said, other agencies that need our assistance, we will help them. We will definitely guide them if need be, to the point where they can actually acquire or obtain or purchase their own set up equipment and use our machine, which has happened. With that being said, also, if there is an agency that does not have the funds for it and that needs to solve a case because we're talking about homicides, we're talking about the murder of one person to another, or even cases where there are serious injuries. There is no limit as to as far as the help that we can give them. So if an agency does need assistance and I've had agencies all the way from California to Florida requesting the assistance of the usage of that machine. I've had other agencies within the state send me their evidence to process with positive results for a full profile of either a suspect or a victim, which is what they needed. So as far as the assistance, it will always be there, because again, that's how we learn and we teach at the same time. Mm hmm.

Jaclynn McKay [00:14:27] That's really great. I know it's so helpful when agencies can depend on each other and utilize everyone's resources. It definitely helps with case resolution as well as investigations.

Roberto Caceres [00:14:39] Absolutely.

Jaclynn McKay [00:14:40] So you mentioned that at the crime scene, you're wearing proper PPE, you're collecting cartridge cases with the wooden end of swabs or tweezers. You're packaging them in glassine envelopes. Talked about how the M-VAC was used to try to get potential DNA off of these cartridge cases and that they're grouped based on where they were found, but also based on the caliber of the ammunition. So at this point, it then goes into processing for latent prints. So, Brian, can you walk us through how that part of this method goes?

Brian Turner [00:15:16] Sure. So we use a system from Foster and Freeman called the Recover LFT, and it works a little differently than most of our typical fingerprint processing. It doesn't rely on the traditional fingerprint residue to be left on the surface. So if an object has been washed clean or, in our case, where we're already processing for the DNA, we've kind of washed away that fingerprint residue. The way the recovery system works is it develops the corrosion fingerprint, so to say, of the impression that was left behind. When a fingerprint touches a metal surface, the oil and the residue is start to corrode the metal. So after metal objects have been washed clean, we can develop that corrosion signature with that their unique proprietary chemicals.

Jaclynn McKay [00:16:01] You mentioned that the cartridge cases can be entered into , and that's how you can get a record of all your head stamps. Does that happen prior to this latent print portion of this method or after?

Brian Turner [00:16:14] We can do it either prior or after. If prior, we just make sure we're not contaminated. Obviously wearing again, the proper PPE with gloves and everything to make sure. Because the sensitive DNA processing has already been done. So there's not an issue with scanning the fire casings in that at that point.

Jaclynn McKay [00:16:31] Okay. Are there any factors that could affect how successful this method is, whether it be from the environment or from a subject?

Roberto Caceres [00:16:40] So some of the environmental factors that could affect the collection of DNA and or the recovery of friction ridge would be the location. So are the casings laying on the pavement for a couple of hours in 90 or 100 degree weather where it's really sunny and the sun is just beating down on the casings. Are they in a air conditioned room? You know, 75 degrees, 70 degrees. They said cool. Or are they in an open field where there's dirt and there's grass and little animals walking around? Because remember, the transfer of DNA is very, very sensitive. So those are some of the factors environmentally also. How long have they been there? So if a shooting happened at midday, was the collection of the fire casings within a couple of hours, or are we talking about a shooting where we collected the casings? Days later, or even sometimes when we have to wait for a search warrant? Right. So, again, because of the location, where is the search warrant and how long is it going to take for the search warrant to be executed? 2 hours. 3 hours, 7 hours. We get all those. So those are some of the factors that we face.

Brian Turner [00:17:46] And so the the subject that handles the firearm is also a factor that can affect whether we recover DNA or fingerprints. Some people are known as a shedder. So when they touch a surface, some people are more likely to leave DNA or fingerprints behind because of just their the characteristics of their skin, their own DNA, whether their tend to have greasy or oilier skin, or if their skin cells tend to shed off a lot quicker than other people. You also found that when somebody handles a live cartridge before it's loaded into a magazine, they handled it more often than others. They'll leave more DNA or more chance of a fingerprint being developed on that that casing later on, as well as if when the fingerprint is touched on the fire casing, if it is allowed to sit there for a little bit longer before it's fired, the oils and the residue from the fingerprint will create a more distinct corrosion signature on that that casing later on.

Jaclynn McKay [00:18:42] Thank you for explaining that. So we mentioned that you were able to develop a full CODIS profile from the M-VAC system. Have you been able to develop any AFIS quality fingerprints from the fingerprint development portion of this method?

Brian Turner [00:18:57] So far, we've had that I know of. We've had three successful full AFIS quality fingerprints that were developed from a fired cartridge casing.

Jaclynn McKay [00:19:06] That's pretty remarkable, especially when we think about the yield that we were talking about earlier. That's that's fantastic results.

Brian Turner [00:19:13] Yes. Prior with like the superglue or the VMD, we weren't getting as many friction ridges as we are now getting with the recovery system.

Jaclynn McKay [00:19:21] Are the individuals in the Broward Sheriff's Office Crime scene unit, the one collecting the cartridges, processing for DNA and processing for latent prints?

Brian Turner [00:19:32] Yes. At our agency, we do the processing on the scene. We collect it, we process for DNA, and then we process for the latent prints. In other agencies, they may the crime scene people may just do the crime scene aspect and then bring the evidence to the lab and their lab people may then further process it for DNA or latents.

Jaclynn McKay [00:19:50] I would assume with validating this method, you had to work really closely in conjunction with your crime lab. Can you talk about what went into trying to validate this methodology and what sort of collaboration was needed in order to get this new method off the ground?

Brian Turner [00:20:06] Sure. When we got the recover system, I worked doing the validation study of the recover. So I tested it compared to the superglue and VMD methods. So what I did was I had different metal surfaces. I placed fingerprints on on the metal surfaces, and I allowed ample time in between each one and tested it. I also washed some of the substrates and then tested them from each of the three different methods and the ones that were washed. The only ones that developed fingerprints was the recover system. So a further proved that we can do that post our DNA processing.

Jaclynn McKay [00:20:41] This method seems to fill a critical gap in forensics labs, especially with the amount of gun violence that we face. Are there any plans to keep improving the current methods? And what is your ultimate measure of success?

Roberto Caceres [00:20:54] So for the M-VAC system, what we're trying to improve is we actually bought a 3D printer and we're trying to develop trays where we can place the fiber casings to make it easier for us to be able to collect and sort out. We're also developing some sort of tweezer like contraption where it'll make it easier for us in the field to collect the fired casings from the ground, as opposed to just using the wooden end of a sterile swab. Sometimes we'll collect it and it will fall off the wall because there's nothing making or resistance. So that's what we're developing with a 3D printer.

Jaclynn McKay [00:21:30] Yeah. And even if cartridge cases head stamp down, you know, it would be very.

Roberto Caceres [00:21:35] Correct because at this point we're using the wooden end of the stick like a shovel. Yeah. Yeah. And hoping that it won't fall off that shovel in order for us to put it inside the glassine envelope. And sometimes I'll give you a scenario. It's about 90 degrees outside and I'll keep it nice and cool. It's 90 degrees outside, right? The humidity is about maybe 65%.

Jaclynn McKay [00:21:54] Are based in Florida.

Roberto Caceres [00:21:55] Oh, yes, we are south Florida. South Florida.

Roberto Caceres [00:21:59] Yeah, 90 degrees. It's nice and cool. About 65% humidity. We are sweating and we're not even wearing any type of Tyvek suit. So we are gloved up, sweating forehead is all beaded up with sweat. And we're trying to open this envelope with, on one hand, using the pinch you know, the pinch system, trying to open it up. In the other hand, we have this casing that is being held by the wooden end of a stick, and we're trying to put that inside the envelope. So with that, imagine doing that 15, 25 times over and over. It gets tedious and again, developing some type of equipment or contraption using a 3D printer that we can sterilize and use it in the field, probably make it very much efficient and quote unquote, cleaner for us to be able to continue working because it's not

just collecting casings, as we all know. It's other stuff that we have to do on scene. So that's just part of it that takes up a lot of time.

Brian Turner [00:22:51] So we've also just instituted a a new policy with our fired casings as of last week. When we recover our fired casings from the crime scene, we're now putting it in in an incubator and allowing it to kind of like cook basically for at 40 degrees Celsius for anywhere from 2 to 24 hours prior to us doing the M-VAC processing to help us to retain that DNA and keep those cells viable so that way we can get a higher yield with our DNA profiles.

Jaclynn McKay [00:23:19] Can you walk me through a little bit of how you actually M-VAC the cartridge cases? Because I from my understanding of the machine, it has kind of like a vacuum. So do you put the cartridge cases in a solution and let it soak and then run that solution through the M-VAC?

Roberto Caceres [00:23:37] The first thing we do is we have a conical tube and we will place two grams of chelex beads in the conical tube. And the chelex beads are sort of think about a diaper, that gooey absorbent material inside a diaper that's kind of grainy. That's what the chelex beads remind me of at least. So we put two grams of that and then we fill the conical tube with about 20, a little bit less than 25 millimeters of buffer solution. After that, we vortex the buffer solution with the chelex beads in order to dissolve the material. And then one at a time we place the casings inside of the solution and we vortex them for about 30 seconds each. So once that is done, we run the buffer solution through a pre-filter And what the pre-filter does, it collects right at the filter level. It collects not only the used chelex beads, which at this point is like a mushy material, but also any other inhibitor like small metals, dirt, a little rocks. If it has a little rock attached to it, any grass blades or any other, like I said, any other type of inhibitor. So for us to have a cleaner solution, once we obtain the clean solution, what we'll do is we'll grab a funnel and place it inside the Nalgene filter in order to reduce the amount of space where the solution will run through the filter. Once that filter is used, we cut it with a sterile scalpel and then we place it in a petri dish and ready to go to the lab.

Jaclynn McKay [00:25:04] You mention that you put each individual cartridge case in its own conical tube, is that correct?

Roberto Caceres [00:25:10] So we use the same conical tool for the grouping, for the grouping. So if we have to in group, it will only be two one at a time though, because then after that we don't know which one is which as far as itemization and kind of for cataloging purposes, if we have 15 in the same group, then we do all 15 just one at a time that makes the same solution.

Jaclynn McKay [00:25:29] Are there any things that can inhibit the recover lift system from developing fingerprints on cartridge cases?

Brian Turner [00:25:36] So one thing that we have found that has been a factor in affecting that is most American made ammunition has a shiny coating to the outside of the cartridge casing. So sometimes that inhibits that corrosion of the metal, because that's the purpose of that. That coating is to prevent the corrosion. When we have cases where we have more foreign made ammunition, they don't have that coating on there. So we've found that we were getting better fingerprints on those types of cases than the ones from American made ammunition.

Jaclynn McKay [00:26:06] That's really interesting. Speaking of getting better rates, Roberto, could you touch on what your success rate has been for developing DNA profiles pre and post using the M-VAC system?

Roberto Caceres [00:26:19] Absolutely. So let me first start off by saying that prior to obtaining the M-VAC machine and going through all of these methodologies that we go through now for obtaining DNA. We used to our protocols were to swab the fired casings with the swabbing method of firedcasings, which is the traditional method of collecting DNA. We were obtaining less than 1% of success for any type of DNA profile. After obtaining the M-VAC machine and the methodologies that we have developed throughout the probably last four years, four or five years. We now our success rate has gone. When we first started doing our trainings from 11% of success. So the latest that we have up to date is about 17 to 19% of success return rate, which is great if you think about it, for every 100 cases that we work, we have about 17 or 19 cases that come back with the full profile just on the fired casings. And that is not to include any other pieces of evidence that we can submit to the lab, for example, fingerprints, any type of blood evidence, any type of trace evidence. This is strictly DNA off of fired casings that can be solved, and it's about 17 to 19 out of every 100. We want to obtain at least a 24% return, which I think we will obtain it eventually. But as for now, our numbers continue to increase. And with the number of cases that we obtain every year, we I believe they will be on the right track to obtain that only because we continue to work on it. It's not something that that just stays stagnant for a couple months because we don't get shootings. We get shootings all the time. So we'll definitely be able to work on that as we go along.

Jaclynn McKay [00:28:02] So do you think you can hit that 24% success rate just with working more cases and utilizing this technique on more cases? Or are you guys still trying to make tweaks to this process to keep increasing that success rate?

Roberto Caceres [00:28:19] We want to improve on the methodologies that we're using, whether it's to add another item of equipment or to remove something in order to lessen the transfer of DNA. One of the things that we recently did was remove all of the DNA equipment, including the M-VAC machine, from the general processing area, and move it to a room where it's more sterile, cleaner and less frequented by visitors. And because of that, hopefully we'll be able to have less of a mixture from an unknown that is actually coming from the office or from our lab.

Jaclynn McKay [00:28:52] Coming from a previous forensic serologist. I am very impressed with all of your procedures to try to keep things sterile and wearing masks when you're collecting any sort of evidence that's going to be sent for DNA testing. So I'm very impressed.

Roberto Caceres [00:29:08] We have to because unfortunately, I mean, we want success in our in our case rates or case returns. But at the same time, you know, going up to a jury and explaining why somebody that retired a year ago is coming up in our cases, it's embarrassing. So one of the things that we always, always, always keep in mind is going to be that transfer of DNA. Let's lessen it in order to get what we really need, which is a suspect or a victim on the surface of these casings.

Jaclynn McKay [00:29:37] I'm really interested to see how once you start 3D printing new tools to collect cartridge cases, to see how that might impact the results that you're seeing. So that's really exciting.

Roberto Caceres [00:29:48] I'm interested, too. Yeah.

Jaclynn McKay [00:29:49] Yeah. Your agency is using a lot of interesting technologies in this methodology. Could you talk to what the training process is like for your crime scene unit in order to be able to utilize these tools?

Roberto Caceres [00:30:01] Yes. So during the FTO training and ours is nine months, there is a week block where the usage of the M-VAC machine, as well as the recover system is not only introduced, but also the trainee gets to work in-house cases where they can show their proficiency on these on these methods. And the machine, as time passes by and new methods are developed or refresher training needs to be done. In our unit, we actually do it as a group so that everybody is basically in the same mindset as far as the the usage, the methodologies and the deployment of the machines. We want everybody to be on the same boat because it's not fair for someone to be trained fully on this machine and the next person to have half of the training and then they can explain themselves either in court or in general.

Jaclynn McKay [00:30:57] Kind of a along those same lines with all these different technologies that you guys are using. Could you talk to me a little bit about the cost of using these technologies and any sort of funding that might be available?

Brian Turner [00:31:11] Sure. So the M-VAC, because of the sensitivity of the DNA collection, a lot of it is consumable. So the costs can escalate quickly from that. So we've. Actually been able to work out, especially with our fired casings. We can utilize most of the stuff multiple times as long as we're not contaminating that sterile solution or that the nozzle head to get the solution from. But if we're processing an article of clothing or something, all of those consumables have to be changed out between one article and the other to keep that sterile environment. So we have worked out the costs where for our fired casings, it's about $150 per case with the consumables and the material that we use to process each each one. Some agencies that are not able to necessarily afford the M-VAC system may just buy the consumables and use another agency's system. We work with a lot of agencies where they'll do that. They'll buy the consumables, come to our office and use our system with their their supplies and do their own processing to kind of save some costs at their agency. There are definitely some grants out there that agencies can apply to that is there for equipment to supply to a police agency to have these types of devices for their use.

Jaclynn McKay [00:32:31] And when thinking about going from a less than 1% yield to fingers crossed 24 and that's that's a low price to pay for getting leads.

Roberto Caceres [00:32:43] Yeah, absolutely. And we're talking about major crimes here as far as a homicide or even a shooting with serious bodily injury. We're not talking about small burglaries. Not that I'm downsizing, but considering the cost of the materials, just like Brian said, as well as the labor. It's a small price to pay to get justice for these families, for their loved ones.

Jaclynn McKay [00:33:05] I thank you guys for all your work out there and thank you for taking the time to discuss this method with me. It truly has been a pleasure speaking with you.

Roberto Caceres [00:33:12] I appreciate it. Thank you very much.

Brian Turner [00:33:14] Thank you.

Jaclynn McKay [00:33:14] If you enjoyed today's episode, be sure to like and follow just science on your platform of choice. For more information on today's topic and resources in the forensics field, visit Forensiccoe dot org. I'm Jaclyn Mackay and this has been another episode of Just Science.

Introduction [00:33:34] Next week, Jason sits down with Laura Mattsson to discuss the value of footwear investigative leads as a resource during investigations, 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.