



Toxicology: A Small Dose of Science for Attorneys and Insurance Claims Professionals - Episode #145

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John Czuba: Welcome to the *Insurance Law Podcast*, the broadcast about timely and important legal issues affecting the insurance industry. I'm John Czuba, Managing Editor of *Best's Recommended Insurance Attorneys*, including Expert Service Providers.

We're pleased to have with us today, expert service provider, Dr. Allison Muller from Acri Muller Consulting, LLC in Aston, Pennsylvania, which is right outside of Philadelphia. Dr. Muller is a board-certified toxicologist and registered pharmacist with over 20 years' experience in the field of clinical toxicology.

She spent nearly two decades at the Poison Control Center at Children's Hospital of Philadelphia, where she was consulted on toxicology cases from 21 counties in Pennsylvania and Delaware.

Dr. Muller is presently an independent consultant providing expert witness testimony on cases involving medications, alcohols, chemicals, and environmental toxins. She is also adjunct faculty at the University of Pennsylvania School of Veterinary Medicine and a section editor for the *Journal of Emergency Nursing*. Dr. Muller, we're very pleased to have you with us today.

Dr. Allison Muller: Thank you.

John: Today's topic for discussion is toxicology, a small dose of science for attorneys and insurance professionals.

Dr. Muller, you're a toxicologist who works with attorneys as an expert witness. Can you tell us some examples of legal cases you've worked on, so our audience understands the expertise of a toxicologist and what types of cases they may need to consult one for?

Dr. Muller: Sure. Thanks, John. That's a great question. I really like to talk about the range of cases that I am consulted on by attorneys when it comes to toxicology.

The range of cases typically involves drugs. The drugs might be prescription level, might be over-the-counter, might be herbal or street drugs, certainly alcohol, which is a drug itself.

Then cases about environmental toxins, things like mold or carbon monoxide, which may be in a residential setting or even in a workplace setting. Then also cases that involve chemicals. Those are often workplace related cases.

To give you an example of the type of case that I'd be consulted on regarding these types of substances, an attorney might have a case involving an accident, let's say a car accident, or a workplace accident, or a pedestrian accident, and drugs are found in the system of one or more of the parties involved.

Then the question becomes, we see these drugs were in the system of one or more of these parties. What was the role of the drugs in this particular accident? Did the drugs cause the person to be impaired? Did the drugs affect the person's judgment, behavior, reaction time, balance?

Really being able to figure out what these drugs in the system mean in terms of their relation to one of the sites of accidents.

There also might be a situation where there is a case involving a toxin in the home or the workplace, like carbon monoxide. Carbon monoxide is odorless and it can be potentially deadly. It's a byproduct of a fossil fuel, like home heating oil or gas. If the product is not being burned off cleanly, carbon monoxide is produced.

Cases that I get from attorneys about carbon monoxide typically ask the question of, "Are the person's symptoms at the time of the exposure to carbon monoxide truly related to the carbon monoxide? When it comes to cases where there's litigation involved, the effects, are they lingering, are they permanent, and are they related to the carbon monoxide?"

Finally, another type of situation would be, let's say a medical malpractice attorney is investigating an unfavorable outcome following a person's medical care. Maybe medications aren't even on their radar initially.

Perhaps it was a surgical malpractice case that they are defending or trying to litigate against, but a patient was on several medications. The attorney wants to know what role could they have played in the outcome of the patient's hospital stay? They may not see some things, and I bring these to attorneys' attention when they are reviewing medical cases.

Look at what the drugs are that are involved. Look at the doses. See if there's any antidote use. If there is any antidote use, that means that something potentially bad happened in terms of the patient got too much or had an unexpected reaction.

If there are drug levels that are in a patient's medical record, why were the drug levels being drawn? If it's for patients that are very old or very young, meaning young pediatric patients. We unfortunately define old adults being 65 or over. It doesn't seem all that old.

When we have patients in those two age groups, we have to look very closely at the medications they're on, because they're more sensitive to the effects of drugs versus someone who is not of one of the extreme ages or another.

There's many aspects to cases involving medications beyond was the dose correct or not. That's certainly somewhere that an attorney could start and go to a reputable drug information source online, and check the drug dosages of the patient, but they are very individualized. There's a lot of other factors.

Thank you for that question about asking me to provide some examples.

John: What are some common pitfalls that an attorney should be aware of when looking at drug testing results?

Dr. Muller: If all you have are drug levels, then all you have are drug levels. It sounds like a very simplistic statement, but it means a lot.

The biggest pitfall that I see is that attorneys – sometimes, healthcare providers do this too – is that they look at drug levels in isolation, meaning they look at a level, they look for some handy-dandy chart, and they try and make a conclusion from there. That's actually not the correct approach.

For example, an attorney will retain me for a case and want to know my opinion is based on a drug level alone. I can't stress enough that most of the times, drug levels looked at in isolation are not going to tell me enough of the story to figure out what exactly was happening when that person was exposed to that drug.

I want to know things like, tell me more the background of this person. What's the person's medical history? What other medications are they on? I want to know their entire medication history. What did they look like to bystanders at the time of the incident or accident?

Was there also alcohol involved? Was there a police report? Do we have all the pharmacy records for the person, medical records, and that sort of thing?

The biggest pitfall is if you have drug levels, you need to look further. We just don't want to take a drug level and make any conclusions in isolation.

John: Dr. Muller, what can you tell us about false positives and how they can happen? What are the most common false positives on a drug screen?

Dr. Muller: To answer that, I want to go over what types of toxicology tests are out there. I'll keep this simple. The dichotomy is there are screens – toxicology screens – and then there are confirmatory tests.

Most often, we hear about drug screens or urine drug screens as being the first level of testing. They're often known as UDS, which stands for urine drug screen.

Screens are looking for drugs with structural similarities that are going to then produce a positive result on the screen. That's different than a confirmatory test, which is looking for the molecular fingerprint of a drug.

You're not going to get false positive with a confirmatory test, but you are for screens, because it's just looking for structural similarities, not the actual molecular fingerprint of a particular drug. A screen is just a starting place.

For example, let's say a drug screen is looking for PCP as one of the drugs. There's several types of drugs other than PCP that have the structural similarities.

Therefore, there are several drugs that can produce a false positive for PCP, like things like an over-the-counter cough suppressant, dextromethorphan. You'll see DM on part of a name for these types of cough syrups that are over-the-counter.

Some anti-seizure drugs like lamotrigine. There's over-the-counter pain relievers such as ibuprofen. That can also cause a false positive for PCP. I mention PCP as example because it's one of the most common false positives on drug screens. There's just a lot of other drugs that cross-react with the screen.

Finally, there are false negatives. There are false positives, but there can be false negatives, too, to be fair here. In other words, if there is a drug that's being tested for, let's say benzodiazepines are on a drug screen. Benzodiazepines are things like the brand VALIUM, or XANAX, or ATIVAN.

If the drug screen is looking for one type of metabolite, let's say – a metabolite is formed when a drug breaks down in the body – not every benzodiazepine is going to break down to the same metabolite that the drug screen is looking for. In that case, we can get a false negative.

We don't always have this information, but the toxicology screens can be followed up with a confirmatory test. It may or may not have been done. For the purposes of taking care of the patient, it might not be necessary.

Of course, when it comes to the legal world, we want to know more and more, and to see if something was a true result or not. We don't always have that information.

As a toxicologist, I always need to know what type of test was done before interpreting drug test results. Usually, that's clear when the case is sent to me and I'm given the laboratory results, the toxicology screens or the toxicology tests.

If it's not, if there's any question as to what they were testing for as such, I give a call over to the lab and speak to the medical director or one of the other professionals there.

John: Dr. Muller, how is toxicology testing different when different samples are used, such as blood, urine, hair, or nails?

Dr. Muller: We keep expanding that list of different sources that we can test to determine drug use and alcohol use. Sources of sampling have different pros and cons. For example, blood is the least likely sample to be tampered with. That's the upside of blood.

Drugs in the blood are there for the shortest time, whereas their metabolite – again, those are formed when drugs break down – they're found in urine longer. The issue with urine is – depending on the setting – there's the risk of it being tampered with, when people attempt to add things to their urine to try and dilute it out to change the pH.

They try and take supplements to alter the detection of drugs in urine. They use other people's urine when they come to their drug test, or they have something that's available now called synthetic urine.

We have the blood versus the urine for the drug testing and the confirmatory tests as well. We have hair and nail sampling. We have certain drugs that can be detected.

The upside of hair and nail testing is those drugs are going to be detected via the hair and nail sampling until the hair and nails grow out. We have a long detection time with them. The downside is we have limited data on interpreting any type of levels from those two sampling forces.

I'll also mention breath testing. Everybody is familiar or at least heard of breath testing done for alcohol. We're able to do breath testing for alcohol levels, and then correlate those breath levels to ability to safely drive a vehicle.

Interestingly enough, breath testing is under development for marijuana use right now. The interesting thing about that is because we're not able to tie a level of marijuana with impairment, unlike we can do that with driving and alcohol levels.

We sometimes can tell if the use is recent, but it doesn't tell us, "OK, was this person impaired at the time that they got hurt working the machine at work, or the time they got into the accident?" The breath testing for marijuana is being developed to try and narrow down when the person smoked the marijuana to a very narrow time-frame.

We'll have to see if there is going to be data that will then support if the person was intoxicated at the time of testing, or not.

John: Dr. Muller, how about drug levels in patients who have died? Sometimes, attorneys have cases with autopsy results. I've seen your credentials, and you've presented a CLE talk on postmortem toxicology for attorneys. Do you interpret these levels the same way you would in living patients?

Dr. Muller: Postmortem toxicology is a different area of toxicology – a subset of toxicology. The principles that we would apply to drugs in the body when the patient is living is much different than when the patient is deceased.

The body goes under many changes after death. Calculations and interpretations are different versus what we would interpret when the person was still living. Things like drugs will shift compartments in the body. Body fluids may spill into other body fluids. There is pH changes.

There's different things that are happening as soon as death ensues. Trying to figure out what happened to a person before death based on toxicology testing as it relates to the autopsy file findings is challenging.

With these cases, certainly, I need as much background information as possible on what the person was doing before death, how they were acting before death, what their medical status is like, to really interpret levels.

It's a whole different area, but it can be done with the proper data. Just having drug levels from an autopsy, there's the same challenge of having drug levels in a living patient. Just having levels in isolation is not telling us enough. We need more background information on that person.

John: Dr. Muller, thank you very much for joining us today.

Dr. Muller: Thank you very much for having me do the podcast today, John.

John: That was expert service provider, Dr. Allison Muller from Acri Muller Consulting, right outside of Philadelphia, Pennsylvania. Special thanks to today's producer, Frank Vowinkel.

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