American Chemical Society AMA: Hi Reddit! I'm Kevin Shanks, a Senior Forensic Toxicologist with AIT Laboratories/Axis Forensic Toxicology. Ask me anything about forensic science!

r/Science AMAs[1] and AmerChemSocietyAMA [1]

[1]Affiliation not available

April 17, 2023

Abstract

Hi Reddit, and Happy National Chemistry Week! This year's theme is "Solving Mysteries through Chemistry" so I'm here to answer your questions about forensic chemistry and how science plays a key role in criminal investigations. I'm Kevin Shanks, a Senior Forensic Toxicologist with Axis Forensic Toxicology, a forensic toxicology laboratory in the Midwest USA. My areas of expertise include liquid chromatography mass spectrometry (LC/MS, LC/MS/MS, LC/ToF) and the analytical detection and toxicology of new psychoactive substances (NPS) such as substituted cathinones (bath salts), synthetic cannabinoids (spice/K2), NBOME hallucinogens, fentanyl analogs, and opioid research chemicals. I oversee all method development and validation of analytical methods for NPS at Axis and have provided fact and expert witness testimony in drug chemistry, human performance toxicology, and postmortem toxicology matters in numerous states. I hold a B.A in Biology from Franklin College in Franklin, Indiana, an M.S. in Forensic Toxicology from the University of Florida, and am certified as a Diplomate of the American Board of Forensic Toxicology in forensic toxicology. I also have published papers on the analytical detection and postmortem toxicology of synthetic cannabinoids (i.e. JWH-018, 5F-PB-22, ADB-FUBINACA, and 5F-AMB) as well as the detection of designer substances in pills, powders, and plant materials. I have presented research and casework at national meetings such as the Society of Forensic Toxicologists annual conference. My most recent projects include the analytical and forensic toxicology of fentanyl analogs, such as carfentanil and furanylfentanyl, and their emergence in the United States' heroin supply. Ask me anything about drugs, poisons, newly emerging substances, life in a forensic laboratory, postmortem toxicology, and analytical chemistry. I'll be back at 2:00 pm ET (11:00 am PT) to answer your questions. EDIT: I'm online now (came on early) and will begin answering questions soon. Just as a disclaimer, many of the answers are my opinions and do not reflect the thoughts and views of my company/lab. Also, because of the nature of the work, I cannot discuss active casework and also may not answer questions which could lead to illegal or criminal activity. -KGS EDIT: Thanks for all the awesome questions! I'm still answering questions. Going to try to get to as many of these as possible. -KGS EDIT: I have to log off for now. It's been fun answering questions! I'll be back around 6 pm ET (3 pm PT) to answer some more questions. -KGS EDIT: I've logged back on for a bit to answer some more questions. -KGS EDIT: I'm logging back off. This has been a lot of fun. And I'm happy that there have been many excellent questions. I'll log in one more time later to try to answer more questions. Look for that around 8 pm ET (5 pm PT). EDIT: I've had fun. Hope I was able to answer some questions for you. I wish I could have answered all the questions. Thanks to the ACS for having me do this. -KGS

the WINNOWER

REDDIT

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AMERCHEMSOCIETYAMA R/SCIENCE

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Ask me anything about drugs, poisons, newly emerging substances, life in a forensic laboratory, postmortem toxicology, and analytical chemistry.

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READ REVIEWS

WRITE A REVIEW

Hello, and thank you for taking the time to answer questions! So I took a forensic class in high school and we learned that TV shows are not very accurate at displaying the real workings of a forensic lab. I

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also heard that many forensic labs are under staffed and under funded. Seeing as how forensics is an important field, what are some things the public can do/should know about forensics? And the inaccuracies of popular TV shows, how do you spread the word what actual forensics is like?

DrBallz444

Oh, the tv shows! Speaking of drug chemistry and toxicology, most if not all are highly inaccurate or just downright wrong.

Public outreach. Explaining that TV shows are not "reality". Pointing out the inaccuracies when you can do so. Explaining the science to the general public and showing them what actually happens in a lab setting.

What poison scares you the most -- which is to say, which is the least detectable by current methods and most likely to result in your mysterious demise?

alphabetabravo

Historically? In drug toxicology, probably some quaternary neuromuscular blocking agents like pancuronium or vecuronium. Maybe succinylcholine. Potassium chloride. Reminder - these can be tested for, but not are not commonly tested.

Recently? Carfentanil.

I'm not including any heavy metal or radioactive substances.

-KGS

What has been your most memorable or complex case until now and why?

myk2801

I've been involved in some memorable cases and trials. The case that solidified my love of postmortem toxicology involved identifying a new substituted cathinone in a "bath salt" product by LC/ToF and LC/MS/MS and then finding it in the blood of a deceased individual by LC/MS/MS. The toxicology results set off a chain of events and aided the family of the deceased person in seeking closure in his death. -KGS

When you are looking for the cause of something in the body, do you have to know what you are looking for first?

MiiisssterMiiissster

Good question.

The answer is...it helps! A lot!

But unfortunately we usually do not have a lot of information to go on, especially if the death was unwitnessed or there is no evidence at the scene such as syringes, pills, tablets, powders, etc.

Most labs offer "comprehensive" panels of testing with broad spectrum scopes (typically made of 200-500 different substances). The sample will be screened for those substances and then any presumptive positives from that screen will be further confirmed by alternative, more specific testing.

Of course, not everything is included in those comprehensive panels, so that is where we would have to dive into more specialized and directed analysis - such as testing for rare anesthetics or newly emerged synthetic cannabinoids. - KGS

Hello! I'm currently a student about to enter university next year in a Life Sciences course. As an option, I could pursue a Masters in Forensic Science as part of an extension of my degree. My knowledge of careers in forensic science is limited pretty much to CSIs though so I would like to know:

1. what other possible career paths are there for a degree with forensic science?
2. Is the job really tedious and repetitive? I've heard about forensic science jobs consisting of a lot of tests and waiting for results so I'm hoping it's more interesting than that.

Thank you so much!

capeswing

1. With a general forensic science degree, you may be able to dive into any one of the forensic disciplines - serology, chemistry, toxicology, firearms, trace, etc. I recommend finding an area that you are interested in and diving headfirst into it. Just remember, being a CSI and being a lab person is not the same thing.
2. It can most definitely be tedious and repetitive. Much of the work at the bench level is. But, work off the bench isn't so repetitive. My job consists of toxicology case review and release, talking to coroners/pathologists/medical examiners/law enforcement/attorneys/families about toxicology results, testifying in criminal and civil court, consulting, laboratory work, method development/validation, research, etc.

-KGS

Are we ever going to see a conclusive test for cannabis for driving under the influence, like we have for BAC? Are we ever going to have a test that actually determines you are impaired?

This is a huge unanswered question for many areas that are or going to recreationally legal. When is it appropriate to fine or arrest someone?

A potential for false arrest is pretty huge considering most tests can show the same level of by-product whether it has been 10 minutes or 8 hours since you used.

herbertJblunt

In my opinion, no, there will likely never be a test that determines "impairment" from THC. Pharmacokinetics of THC are not like ethanol. The best course of action is to marry up toxicology results with observed behavior, DRE observations, etc. -KGS

I have a friend who is freaking me out a bit. When I cut a fart in the office, he will take a deep breath and then tell me what I had for lunch. He's never wrong. It's freaking me out because scientifically, I don't see how this is possible. No matter how much I mix up my menu he never makes a mistake. Yesterday I skipped lunch and he correctly guessed what i had for breakfast instead. Is it possible to forensically tell what someone had for lunch by "testing" the effluvium?

Tomorrow I am going for all you can eat sashimi. Prepare for some cuttle fish Kyle!

mein_liebchen

No. But interesting question. It made me laugh out loud.

-KGS

In the Netherlands we can send our drug to an institution, anonymously, to test for substance and contaminations. I believe this greatly increases safety, especially with false substances such as NBOME's sold as LSD. Does such a thing exist in the USA, if not are there incentives to set up such a system?

Pharmacorium

In my opinion, these are great services.

Ecstasydata.org does exist in the States.

http://www.ecstasydata.org/

I think with our current government/legal system, there is no incentive to do this sort of testing and it may actually be frowned upon by many people. I'm not one of those people though.

-KGS

Hi! I used to run a Q-trap in a veterinary toxicology lab, I miss it but not enough to go back :-). What drug do you most dread having to confirm and why? Do you have a good screen for cathinones that you feel is accurately detecting new forms as they pop up? In human forensics do you ever need to quantify or is detectable presence above a reasonable limit good enough for court proceedings?

nefariousmango

Any drug that requires an extremely low limit of detection!

We have a good assay for cathinones, but it is a targeted assay, so we are only going to detect what we are looking for in the method.

As for quantification - for many of the drugs we have good information and long histories with, quantification is necessary. But for many of the new substances appearing on the market - we have no frame of reference as to what is "toxic" or "lethal". It is my rule that for NPS such as synthetic cannabinoids or cathinones or NBOMes, etc. the simple qualitative (yet confirmed) presence of the substance in a biological fluid is important. The quantification of the substance doesn't really contribute much (at this time) to the interpretation of the toxicology result.

-KGS

Hi Mr. Shanks, thanks for doing this AMA.

Can you tell us more about your recent work on fentanyl analogs? Given how ludicrously potent (I believe that is the proper scientific terminology) carfentanil is, and given that fentanyl alone has caused innumerable overdose deaths, is carfentanil really going to be an even bigger problem without killing pretty much half of the users and hence rapidly becoming unprofitable? Also, can you determine in your analysis where the analogs have been made, e.g. due to distinctive contaminants in specific overseas factories?

KeystoneKops

Carfentanil is scary. Ludicrously potent is the proper term. :)

It really depends on how widespread it becomes. I do believe that law enforcement is doing a good job with attempting to identify and contain the carfentanil containing products as best they can. From all information available, it seems to be contained to the Midwest and Florida, but as with any substance out there, it could spread quite easily.

No, we are not set up to do that sort of contaminants analysis. I'm guessing it could be done, but I'm not too educated on that. Authorities have said that the carfentanil being used in this country is being synthesized in China and then sent here.

Here's the DEA release on Carfentanil:

https://www.dea.gov/divisions/hq/2016/hq092216.shtml

-KGS

I am aware that your profession is constantly surrounded by other mayor branches that pursue the truth behind a death. How is the relationship your job has with the police and the families of the deceased? Which of them can you classify as "harder" to deal with?

thoughtgerm792

Interesting question - as a private toxicology laboratory, we are here to make sure our science is sound and that the results we produce are accurate. We are definitely not law enforcement or affiliated with them in any way, but I do talk to law enforcement all the time. We also do talk to family members, but that is rather infrequent. I wouldn't classify either as "harder" to deal with. We try to relay the most accurate scientific information to both law enforcement and family.

How do new forensic techniques become admissible in a court of law without precedence.

As well, how easy is it for a new technique to become admissible.

By new technique I mean anything new to the scientific community , not just the courts

DISKFIGHTER2

Ah. The Frye standard.

If the science is sound and can be explained at the most basic level, new techniques are easily introduced in court and admitted as evidence. I've went through this with the introduction and popularization of liquid chromatography time of flight mass spectrometry into the forensic toxicology world in the mid-2000s.

-KGS

As somebody with only a B.S. in Chemistry, how can one get into forensic chemistry? Is a M.S. required, and are jobs posted on various state agency websites?

NinjaChemist

Many bench-level jobs only require a BA/BS. These jobs can include doing the actual wet chemistry techniques (organic extractions), analytical chemistry/toxicology (setting up, running, and maintaining

analytical instrumentation like an HPLC or an LC/MS), or even work in R&D. I started my career running HPLC-UV instruments. Pretty much any career outside the bench will require at least a Master's degree.

As for jobs, state agencies post their open positions on their websites, but organizations and societies like the American Academy of Forensic Sciences (AAFS) and Society of Forensic Toxicologists (SOFT) also post job openings.

You can find some here:

https://webdata.aafs.org/public/jobs/postings.aspx

http://www.soft-tox.org/jobs

What is the most dangerous drug you've seen in your professional career?

Coach_DDS

All drugs and substances have harm, but it's a sliding scale.

Recently? I'd say carfentanil. There is no real rival (at this time) to its potency as an opioid receptor agonist. And its appearance in the US heroin supply is tragic. I mean, it is surmised to be active in the human body in microgram dosages. This is a compound that has been used in chemical warfare. And now it's being used unsuspectingly by people thinking they have heroin. Frightening. - KGS

Hi Kevin, thanks for doing this AMA!

Which skill learned as an undergrad do you think is the most important to success in your field? Lab experience, research capabilities.....?

imgeekynotcool

Lab experience by far. The ability to carry out an experiment to the end. The acceptance that not all experiments are successful. The realization that negative results are just as important as positive results. - KGS

Good day Mr. Shanks.

What extraction methods do you recommend for a general extraction procedure of drugs and/or poisons in human organs and bodily fluids? Also, which references do you use for Forensic Toxicology in general?

frmnnsl

Your extraction method will highly depend on instrumentation available to use. For something that will be run on GC/MS, you'll probably have to rely on a liquid-liquid extraction (acid-base) or even solid phase extraction. For something that will be run on LC/MS, you may be able to utilize a "protein crash" or precipitation with an organic solvent such as acetone or acetonitrile.

Some references I like:

Levine's Principles of Forensic Toxicology Baselt's Disposition of Toxic Drugs and Chemicals in Man Casarett and Doull's Essentials of Toxicology Clarke's Analytical Toxicology Goodman and Gilman's

The Pharmacological Basis of Therapeutics Garriott's Medicolegal Aspects of Alcohol

-KGS

How accurately do shows like NCIS portray forensic science?

Scamp3D0g

It doesn't.

There's an episode of NCIS that I always use as an example - the one where Abby needs access to some sort of mass spectrometer, but she doesn't have any way to get ahold of it. It just so happens there's a trade-show she is going to and she removes the evidence she needs tested from the lab (chain of custody?!?) and talks the salesperson at the tradeshow into running the sample (which I believe is a hair or fiber in a glass jar) on the instrument right there at the show.

Yeah, not real. Completely dumb and wrong.

-KGS

How well do you think the people developing new synthetic cannabinoids know chemistry? Are they just throwing on functional groups in random places and hoping it works? I only ask this because I hear new synthetic cannabinoids appear quite frequently.

Skoobalunker

I think that most of the people synthesizing these compounds know exactly what they are doing. They are using techniques in medicinal chemistry and organic synthesis to make potent synthetic cannabinoid receptor agonists. Of course, you'll have those people that get involved that have no prior chemistry experience, but it seems that the people making them are actually formally trained chemists.

And yes, new synthetic cannabinoids appear in the wild quite frequently. - KGS

I've been looking for while but haven't been able to find the answer to this question: Are there statistics on what cocaine is cut with most often in the US?

aryanoface

I don't have any statistics on hand, but levamisole is a major adulterant to cocaine in the US.

Here's a paper from Clinical Toxicology on the subject:

https://www.ncbi.nlm.nih.gov/pubmed/22455354

-KGS

Hi Kevin thanks for the AMA, Go gators! What is your opinion on the fentanyl epidemic? I'm constantly seeing ODs on the news and I know fentanyl is the culprit since it's spreading into the opioid market and fast. Is it really that easy to synthesize?

elizone

If you know what you're doing and have access to the appropriate reagents, yes they are relatively easy to synthesize - definitely requires knowledge though.

The fentanyl and analogs issue is sad and frightening. If introducing fentanyl wasn't bad enough, let's introduce carfentanil! Just makes me shake my head sometimes. - KGS

1) How difficult is it to find a job in the field? I have 4 years experience in a chemical lab and a BS in Biochemistry (Go Gators!).
2) How grisly is work in a forensics lab? Do you see corpses often or are specimens brought into the lab?

Jesus-chan

1. There are job openings all the time, so I would look at sites like SOFT and AAFS.
2. In a tox lab, you'll work around blood, urine, brain, kidney, lung, spleen, gastric contents, muscle, etc. All of these tissues and samples could be from a decomposing body, so they could be putrid and definitely smell. We don't work with corpses as we are a private lab - our clients do the autopsy and then send us the blood or other samples to analyze. If the tox lab is attached to a coroner or medical examiner's office, then you may actually see the bodies.

I have seen some decomposed tissue specimens explode in their tubes though - gas buildup over time. That was fun.

-KGS

G'day! Thanks for taking your time to answer questions. Recently in Australia, particularly Queensland we have had a huge problem with overdoses on people trying NPS, (or drugs that are yet to be classed? Is my way of understanding that)

1: Are you worried about the rapid development of these new NPS?

2: The most common term we are hearing is a drug known as flakka (alpha-pyrrolidinovalerophenone) are these drugs just in early stages with the people producing them not fully understanding what there making? Or what the effects are?

3: Finally. What's your opinion on legalising Marijuana?

Thankyou again. And hello from down under!

let_me_get_fork

1. Yes, the rapid proliferation of NPS are always troubling.
2. Most of these substances are developed in academic research and published or synthesized and patented but never followed up on. Alpha-PVP was among some other pyrrolidino compounds actually patented in the 1960s. Very little pharmacological testing was completed prior to patenting the chemical. It isn't until the last 2 years or so that we understood how Alpha-PVP works in the body.
3. Personally, while I don't condone drug use, I am for marijuana legalization, as long as there are regulations and a structure in place to deal with all that goes along with legalization. -KGS

I've recently learned that you can get botulism from oil infused with garlic stored at room temp. What's some of the other accidental poison people might not know about?

blue-ears

Don't forget botulism from canning food! -KGS

http://www.cdc.gov/Features/HomeCanning/index.html

Do you end up randomly fantasising about the perfect crime using poison? Or would that perhaps be easier than one might think?

snoozieboi

I have my personal thoughts, but this will be a question I won't answer. - KGS

Hello! I'm currently in year 11 and have set my career goal to forensic science. Are there any tips or suggestions that you could pass on that would be important when considering this career path.

Also the university that im going to requires chemistry as a prerequisite, but not biology. However I'm doing both next year. If I could also ask what sorts of chemistry applications do you use in the field, and how important is biology.

Idiot-Head

First, read as much as you can. Read all the time. Get as much lab experience as possible. Become accustomed to documenting everything in writing (notebooks - if it isn't documented, it never happened!). It's cliché, but never stop questioning.

For my field of toxicology, it is important to have a firm grasp on both chemistry and biology - especially when you delve into pharmacodynamics and pharmacokinetics of drugs. But, for the other forensic disciplines, it may not matter.

-KGS

What is the most commonly used "untraceable" poison against humans that you find?

Somedudewithagun

The vast majority of things are traceable if you know what you're looking for and have the right instrumentation. Some things are just more difficult to detect than others. But that's all I will say. -KGS

Could....could you please make more of your papers "Open Access"....? In desperate need of academic literature here but all the papers i need are expensive :(

1234hrishipai

I think we should strive to be as open access as possible. But, one thing I have found is that if you email the author(s) of the paper, he or she will gladly send you a copy. Scientists love disseminating their work!

-KGS

How easy is it to test for LSD? Can it be found in urinalysis, hair tests, or blood tests? Is it more expensive to test for LSD? Are there any myths about testing for LSD that you could dispel? It just

seems like there is a lot of misinformation floating around on the net.

Level4_The_Horrors

LSD is a difficult analyte to test for, but it can be done.

Because the normal LSD dosage is in the microgram range, the blood/urine concentrations will be quite low. Detecting these concentrations can be difficult due to the analytical sensitivity of our methods/instruments.

Also LSD is pretty unstable when exposed to light. It degrades pretty rapidly in the presence of light.

Here's a good paper on LSD storage stability.

https://www.erowid.org/archive/rhodium/pdf/lsd.storage.stability.pdf

-KGS

Does your company have any divisions in Canada?

BeautifulTorment

No, we are strictly based in Indiana, USA. - KGS

Any suggestion as to the best way for one to enter the field of forensics? I recently graduated with a degree in chemistry and work regularly with LC/MS and LC/MS/MS. I find forensics work fascinating, but it seems rather difficult to break into the field (or any field of analytical science really), without a specifically tailored set of skills.

jawnlerdoe

Try to do an internship in a forensic laboratory. Many labs or agencies offer them. See if you can shadow for a day or two. Attempt to talk to the people in charge of the labs - not the owners, but the lab supervisors and managers.

You're correct about the skill set, but most of that is learned while on the job.

-KGS

A toxicologist named Shanks? The RPG'er in me wants to disbelieve.

Now that I have wasted everyone's time on that horrible joke, an actual question: Have you ever worked on a homicide case of poisoning? As in not a drug overdose, or tainted supply, but good ole murder, Agatha Christie style.

JDub_Scrub

I get that a lot about my name.

Yes, I've been involved in intentional poisoning cases with things like strychnine, brodifacoum, tetrahydozoline, etc.

-KGS

IMO there should be more toxicological understanding of psychoactive substances other than "drugs are bad, mmkay". Do you co-operate in projects where the dangers of NPS are made more accessible, and comprehensible, with most info on Errowid being outdated?

Pharmacorium

I wish I could do so. I'm a proponent of harm reduction. But, I haven't been able to do so yet (other than educating people during presentations/seminars, etc.)

-KGS

What degree in college should I peruse if I want to become a forensic scientist? I know there are different routes you can take, but which is the best?

MossyMau

If you want to get into chemistry or toxicology, you'll need to focus on chemistry classes with a little biology. DNA/serology? Focus on biology with some chemistry.

It really depends on the discipline though.

-KGS

How dangerous is NBOME and LSD?

aziplease

NBOMes are extremely dangerous. Nothing good has come from NBOMe compounds being in the wild.

LSD. Well, not as dangerous as NBOMes.

Danger/harm/toxicity is a sliding scale.

We published a paper on a couple of NBOMe related deaths in Indiana.

https://www.ncbi.nlm.nih.gov/pubmed/26378133

-KGS

What is your opinion on research chemicals, and do you see drug tests detecting substances such as U-47700 and substituted cathinones in the near future? Thank you!

WSRBoater

We already have tests that can detect U47700 and many other research chemicals. These are very specific tests by LC/MS/MS or LC/ToF-MS in some form.

-KGS

What is the most interesting chemical or process that you can think of?

dcred123

Interesting? Probably the 100+ cannabinoids in marijuana and how a plant evolved over time to contain each of those cannabinoids for some reason or another. -KGS

If i want to do forensic science when i get older, how should i start?

zeoranger7white

Read a lot of science. Study the world. Study people. Learn as much as you can. Focus on chemistry, biology, and other sciences, but don't forget psychology.

-KGS

How close are forensic sciences in real life to the ones shown in TV shows?

AvoidableBoat67

Not very close at all. Basically anything that happens in a TV show is misrepresented in some way or another.

-KGS

What's the best way to destroy evidence without there being evidence of anything being destroyed?

misterhamtastic

I won't answer this one.

-KGS

Would a forensics lab ever use LC/MS in a purely qualitative way so that they wouldn't have to report a blood concentration of a compound? That it would only report positive or negative?

Rayxor

Yes, we do it currently for some assays. Other labs do it as well.

-KGS

What's the most dangerous thing you've ever come into contact with?

Alternatively what's the most dangerous one you know *exists*?

(Bonus points: No dimethyl mercury)

LawlessCoffeh

At this time, probably either carfentanil or brodifacoum or strychnine.

Danger is always a sliding scale.

-KGS

What are some of your thoughts on Ayahuasca? Do you think there is a potential for the brew to help battle neuorlogical problems like addiction, PTSD and such?

alissagata

Ayahuasca is an interesting concoction. We don't really encounter it much in postmortem toxicology. People just don't die often at all after consuming it.

I think it could has some potential to treat neurological problems, much like other psychedelics may have the potential, but it is Schedule I in the USA, so we'll probably never know.

-KGS

Long shot here but wondering what your take on this is. I have a friend (yes it actually is a friend) that recently took a urine test for a new job. The immunoassay was positive for methamphetamine so they did GC/MS and determined something around 1000ng/ml of methamphetamine. She takes 40mg of generic Adderall tablets daily for which she has a legitimate prescription. She swears she has never done meth and knowing her I believe her 99% (also who needs meth if you are prescribed that much Adderall). We are awaiting the results of the isomer test to see what the ratio of D to L is.

I have looked but not found any controlled studies where subjects are given Adderall and urine is tested for methamphetamine, only ones where they look for and report amphetamine concentrations. I wonder if a simple methylation event could occur either in the body, in the urine, or during sample preparation to produce this false positive. She is quite distraught over this situation and is looking for answers since the job rescinded the offer based on this test. Do you have any insight or resources you could direct my way so I can help her out?

PannusPunch

I would not expect any sort of in vivo methylation to occur. Or in vitro as well.

Could you ask to have another sample collected or a retest of the original sample (i.e. send to another lab)?

-KGS

I have a beautiful Monkshood (aconite) growing in my back garden. How would you catch me if I used to poison my mother-in-law?

lavachequipisse

Good question! We wouldn't unless we had information that aconite was suspected. -KGS

Hi, thanks for taking the time to do this ama.

I remember about a year ago Vice was running a lot of articles on Spice and the damage it has done to low-income areas in LA and elsewhere. Specifically, I remember long segments describing Spice "zombies" or people using spice and going absolutely crazy afterwords. These stories have been mostly agreed on in my own networks as well as other drug-cultures (such as r/drugs) and the general consensus seems to be that Spice is to be avoided, especially if other drugs are available.

I'm no chemist but I have smoked a lot of cannabis in my life and I have never seen a marijuana user go crazy in the way that Spice users seem to. So my question is a)what makes synthetic cannaboids different from pot, hash etc. and b)is it possible to make synthetic cannaboids that have the same effects as "natural" cannabis?

Pleb-Tier_Basic

This could be an hour long conversation, but here's the short:

A. Cannabis is a plant consisting of 100+ cannabinoid compounds - some of which act as partial agonists at the cannabinoid receptors; some have other pharmacological properties such as CB receptor antagonism. Synthetic cannabinoids are man-made chemicals that act as full agonists at the cannabinoid receptors - and we know very little about them other than that. B. No.

-KGS

Hi Kevin!

I graduated with a degree in forensic chemistry but never got into the profession. I worked a few years in a research lab but have now decided to go back and teach high school chemistry. I would love to create a forensics course once I get into the classroom (I am currently in masters program for teaching).

What skills do you think would be useful to students in a high school chemistry or forensics course? Toxicology requires a good chemical knowledge which may not be achieveable in a high school classroom.

langis_on

Good documentation skills are fundamental. Learning how to set up basic experiments is also key. Realization that negative results are sometimes just as important (or even more important) than positive results.

-KGS

Through political connections, I got the chance to have dinner with Kathy Augustine and Chaz Higgs, shortly before he murdered her with suxamethonium chloride.

Is poisoning by suxamethonium chloride something that you've come across before, and how easy/difficult was it to detect?

I'm assuming that Kathy's husband thought it was a foolproof plan. Obviously it wasn't.

pl4typusfr1end

Sux is pretty difficult to detect, but not impossible. I've never encountered it in my career.

-KGS

If someone is poisoned with a hazardous substance from a lab (eg. Sodium Azide), can you identify which batch or source it came from? How do you do that?

For context, I recently used Sodium Azide in a C. elegans experiment during an internship, and read

that the LD50 for humans was 0.7g on skin. I realized that the bottle I was holding was enough to kill more than 10 people, and wondered if it had identifiers to indicate its source if it was misused that way.

Kikanolo

No, we cannot determine a source of chemical from normal drug chemistry or toxicology testing.

-KGS

Thanks for doing this AMA! What are your thoughts on people taking drugs (cocaine and heroin in my city) cut with fentanyl and then dying due to respiratory depression? Do you have any thoughts about educating drug users or preventing these deaths?

Do you have any ideas if MS could be adapted to work in the ER setting, to rapidly detect what drug(s) an overdosed or drugged out patient took?

Codes4Nailpolish

With the emergence of fentanyl and other analogs in the heroin supply, it is important that we educate the public. We need more harm reduction avenues in this country (and others as well). People are going to seek these substances out no matter if they are illegal/legal. We need to provide them with as much information that we can. Harm reduction is everything to me.

Yes, MS can be adapted for use in the hospital or ER. It has in some spots in the USA. In fact, it's one of my dream projects. I'd love to be involved in hospital based STAT toxicology testing. Technology is evolving at a quick pace. I hope one day, every major hospital will have an MS in their lab.

-KGS

Is it true that if you kill someone with a kalium shot, it's impossible to determine the actual poisoning afterwards, and it would seem like he/she just died to a heart failure?

I heard this from a girl working in medical field. It had something to do with the natural kalium levels rising after death, so the actual kalium poisoning would be impossible to detect...

Edit: This shit is scary

Alpha-one

I wouldn't go so far as to say it is impossible. It's really difficult though. We can chemically analyze vitreous fluid (from the eye) for potassium.

You are correct that after death, postmortem levels of potassium can increase and in many cases with decomposition potassium levels are very very elevated.

Here's a good link on vitreous chemical analysis and even some interpretive information on levels.

http://emedicine.medscape.com/article/1966150-overview#a3

-KGS

I was a former Chem major that later ventured into the realm of physics as an undergrad. I joined the ACS club as a freshman because I was fascinated with chemistry. Our chapter didn't do much besides fundraise and have socials. I didn't feel any convection with the actually ACS. What can be done to

reach out to chapters at universities with students hungry for knowledge?

sleal

I'm not actually a member of ACS. But I'd love to get involved in some way.

-KGS

Hello I'm a BS in Pharmacology and Toxicology student graduating this year. What tips do you have for getting a job when I'm not sure what I'd like to stay in? I've done about a year of undergraduate research with cell culture, cocultures, tranfection, migration, invasion, and am currently working in vivo with transgenic mice.

ZachF8119

I recommend trying to intern somewhere. Maybe a crime lab or somewhere where you could be exposed to multiple forensic disciplines.

-KGS