

I'm Kevin Lothridge, forensic chemist and CEO of the National Forensic Science Technology Center. I'm here to answer questions about forensic science, forensic technology and how the work has changed over the past 20 years.

Kevin Lothridge¹ and r/Science AMAs¹

¹Affiliation not available

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Abstract

Hi Reddit, I have been a forensic scientist for 30 years and times have really changed, but the purpose of forensic science has remained constant: to apply science to matters of the law. Our company, www.nfstc.org, trains the professionals in all kinds of disciplines from crime scene investigation techniques to DNA analysis to field chemistry. Sometimes new technology is best for the case, but sometimes the tried and true methods are the best. We have developed lots of resources for non-scientists like www.forensicsciencesimplified.org and even online training programs anyone can take (<https://www.nfstc.org/service/forensics-training/>). I get lots of questions about forensic science from the pros and from people who have seen shows on TV, and would love to hear your questions, too. I will be back at 2 pm ET to answer your questions, ask me anything! Edit: fixed URL Edit: Okay, we're ready to roll!! I'm going to get started on all your great questions. Edit: That's it for me now. Sorry we ran out of time but thanks for all your great questions.

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KEVIN_LOTHRIDGE [R/SCIENCE](#)

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Do you believe that forensic science is reliable enough to be used in a trial that may result in capital punishment?

[brainotomy](#)

Forensic science by itself doesn't determine the outcome of a trial. The forensic evidence is only one piece of information used in any trial. I believe the science, if properly conducted, is reliable.

Forensic science has taken a lot of criticism from different sources, notably the various innocence projects around the country (1,2) and as a molecular biologist myself I know first hand how finicky DNA can be. Do you see the concerns raised organizations such as the innocence project as valid and something needing to be addressed, or as somewhat overblown?

If valid, what is being done to address the problem?

[phytalchemist](#)

I believe it's important that any time there is an opportunity to improve the science, or the application of the science, that we as forensic scientists explore how it impacts the work we do and the technologies we use. Because the court system in the US allows for everyone to question evidence brought against them, then this questioning will continue.

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- **What are the workhorse techniques(e.g. LCMS, PCR, ELISA, etc?) and expertise(e.g. analytical chemistry, molecular biology) that are most used by forensic scientists**

As someone who has worked in basic science and clinical environments I am fascinated how different research goals can be driven by overlapping tools in [Molecular Biology](#), [Cell Biology](#), and Chemistry.

- **Also, how often are genomic/data-driven tools used in forensic science (e.g. [to determine country of origin of a John Doe](#)**

Thanks for taking the time to do this!

[practically_sci](#)

workhorse techniques: they range the gamut from simple screening technologies like colorimetric testing and bio screening to high level tech such as all types of mass spectrometry. There's a wide range of analytical tools - it would be difficult to know what's used most. Forensic science is applied, so it does include all applications of chemistry, biology, physical and other expertise. the use of genomic data-driven tools are growing in forensic interest (such as next-gen sequencing for DNA analysis).

Can you talk about Dr. Bass's body farm at the University of Tennessee at all? I'm just wondering how important that work has been to the field.

[DrDueSs](#)

Facilities like the UT's Forensic Anthropology Center provide valuable data for medicolegal death investigators, pathologists and anthropologists to use in their casework. Without centers such as UT, these professionals may not be able to provide as much information in their case work.

Hi Kevin!

So I'm going to be graduating next year with a Bachelor's in Chemistry and an emphasis on organic synthesis. What sorts of positions are available for me in this field that utilize my skills and interests?

Also, are you hiring?

Thanks!

[babysalesman](#)

With a background in chemistry and organic synthesis, you may want to explore positions in laboratories doing controlled substance analysis. As far as a job goes, always keep an eye on the NFSTC.org website where we post our openings when we have them. Good luck!

Do you, or anyone in your office get called as an expert witness (criminal or civil)? I've worked as a criminal defense litigator for a number of years, and no one in my office has ever had to call an expert witness or had one called by the prosecution. I'm begining to think they lied to me in law school about needing to know how to call an expert.

[MyWifeDontKnowItsMe](#)

Yes, we get contacted by attorneys to provide expert services. Since we don't do actual casework here at NFSTC, the calls are only occasional. While I was working in an operational lab, I testified numerous times. Sometimes I was called by the prosecution and sometimes I was called by the defense. I believe that many cases settle prior to going to trial, therefore experts are not called.

Hi Kevin. What is the biggest forensic myth that is portrayed by movies or TV and do you feel

any any of these myths have influenced the judicial system, perhaps by having jurors that believe things are possible, but aren't?

Bewitched23

The biggest myth, or the one we seem to get asked about most often, is when they show investigators getting address and phone numbers and the like from just a DNA profile. The over 200 per week of 'edutainment' (TV) where forensic science is used has had an impact, both good and bad, on the profession. Many people take what they see on TV and try to apply it to real life. Mainly the time it takes to complete testing and the results that can be supported by this testing. check out:

<http://projects.nfstc.org/csieffect>

How common/widespread is the use/implementation of ambient ionisation techniques (such as DESI) in the screening of solid dosage forms of drugs or other drug samples around the US or even the world? Does this kind of screening technique have potential to replace the commonly used chemical spot test and be implemented as a standard form of analysis? I see many applications of it to forensic analysis but no news on the technique's uptake in forensic laboratories.

Edit: Thank you in advance! I am about to start my honours research and your feedback will be most appreciated when I give my research proposal!

dyn4styw4rrior

DESI and DART are currently not widely used in forensic laboratories. They do show promise for the analysis of controlled substances based on the fact that they require little sample preparation. As the technology develops, I feel field portable systems could play a role in point of collection drug testing, if the systems can be produced in the right configuration at an affordable price.

I too work in a laboratory field, we are accredited by a number of organizations to ensure the integrity of our results. A few years back there were a some forensic scientists that had faked evidence collected and that altered evidence was used to indict many people to crimes they did not commit. How has the forensic field improved in the following areas:

Quality assurance: proving that the result is repeatable between different scientists Licensing and inspection: ensuring there is government oversight and standards being up held.

Competency and proficiency testing: documenting that the methods being used are being performed correctly by employees and implementing specimen challenges of previously known results to the system that the methods and instruments used return matching results

I am very curious to learn how the field of forensics and reliability of the results has matched up to the standards used in hospital labs. Those cases of the scientists falsifying results definitely had reverberations within my field with added restrictions from our licensing organizations to ensure that results are correct and traceable and difficult to falsify.

lablizard

In dealing with analysts who don't follow quality assurance guidelines, laboratory policies and professional standards, systems must be in place that identify and deal with improper performance. In accredited laboratories that require proficiency testing and case review, these systems should identify individuals who are not performing proper casework. Many of the failures of individuals occur in unaccredited facilities. However, even accredited facilities have had individuals who chose not to follow good laboratory practices.

I've heard a fair number of stories lately about some forensic techniques, such as hair analysis

and bite mark analysis, being called into question. For future techniques that are being developed, what methods do you think can be done to reduce the chance of flawed techniques entering common use?

[kerovon](#)

In looking at technology and procedures, the profession must determine the limitation of the test and not overstate its importance. If you look at hair comparison and bite mark cases that have been called into question, many times it is how the analyst stated the strength of the conclusions. There is ongoing debate on how to make sure this doesn't occur in the future. Groups like the OSAC, run by NIST, are developing procedures that address these issues.

How do you deal emotionally when you investigate scenes involving children? Do you personally go to therapy?

[irondentist](#)

Having worked in a laboratory attached to a medical examiner's office, all cases, including those that involve children, can be difficult. It is important for individuals who work in that type of environment to understand the effects it has on them. Many organizations provide support services for their employees.

What tends to make your job the hardest? Like in my field improper documentation when I do testing just drives me nuts.

[Scuttlebutt91](#)

I agree with you -- improper documentation or descriptions of evidence were always frustrating when I did casework.

I'm very happy to see this AMA. I had just recently stumbled across NFSTC. I had no clue there was such a cool company locally.

I know there was a virtual reality training program that your team worked on with UT's National Forensic Academy a couple years ago.

It seems like there are a lot of opportunities for forensic-based software, for use in the field or for training.

Does NFSTC have its own software development team, to develop tools or to help integrate between different applications/systems commonly used in the field? Or does that sort of thing just get contracted out due to lack of internal resources, demand, etc.?

Thanks for doing this AMA!

[kevinfairchild](#)

We have our own instructional designers, trainers and media production pros. In the case of UT's National Forensic Academy, that was a partnership funded by the federal government.

Hello! I'm currently about to go to college for a degree in forensic chemistry and I was just wondering after you got your degree where did you go and how were you able to start your career?

[TheOriginalRMan](#)

I attended Eastern Kentucky University and got a BS in forensic science. At that time in 1980, there were very few academic programs that concentrated on forensic science. There were even fewer open

forensic science jobs than there are today. Part of the Eastern Kentucky program is to do an internship at an operational laboratory. Based on that internship, I built professional relationships with many practicing forensic scientists. I then did what all recent college grads do -- I sent out resumes to laboratories who had open positions. I was fortunate enough to be hired and started my forensic career.

Do you think that forensic scientists exaggerate the reliability and scientific validity of specific forensic methods when testifying? If so, which methods?

Do you think the [Daubert standard](#) is sufficient to keep untested and unreliable methods from being unfairly used against defendants? Do you think judges have the skill set to make the decisions regarding admissibility under Daubert?

What is your thought on blood splatter analysis?

[LegalFacepalm](#)

Properly trained forensic scientists should only testify to the level of reliability and capability that can be supported for any discipline. However, some forensic scientists have testified inappropriately at times as to the strength of the evidence. As far as the legal admissibility question, those may be better addressed to the legal community. A forensic scientist only discusses the technique in question.

What technological developments (in development or just starting to begin use) in your are you most excited about and why?

[AdoreDeHellno](#)

There are various technologies that are being modified from laboratory-only use to field use. This includes analytical detection equipment, light sources, imaging devices and media analysis tools. This move allows for triage of evidence in the field. This has the potential for possibly providing point-of-collection information that can be used by investigators.

Hey Kevin! I've seen your company at SOFIC, and the mobile labs you guys have are so cool. How are the mobile labs used/who uses them? And how different are they from a standard lab?

[fishywishy1](#)

The mobile labs are used by many organizations for instance the military, state and local law enforcement and even the park service. They are customizable to the specific needs of the user and can be used when laboratories are damaged or need additional assistance. You can learn more about them on our website - just search for deployable labs. www.nfstc.org

No one's done it yet so I'm going to ask my hands down favorite question for all fields -- what's your funniest / most unexpected moment in your job? Is there anything that you've studied or analyzed that you could tell us about that would start with the words "You're not going to believe this, but ..."

[lovebyletters](#)

You're not going to believe this, but ...someone spiked my collard greens with cocaine. That was the beginning of a one-gallon paint can filled with cooked collard greens that I had to analyze for the presence of cocaine. And lo and behold, I identified cocaine.

How much do you hate CSI-type shows, where some guy who looks like Brad Pitt shines a fancy machine at a bloodstain and it tells him where the killer works and his schedule?

[jnb64](#)

I don't know any forensic scientists that look quite like Brad Pitt, but I don't watch any of the shows except for NCIS. These shows have actually done a service to the profession. They brought to the forefront that the work done by forensic service professionals is important. Before those shows, people would ask me what I did and I would say I was a forensic scientist and they didn't know what that was. Now, I don't tell people I'm a forensic scientist because they ask me to solve every crime...

What do you think of Jeffrey Deaver's Lincoln Rhyme novels?

[mqrocks](#)

The only Jeffrey Deaver book I read was the Bone Collector and I quite enjoyed it. Much like the TV shows, it has to be engaging and entertaining or no one would read it.

**How different is your job from the one we see in multimedia settings like movies and tv shows?
Do you ever feel like Abby from NCIS?**

[cheerleader11210](#)

Abby and many other TV-based forensic scientists test evidence of all types. In operational forensic labs most of the scientists are specialists in one discipline. That's the biggest difference.