



Focus on Forensics



Kentucky State Police Forensic Laboratories

April 2014

Big Changes in the world of Toxicology

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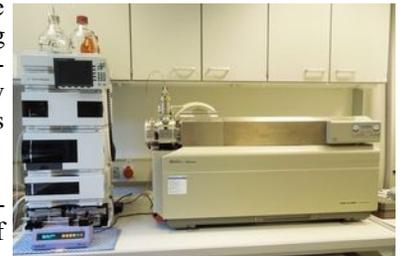


2013 was quite a whirlwind year in the Toxicology unit. We received our ASCLD/ISO accreditation and passed our first review; we implemented new protocols to increase quality and efficiency; and we instituted a process by which our measurement of uncertainty will be presented on reports. While each of those things has taken quite a bit of time and effort we still have one more item to check off our list which will bring the KSP Toxicology unit fully into the 21st century, and it's a big one. For many years now we have realized that our current method of performing quantitation on basic drugs is both limited and inefficient. The problem was that to effectively bring a new method into use we would have to stop the old method and re-gear the instruments for quantifying by a different technique. That time has finally come.

As of the end of 2013 we were no longer placing quants on drug reports, as such this data is unavailable for use during testimony. While this is a temporary inconvenience the positives will wholly outshine this negative in the coming months. We anticipated that by the end of March (barring difficulties) we would have introduced quantified results using the new procedure and all such results would be quantified. What is this new method and what are the benefits? Let's take a look.

—See TOXICOLOGY next page

The previous method used what is known as a liquid-liquid extraction to remove drugs from the matrix (blood or urine). The use of



BEAST

In the last edition of Focus on Forensics we explained the uses of BEAST and provided information on how to obtain access...so now what do you do?

This time we'll go into a bit more detail on how to use the system. First to access the website go to <http://162.114.1.6/beastweb>. (Please note, Firefox will not currently work with this link.) Once logged in using the credentials supplied when you contacted the lab for access, download the "Report Viewer". Now you are ready to search for your cases.

Please note that an officer will only be able to see cases assigned to his/her agency and attorneys will only be able to see cases in their jurisdiction.

Follow this link for more details on how to search in the BEAST system. <http://www.kentuckystatepolice.org/lab/download/BEAST%20Instructions.pdf>



The National Missing and Unidentified Persons System (NamUs) is a national centralized repository and resource center for missing persons and unidentified decedent records. NamUs is a free online system that can be searched by medical

examiners, coroners, law enforcement officials and the general public from all over the country in hopes of resolving these cases.

For questions on handling missing persons cases contact:

KY Case Manager: Davey McCann Ph: 502-564-5230 (davey.mccann@ky.gov)

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Medical Examiner's Office: Dr. Amy Burrows-Beckham Ph: 502-852-5587 (amy.burrows@ky.gov)

Toxicology continued

chemicals with different physical properties allowed the lab to “extract” a broad spectrum of drugs in a single method. Many of the drugs from the 1970’s and early 80’s had similar characteristics that fell in line with this process; therefore, it was useful at that time. However modern drugs are increasingly more diverse and it has become difficult to extract these out with the old method.

Our new process is known as Solid Phase Extraction, SPE for short, and it relies on class specific qualities to remove drugs from the matrix. Using this method drugs that were formerly unavailable to us (Clonazepam, Lorazepam, 6-AM, etc.) can now be identified with ease.

The old method used a single internal standard, which had to represent drugs across the board from Amphetamine to Zolpidem. This fact combined with our strict quality control parameters often resulted in drugs identified but no level associated with them. The new extraction uses “deuterated” versions of the same drug class as an internal standard so an immensely more accurate quantification can be achieved. Deuterated internal standards are drug standards that are unique from the unknown drug, but still have the same characteristics allowing for improved quantitation.

Finally we have retired the process of using the GC-FID (Gas Chromatograph Flame-Ionization Detector) to give us quants for unknown drugs. The new process uses the more refined GC-MS (Gas Chromatograph Mass Spectrometer) method for quantifying drugs with more sensitive and discriminating detectors.

Hopefully with the changes in place the laboratory can produce state of the art results with even more stringent quality control that place the KSP Toxicology unit among the premier laboratories in the United States.



Crime Laboratory Education Courses for Attorneys

RTI International recently announced two new, one-hour, online courses that focus on providing education to attorneys on crime laboratories and their operations. These courses were professionally written and narrated and are provided on-demand. RTI International is a respected leader in providing education and training via online, webinar-style delivery.

From the RTI website, the first course, titled Introduction to the Crime Laboratory – Understanding Its Role and Purpose, “provides information about the history, purpose and responsibilities of crime laboratories and the best practices for interacting effectively with these laboratories as a legal professional.” The follow-up course, titled Managing Quality and Reliability in the Crime Laboratory: A Lawyer’s Perspective, “provides information about how accredited crime laboratories control quality, ensure the reliability of results, and work to maintain a high level of customer satisfaction and confidence in the reliability of laboratory services.”

Both courses have been approved for CLE credit in Kentucky.

To read more and register for the courses, please visit: <https://www.forensiced.org/training/premium.cfm>

Western Lab wins Governor’s Ambassador Award for Teamwork

In December, 2012 and January, 2013, the Kentucky State Police Western Laboratory Branch relocated to a new facility designed and built to meet the needs of the laboratory. Before, during and after the relocation process, the twelve branch employees demonstrated outstanding teamwork, leadership and cost-saving skills.

In preparation for the move, surplus property was dealt with and non-essential items were packed using donated boxes and recycled packing material. At the time of the actual move, the entire laboratory worked together to pack and relocate fragile laboratory equipment. Once at the new location, employees worked together to install necessary items for different sections of the laboratory, sometimes creating those necessary items with their own tools and skills. Employees applied durable finishes and assembled work benches. Chemists helped install gas lines and the manifold system used in both the drug chemistry and toxicology sections. Breath alcohol technicians relocated their section while maintaining 30 instrument sites throughout western



Kentucky. The biology section traveled to Central Laboratory to work on cases in order to avoid interruptions in services. A single analyst took on the responsibility of setting up the toxicology section. Countless hours were spent with laboratory set up all while maintaining day-to-day responsibilities.

The Western Laboratory completed the relocation process and was operational on January 22, 2013. Currently, each section is working cases at or beyond previous year’s numbers even though the laboratory was shut down for most of January. The team comes to work every day ready to work hard and put their new facility to use. For these reasons and more, the employees at the Western Laboratory are commended for a job well-done.

Firearms Submissions— Did you know?

The Firearms Section of the Forensic Laboratory system is located across three labs: **Central, Jefferson** and **Eastern**. Agencies may submit to the most convenient of the three locations.

All three are full service sections offering several services beyond firearms identification. These services include:



Firearms Identification – examination of firearms for function, fired components for manufacturer and/or caliber and association with the source firearm or list of potential firearm manufacturers as an investigative aide.

Serial number restoration – visualization of obscured or obliterated cold-stamped serial numbers in both ferrous and non-ferrous metals. Special knowledge of secondary hidden numbers that may be included in the frame by some manufacturers can be used to determine the original serial number. Most often these are firearm frames but other smaller items can also be processed as needed. The sections are not equipped to process vehicles or similarly large items.

Toolmark Identification – comparison of typical hand tools such as bolt cutters, wire cutters, pliers, hammers, screwdrivers, chisels, pry bars etc. to marks left at crime scenes in doors / door frames, safes, locks, chains, pipe, wire or any other metal items on which the tools may have been used. Often times this examination may include trace evidence comparison if residues are observed.

Muzzle-to-Target Distance Estimation – examination of victim clothing to develop patterns of muzzle residues surrounding a bullet entrance hole. If a pattern is developed a comparison may be conducted to patterns generated at known distances using the suspect firearm and ammunition for a bracketed distance estimation. Often confused with the gunshot residue testing conducted by the Trace section, this analysis is not a specific examination for the presence of gunshot residues but rather development or visualization techniques for a pattern comparison.

Shoepoint / Tire Imprint Comparison – examination of footwear or tires to impressions recovered from scenes. Submission of the actual impression is recommended but good quality scaled photographs or casts may be of equal comparison value. At this time, the sections have limited access to footwear databases but have contacts in the industry should that be required for an investigation.

As always any other type of examination (DNA, Fingerprints, Trace) should be conducted **before** the items are processed by the Firearms Section.

What's New?

FORENSIC BIOLOGY SECTION offers Relationship Testing

We now offer Relationship Testing for applicable cases which include: sexual assault, violent offense, unidentified human remains, and missing persons. Relationship testing compares the DNA profile from a sample e.g., an unidentified body, to the DNA profiles of possible relatives to determine the likelihood of a relationship existing (e.g. parent, child, sibling). This service was previously offered at a cost through vendor laboratories, but is now a **FREE*** in-house service for most case types. We've partnered with the Marshall University Forensic Science Center (MUFSC) in a pilot program to help incorporate the role of relationship testing in the forensic community. MUFSC has been providing training to analysts and free analysis for general cases during the last few years utilizing funding provided by NIJ Grants. We will continue to work with MUFSC and other vendor laboratories to provide the most comprehensive analysis for any cases that cannot be worked in-house.

*Authorization for funding must be made in advance of analysis, if a case does not meet the criteria for in-house testing.

FBI testing for mitochondrial centralized to the lab at Quantico

The FBI has discontinued using regional laboratories for mitochondrial DNA testing. All future testing for mitochondrial DNA by the FBI will be conducted at the FBI Laboratory in Quantico, Virginia. This service is free of charge for cases that meet their criteria.



What can you do to help with backlogs at the laboratory?

Did you know that 10% of cases received by the Forensic Biology Casework Section are adjudicated prior to the start of analysis? This is just one section of the laboratory! A call or e-mail from the submitting agency or an attorney to inform the laboratory that a case has been settled, could result in saving hours of analyst time and hundreds of dollars in laboratory funds. Also, moving your now "solved" case out of the backlog queue makes room for other cases to be worked. Please notify the laboratory about cases submitted to ANY section when the case has been settled or the status of the case has changed.



LEGAL NOTES

Testimony Challenges

Throughout the last decade, interpretation of the Sixth Amendment's Confrontation Clause, guaranteeing that, "the accused shall enjoy the right...to be confronted with the witnesses against him" has changed in regard to what it means for analyst testimony and the daily operations of the laboratory. Unless agreed to (in advance of trial) by defense counsel to stipulate to a report or to accept surrogate testimony, the availability of an analyst needs to be verified as analysts could have retired, have medical conditions, or other scheduling conflicts preventing a court appearance. Alternatives for such circumstances should be discussed with a laboratory supervisor prior to trial. **The following is a summary of rulings which may impact analyst testimony in court.**

In **Crawford v. Washington**, 541 U.S. 36 (2004) (<http://www.law.cornell.edu/supct/pdf/02-9410P.ZO>) the tape-recorded statement of a person who did not testify at trial was played. The petitioner argued there was no opportunity for cross-examination and this violated his Sixth Amendment rights. The trial court cited *Ohio v. Roberts*, 448 U.S. 56 (1980) allowing statements from an unavailable witness if "adequate 'indicia of reliability'" has been met. The Washington Court of Appeals reversed this decision but the Washington Supreme Court reinstated the conviction. The U.S. Supreme Court reversed the decision, finding that the unavailability of a witness and a prior opportunity for cross-examination was required and was not limited to in-court testimony. The Court did not provide a definition for "testimonial" and addressed that many hearsay exceptions covered statements that were not testimonial, providing an example of business records.

In **Melendez-Diaz v. Massachusetts**, 557 U.S. 305, 129 S. Ct. 2527 (2009) (<http://www.supremecourt.gov/opinions/08pdf/07-591.pdf>) notarized certificates reporting drug analysis results of state laboratory analysts were admitted at trial without testimony. The petitioner objected, citing *Crawford* required analysts to testify in person. The Trial Court overruled the objection, The Appeals Court of Massachusetts and Massachusetts Supreme Judicial Court affirmed the decision. The U.S. Supreme Court held that the certificates here are considered affidavits, and do not qualify as "traditional official or business records", but are part of the "core class of testimonial statements". They cited *Palmer v. Hoffman*, 318 U.S. 109, where reports maintained during normal operations would ordinarily be considered hearsay but not "if the regularly conducted business activity is the production of evidence for use at trial"; and the Federal Rules of Evidence, Rule 803(8) where public records/reports, "in criminal matters observed by police and other law enforcement personnel" do not qualify as public records for the same reason. They also found claims that analysts are not "accusatory" witnesses and thus are not subject to confrontation were not supported by the Sixth Amendment since they provide testimony against the petitioner.

The Court advised that there is no reason the defendant could be required to exercise his rights under the Confrontation Clause prior to trial and/or after receiving notice of the intent to use the forensic analyst's report. The dissenting opinion authored by Justice Kennedy provides insight into potential issues the laboratory may have to consider.

In **Bullcoming v. New Mexico**, 564 U.S. ___, 131 S. Ct. 2705 (2011) <http://www.supremecourt.gov/opinions/10pdf/09-10876.pdf> involved the testimony of a surrogate analyst, who was familiar with both the instrumentation and laboratory protocols, but had not participated or observed in the (blood-alcohol concentration) analysis, in the absence of the original analyst (on unpaid leave). The trial court overruled the objection, admitted the report as a business record and allowed the surrogate analyst to testify. The New Mexico Supreme Court held the admission, but the U.S. Supreme Court reversed and remanded the decision. In this case, the state had not advised that the original analyst was unavailable for testimony. The court advised that the surrogate analyst could not provide information about observations during the testing, or "expose any lapses or lies on the certifying analyst's part" and did not know the reasons the original analyst was on unpaid leave. The State also argued that the generated reports were not testimonial. Justice Sotomayor's opinion, concurring in part, provides that the instant case was not one in which the surrogate was a supervisor, reviewer or other personnel with personal knowledge of the specific test who could have provided testimony nor where an analyst's independent opinion about the analysis could be formed without the original reports being admitted into evidence, Federal Rules of Evidence, Rule 703. Again, the dissenting opinion authored by Justice Kennedy provides insight into potential issues this ruling may cause the laboratory to consider.

In **Williams v. Illinois**, 567 U.S. ___, 132 S. Ct. 601/2221 (2012) (<http://www.supremecourt.gov/opinions/11pdf/10-8505.pdf>) the analyst provided information regarding vaginal swabs being forwarded to and returned from the vendor laboratory as business records in a bench trial. The report from the vendor laboratory was not admitted, but the state laboratory analyst testified to the DNA match made between a sample provided to the state laboratory and the sample that had been forwarded to an accredited vendor laboratory as allowed under Illinois State and Federal Rules of Evidence, Rule 703. The defense objected to exclude this evidence based on the Confrontation Clause, but the Trial Court admitted the evidence. The Illinois Court of Appeals, the State Supreme Court, and the U.S. Supreme Court affirmed this decision. The U.S. Supreme Court advised that the vendor laboratory report's "primary purpose was to catch a dangerous rapist who was still at large, not to obtain evidence for use against petitioner, who was neither in custody nor under suspicion at that time". The out-of-court statements from the vendor laboratory were not considered "testimonial" since the "expert" analyst assumed the statements to be true and referenced the report "for the limited purpose of explaining the basis for [her expert opinion]" not for providing "the truth of the matter asserted. . ." The petitioner had the opportunity to cross-examine the results and opinions of the state laboratory analyst at trial. The ruling also discussed that courts allow an expert to testify to "hypothetical questions", in which the truth is assumed and could be cross-examined if "different hypothetical facts were assumed".

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Testimony Challenges continued

Most recently, in *Speers v. State of Indiana*, No. 55S01-1312-CR-841 (2013) (<http://www.in.gov/judiciary/opinions/pdf/12191302rdr.pdf>) an analyst who transferred blood from a piece of glass to a swab for testing was not called to testify in trial. The appellant argued that this violated his right of confrontation under the Sixth Amendment. The Indiana Supreme Court's opinion for this case dealt with chain of custody for DNA evidence, ruling that "there is no Confrontation Clause violation where the State introduces evidence and links in the chain of custody of that evidence are missing", as also discussed in the *Melendez-Diaz* ruling.



Frequently Asked Questions– By Section

TOXICOLOGY

Q: What are additive and synergistic effects?

A: Additive affects indicate a drug plus another drug will combine to have the total impairing affects of both drugs. Synergistic affects indicate two drugs will interact in a way that is greater than the total impairing affects of both drugs.

Q: Because I get a “No drugs identified”, does that mean no drugs are present in the sample?

A: No. There are thousands of substances that can impair human performance; of these, the lab can only test about 50. Our current standard is to identify about 75% of the drugs in use, but we hope to increase this number to 90% using recent technological advances at the laboratory.

TRACE

Q: Why do I need to take 30 head or pubic hairs as a standard for comparison in a Trace Kit or Sexual Assault Kit?

A: Human hairs can vary widely over the head and pubic areas in color, shape, length, and other features. A person with brown hair, for example, can have 4 or 5 different shades of brown on their head. Collecting 30 hairs from all parts of the area to be sampled (from the front, back, sides and top of the head, for example) allows us to see the range of features of that person's hair. From this we can determine if an unknown hair looks like those hairs under the microscope.

Q: What is a good method of evidence collection for hairs and fibers?

A: After hairs and fibers that can be seen with a bright light are collected from a crime scene, the Trace Evidence Tape Kits are the best way to collect hair and fiber evidence on items that cannot be easily sent to the laboratory, such as vehicle seats and carpets. The tape lifts will pick up hairs and fibers that are very small or not easy to see, which may have been recently deposited.

Q: Can you identify the source of the ignitable liquid?

A: No. Most of the time petroleum products come from the same oil refinery even though they may be different brands.

FORENSIC BIOLOGY

Q: Do I need to contact Forensic Biology/DNA Casework or DNA Database about the status of my case?

A: If you submit a case to the lab it will be worked by the Forensic Biology/DNA **Casework** section. Check BEAST for status and to obtain the responsible analyst's name, if possible, before calling.

Q: Do reference standards need to be submitted for a case prior to DNA analysis, if an offender sample is present in the DNA Database?

A: Yes, if probable cause exists, a standard should be obtained. Offender samples are not evidentiary and are not intended for use in court.

Q: Can evidence be submitted for Serological analysis to the Forensic Biology Casework section without reference standards?

A: Yes, but submission of reference standards is required prior to the evidence being forwarded for DNA analysis.

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LAB TIP: To make interaction with the laboratory hassle-free look your case up in BEAST before calling. If you have the name of the analyst, you can ask to speak directly to the person in the know about your case!

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SUGGESTIONS WELCOME!!

Do you have topics you would like to see covered in future editions? Do you have questions you would like to see addressed? Please contact stacy.warnecke@ky.gov with your suggestions.