

Storage, Preservation, and Retention

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Slides prepared by Kelly M. Elkins, Ph.D., Towson University, 2024

Background

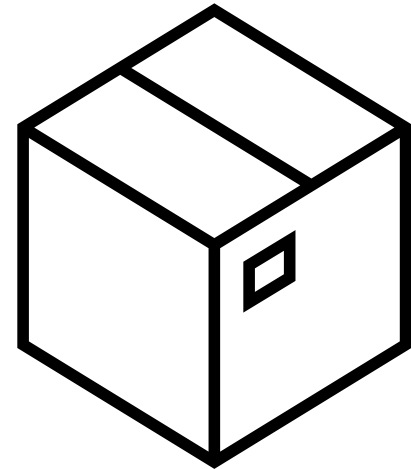
In October 2023, Towson University was awarded a cooperative agreement from NIST to develop a standardized DNA training curriculum for the United States that address the components in ANSI/ASB Standard 115, *Standards for Training in Forensic Short Tandem Repeat Typing Methods Using Amplification, DNA Separation, and Allele Detection*. 2020. 1st Ed.

This presentation addresses the knowledge-based portion of the training program and covers the topic outlined in 4.2.3h in ANSI/ASB Standard 115.

Learning Objectives

This material will provide trainees with an understanding of:

- The storage, preservation, and retention of amplified DNA product according to laboratory policy.



DRAFT FOR REVIEW

From Crime Scene to the Lab

Evidence
collection

Evidence
sampling

DNA
extraction

DNA
quantitation

PCR
amplification

Separation &
detection

Interpretation

Sources of Biological Evidence*

- Bloody clothing
- Hat
- Undergarments
- Condom
- Eyeglasses
- Chewing gum
- Partially eaten foodstuff
- Cigarette
- Fingerprint
- Tools
- Stained items
- Drinking glass or can
- Hair
- Contact lens
- Fingernail
- Rope
- Urine
- Fecal matter
- Cartridge casing
- Firearms

*Not an exhaustive list

Evidence Packaging and Storage

- Biological evidence must be stored in a fashion that not only safeguards its integrity but also ensures its protection from degradation.
 - Appropriate packaging for all items to avoid loss, mold, and contamination
 - Each item individually signed, sealed, labelled and dated with date, time, location, collector's name, case number, and evidence number.
 - Air dry or package bloody samples in paper or with desiccant
 - Dried bloodstains can be collected via finger prick and stored on FTA or non- FTA blood stain cards.
 - Ship suspected tissue with ice packs in Styrofoam overnight
 - Package and submit whole bones and teeth
 - Document chain of custody
 - Listed on form
 - Evidence is inadmissible if chain of custody is broken
 - Stored to preserve and avoid degradation

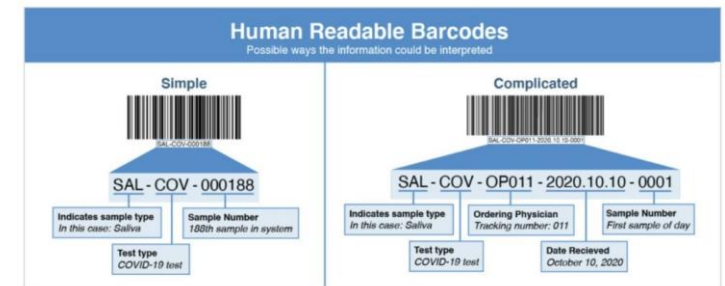
Evidence Packaging and Storage

- Quality is only as good as collection from crime scene
 - Quality in, quality out
 - Evidence should be collected by trained and qualified individuals
 - Evidence will have little or no value if not properly collected, documented and stored
- Submitted to evidence clerk and retrieved by laboratory for analysis
- Often tracked electronically with a barcode via a Laboratory Information Management System (LIMS) database



1D Barcode 
GAL-COV-OP011-2020.10.10-0001

2D Barcode 



Details Print Label

Information	
Customer Sample Name	Sample ID
Sample 1	S000655
Sample Name	Record Type
Sample 1_S000655	Submitted Sample
Sample Type	Frozen
Cells	<input checked="" type="checkbox"/>
Date of Collection	Number of Aliquots
9/11/2023	1

Evidence Storage and Retention

- Evidence shall be stored in pre-PCR areas separate from reagents, consumables, and work products.
 - Storage area should protect evidence from moisture and humidity, excessive heat, and direct sunlight.
 - Appropriate storage will depend on the item and includes freezing, refrigeration, temperature control, and room temperature or cool, dark place
 - Short term storage is typically on site at the lab facility
 - Long term storage may be at a satellite facility
 - Retain for resampling throughout the jurisdictional limits of case



<https://datumstorage.com/industry-solutions/law-enforcement-first-responders/storage-for-evidence-storage/>

Evidence Testing and Storage

- Sampled by cutting, swabbing, vacuum, or scraping
- Use clean, sterile cotton swabs and ethanol-soaked tweezers and scissors
- Typically, only a portion (half to one-third or less) is sampled
- Remaining evidence is repacked and stored
- After detecting quantifiable DNA or confirming the presence of a body fluid, a lab may revert to the sample for additional material for further testing



<https://www.policemag.com/investigations/article/15307923/forensic-resources-second-oldest-statewide-crime-lab-in-the-country-provides-scientific-expertise>



<https://www.statesmanjournal.com/gcdn/-mm-/fcc79562cf1971251b92bf9623b980c23d610328/c=0-112-2200-1355/local/-/media/2017/06/14/Salem/Salem/636330768445224608-SAL-SAFEkittesting-MJS-011.JPG?width=1320&height=746&fit=crop&format=pjpg&auto=webp>

DNA Extract Storage and Retention

- Separate storage areas shall exist for reagents, consumables, DNA extracts, and PCR products.
- Important to properly handle, store and retain DNA extracts as this DNA may be the only source of material for future testing.
- Historically, extracted DNA has been stored in water, TE buffer, or in a preservative and then refrigerated (short term) or frozen (long term).
- Stability and recovery of DNA extracts is dependent on the quantity and quality of the extracted DNA prior to storage as well as the type of tube and temperature used for storage.



Extracted DNA Storage and Preservation

- DNA extracts may be assigned their own sample numbers and barcodes or be considered work product for consumption in testing
- Preservative added to protect the DNA integrity or eluted as lab protocol indicates
- Extracted DNA samples are stored at -4 °C or -20 °C in the pre-PCR area or discarded following testing and case resolution (if indicated)
- Label with 4-digit code
- Manage location in LIMS



Amplified DNA PCR Product Storage and Retention

- Applicable reagents, consumables, and PCR product shall be stored separately in post-PCR areas.
- May be assigned a sample number or barcode or be discarded following testing and analysis based on lab SOP
- Stored at -20 or -80 °C in the post-amp area

Evidence Retention

- Evidence is stored until the case clears court or as required by law and laboratory policy
- Homicide case evidence may be stored indefinitely until the parties are deceased
- Evidence should be retained and safeguarded until final disposition to owner or destruction
- Final disposition should be documented and may require a court order



<https://www.southwestsolutions.com/wp-content/uploads/2010/09/PoorlyOrganizedEvidence-resized-600.png>

Study Questions

- How and where should evidence be stored?
- How should extracted DNA be stored?
- How can extracted DNA be preserved?
- When must samples and evidence be retained and when can it be discarded?

Suggested Readings

- ANSI/ASB Standard 136 (DRAFT), Forensic Laboratory Standard for Prevention, Monitoring, and Mitigation of Human DNA Contamination. 2024. 1st Ed. <https://www.aafs.org/>
- FBI, *Quality Assurance Standards for DNA Databasing Laboratories*, effective September 1, 2011.
- FBI, *Quality Assurance Standards for DNA Databasing Laboratories*, effective July 1, 2020.
- FBI, *Quality Assurance Standards for Forensic DNA Testing Laboratories (QAS)*, effective September 1, 2011.
- FBI, *Quality Assurance Standards for Forensic DNA Testing Laboratories*, effective July 1, 2020.
- Cite evidence document