Collecting DNA Evidence at Property Crime Scenes

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Updated: March 17, 2009

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Training Overview

Welcome to the *Collecting DNA Evidence at Property Crime Scenes* web site. This interactive training program is delivered in four modules:

1. Types of Evidence.
2. Crime Scenes.
3. Evidence Collection.
4. Combined DNA Index System (CODIS).

Those modules introduce and describe the following key concepts:

- Types of physical evidence frequently encountered at a property crime scene.
- Methods used to maintain the integrity of evidence.
- Types of crime scenes and the methods used to search and document crime scenes.
- Process used to collect, mark, and package biological evidence.
- Crime scene reporting.
- CODIS operated databases.

Suggested crime scene procedural guidelines and information to supplement the second and third modules are available in more detail in the accompanying documents:

- CRIME SCENE PROCEDURES II.
- CRIME SCENE PROCEDURES III.

Opinions or points of view expressed in this training represent a consensus of the authors and do not necessarily reflect the official position or policies of the U.S. Department of Justice.

Introduction

The field of crime scene processing is extremely demanding and ever changing. Demands from the scientific and legal communities influence the crime scene investigator's everyday activities. The scientific community focuses on the examination of evidence collected at a crime scene. Investigators and crime scene specialists are responsible for identifying, securing, documenting and preserving biological evidence recovered from a crime scene. Legal considerations include scrutiny of procedures used at crime scenes and chain of custody. The investigator must also know when and how to make decisions to obtain written consent or a search warrant to assure that the evidence will be admissible in court and not subject to a motion to suppress.

DNA databases provide law enforcement officers with the ability to identify potential suspects when no prior suspect existed. The development and expansion of databases that contain DNA profiles at the local, state and national levels have greatly enhanced law enforcement's ability to solve cases with DNA evidence. These databases are operated using the Combined DNA Index System (CODIS), a software program that permits the cross-comparison of DNA profiles developed from biological evidence found at crime scenes and also of known offender profiles.

This training describes handling the most common types of biological evidence that may be encountered. This general information is subject to agency protocols for handling evidence.

Learning Objectives

Upon successful completion of the four modules of training, the student should be able to do the following:

- Describe the types of physical evidence typically encountered at a property crime scene.
- Define Locard's Exchange Principle.
- Describe types of trace and biological evidence.
- Define "touch DNA" evidence.
- Explain the importance of maintaining the integrity of physical evidence.
- List and describe the three types of crime scenes.
- Describe the process used to secure and investigate a crime scene.
- Describe the purpose of a victim interview.
- Describe methods used to locate evidence at a crime scene.
- Describe the importance of scene documentation in successful case resolution.
- Define priorities for collecting biological evidence.
- Define situations that require control and reference samples to be collected.
- Describe equipment used when collecting biological evidence.
- Describe procedures used to collect, mark and package wet and dry biological evidence.
- Describe the purpose and method used to establish and maintain the chain of custody for items of evidence collected at a crime scene.
- Describe the methods used to preserve evidence.
- List the elements included in a crime scene report.
- Describe general requirements for an investigator when testifying in court.
- Describe the purpose and use of DNA databases.
- List the different types of DNA profiles in CODIS.
- Describe the purpose of a "John Doe" DNA warrant.

Module Overview

This training module introduces and describes the following key concepts:

- Types of physical evidence frequently encountered at a property crime scene.
- Locard's Exchange Principle.
- Importance of maintaining the integrity of physical evidence.
- Sources of degradation of biological and trace evidence.

Physical evidence consists of tangible objects, such as biological material, fibers and latent fingerprints. Physical evidence is any object that can connect a victim or suspect to a crime scene. Biological evidence, which contains DNA, is not always visible to the naked eye.

Evidence may aid an investigator in re-creating the crime scene and establishing the sequence of events. Physical evidence can corroborate statements from the victim, witness and suspect. Physical evidence is objective and, when documented, collected and preserved properly, may be the only way to reliably place or link someone to a crime scene. Physical evidence is often referred to as the "silent witness."

Evidence Found at Crime Scenes

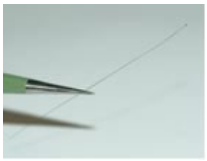
The concept known as "Locard's Exchange Principle" states that every time someone enters an environment, something is added to and removed from the scene. The principle is sometimes stated as "every contact leaves a trace," and applies to contact between individuals as well as between individuals and a physical environment. Law enforcement investigators should always assume that physical evidence is left behind at every scene.

The amount and nature of the physical evidence deposited will be largely dependent on the circumstances of the crime and may include:

- Trace evidence — fibers, hair, glass, paint chips.
- Biological evidence — blood, saliva, semen.
- Comparative evidence — latent fingerprints, tool marks.

Items of physical evidence are not always visible to the naked eye and may be easily overlooked. A methodical approach to the collection and preservation of evidence is essential. One exception is that if evidence integrity is at risk, it is important to make rapid decisions to prevent degradation or loss. Agency protocol dictates who collects this type of evidence.

Trace Evidence



Trace evidence, such as hair, fiber, glass and paint chips, is a type of physical evidence that is small and transient, but measurable. When larger items of physical evidence are subjected to closer examination in the laboratory, trace evidence may be detected.

The importance of trace evidence can be critical to an investigation. Awareness of this type of evidence cannot be overemphasized. Photographing the area where any evidence is collected not only provides documentation of the collection but also assists in locating trace evidence.

Even if identification cannot be made in the laboratory, the investigator and prosecutor may use trace evidence as part of a convincing circumstantial case. Skill and effort during collection, testing and case preparation can help ensure a successful presentation of trace evidence in the courtroom.

Integrity of Trace Evidence

Protection of trace evidence from loss or contamination is essential. One of the primary paths of contamination is from the collector to the evidence. The collector must ensure that no contaminate trace is deposited along with the evidence in question. This may include hair or fiber from the collector. To prevent contamination, crime scene personnel must wear Personal Protective Equipment (PPE), such as gloves and masks, and use trace-contaminant-free implements when collecting evidence.

Biological Evidence

Biological evidence consists of bodily fluids and tissues. Biological evidence has particular significance since DNA analysis can be conducted in many instances. This DNA analysis may identify the donor. Examples of biological evidence containing DNA include:

- Blood.
- Saliva.
- Semen.
- Sloughed skin cells.
- Hair.
- Urine.
- Fecal material.

A DNA profile may also be obtained by swabbing items thought to have been handled by a perpetrator. This type of evidence is sometimes referred to as "touch DNA."

The power of DNA testing is such that examination of biological items can produce very compelling evidence. However, attention must be paid to safety, contamination and degradation issues.

Biological evidence may be detected by any of the following:

- Visual inspection.
- Alternate light source.
- Chemical enhancement, such as luminol.

Safety

Blood can contain pathogens such as the hepatitis B virus, hepatitis C virus and the human immunodeficiency virus (or HIV). It is essential to regard all biological evidence as potentially infectious and to follow universal safety precautions.

Those precautions include the following:

- Wear Personal Protective Equipment (PPE), such as gloves and face masks.
- Avoid eating, applying cosmetics or any hand to face contact (especially mouth and eye).
- Use implements and wear puncture resistant gloves to handle objects that may be dangerous, such as broken glass. Ensure safe packaging is used.
- Identify biohazardous evidence material and packaging in containers with appropriate labeling.

Integrity of Biological Evidence

Biological evidence can be significantly degraded due to the effects of environmental factors before and/or after recovery. The amount of evidentiary value is typically in inverse proportion to the duration and intensity of exposure to the following conditions:

- Presence of living organisms (bacteria, molds, insects, animals).
- Weather conditions (temperature, humidity, rain).
- The chemistry of a hostile environment (substrate at the location, soil pH).
- The amount of time interacting with any or all of the above.

It is recommended that biological evidence be air-dried as soon as possible and kept in paper packaging. The techniques used to develop DNA profiles are extremely sensitive. It is important to wear protective clothing during collection and handling to prevent contamination transmission from the collector to the evidence or between evidence items.

Very small amounts of biological material can produce a usable DNA profile. Very small amounts of biological material can also contaminate a crime scene. Contamination of a crime scene is more likely if the number of people inside the scene is not limited. First responders, emergency medical personnel, patrol supervisors, crime scene investigators and medical examiners are all potential sources of contamination and loss of evidence.

Latent Fingerprints

Special attention must be paid to items that will be processed for latent fingerprints. These must be packaged and handled in a way that prevents the deposit of additional latent fingerprints or smearing of latent evidence prints before visualization.

When latent prints or palm prints, etc., are present, they may be examined for the presence of touch DNA. The destructive nature of certain processing techniques needs to be considered before a decision can be made as to whether to swab for DNA or collect the latent print. The quantity and quality of other sources of DNA evidence that may also be present at the scene should be considered in a discussion with the investigator or laboratory personnel.

In addition, there are some cases where discussion with laboratory personnel is advised to determine the sequence of examinations. For example, an aluminum can may be submitted to the laboratory with a request for latent fingerprint and DNA analysis. Some latent print visualization and processing techniques can cause loss or damage to DNA evidence. In the reverse, the DNA analysis process may eliminate latent fingerprint evidence.

Summary

The common types of physical evidence encountered at a property crime scene are trace, biological and comparative evidence. Assume that visible (blood, hair, etc.) or invisible (saliva, touch DNA, etc.) evidence may be left at every crime scene. The investigator should be aware of all types of biological evidence and the specific collection procedures used for each.

Biological evidence is subject to degradation from environmental factors. Maintaining safety and the integrity of evidence through preventative measures should include drying biological evidence and proper packaging.

Module Overview

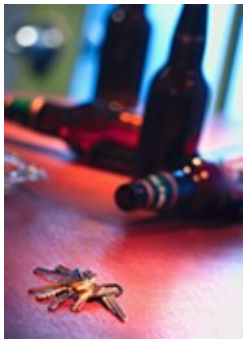
This training module introduces and describes the following key concepts:

- Types of crime scenes.
- Seven step protocol.
- Victim interview.
- Locating evidence.
- Search methods.
- Documenting the scene.

Suggested crime scene procedural guidelines and information are available in more detail in the accompanying document.

- CRIME SCENE PROCEDURES II

Types of Crime Scenes



- Outdoor.
- Indoor.
- Conveyance.

Be aware that the flight path of the perpetrator may reveal evidence important to the investigation. Property removed from the scene or conveyance may be deposited or dropped as the perpetrator flees the scene. Cigarette butts, beverage containers or any evidence capable of the transfer of biological evidence are sometimes found in and around the scene.

Outdoor Crime Scene

An outdoor crime scene is the most vulnerable to loss, contamination and damaging effects on biological evidence in a short period of time. Individuals with access to the scene can potentially alter, destroy or contaminate evidence. The risk is greatest when the crime scene is not properly secured.

Destruction or deterioration of evidence due to environmental conditions, such as heat, cold, rain, snow and wind call for rapid and effective protection of biological evidence. Evidence that cannot be protected under these conditions should be quickly collected without compromising its integrity. When encountering a combination of an indoor and outdoor scene, process the outdoor component first.

Nighttime outdoor crime scenes are especially problematic. Regardless of the quality of the light source used to illuminate the scene, the lack of sunlight can increase the possibility of missing or destroying evidence. Whenever possible, hold and secure outdoor crime scenes for processing until daylight.

Indoor Crime Scene

Compared to an outdoor scene, evidence at an indoor scene is generally less susceptible to environmental loss and deleterious change.

The possibility of loss and contamination from multiple people accessing the scene is greatly increased. Limiting access to the scene and collecting known reference samples from individuals with access to the scene are a priority.

Conveyance

Conveyance is a means of transportation. Types of crimes committed in conveyances include the following:

- Vehicle burglary.
- Grand theft .
- Car theft.

Physical evidence recovered from these scenes may extend well beyond the conveyance. Suspects leaving in a hurry may carelessly leave additional evidence. A conveyance, such as a vehicle, may be transported to the laboratory after proper documentation has been completed.

Seven Step Protocol

The seven step protocol discussed in this module is used to secure and investigate a crime scene. This protocol is a general method that may be superseded by individual agency policies.

Click here to view seven step protocol details.

Printable Version of Seven Step Protocol
(Four double sided 3 X 5 copies suitable for laminating)

Victim Interview

It is imperative that the investigator obtain as much information as possible regarding the circumstances of the crime prior to entering the scene. Statements from witnesses and victims can broaden the scope of the investigation. The investigator develops an approach to the scene based on this information and the nature of the crime. At the scene of a burglary, attention will focus on the points of entry and exit.

When possible, to help determine what evidence may have been left behind by the suspect, ask the victims a series of questions:

- What has been moved, handled, or touched by the perpetrator(s)?
- Has the victim noticed anything unusual or out of the ordinary? (For example cigarette butts in a nonsmoker's home; gloves or masks not recognized may have been left at the scene.)
- Did the victim pick things up, move items back or clean up?
- Have food/beverage items or containers been left behind by the perpetrator?

Document what questions were asked of the victim and the reason for asking in order to justify evidence identification, collection and preservation. This supports the chain-of-custody requirement.

Locating Evidence

Items of physical evidence are not always visible to the naked eye and may be easily overlooked. A methodical approach to collection and preservation of evidence is essential. One exception may be if evidence integrity is at risk. Under those circumstances, it is important that rapid decisions be made to prevent degradation or loss of evidence.

An alternate light source or oblique lighting may be used to identify some types of biological evidence. A sample detected with the ALS should be properly collected and packaged with a label noting that it is a biological sample.

Blood may also be detected with chemical processes such as luminol. Luminol is an investigative aid that can assist in determining the presence of small quantities of blood (human and animal) including where

bloodstains may have been cleaned. The luminol reagent reacts with the iron in hemoglobin resulting in a creation of a blue-green, luminescent light.

Precautions to consider when using luminol include the following:

- The chemical reaction can destroy evidence at the crime scene.
- Luminol will react to other substances, including copper and bleach.
- Luminol reactions must be viewed in complete darkness to observe the luminescence.

Based on these considerations, this method can be a valuable tool. It is generally only used after exhausting other options.

Evidence Search Methods

The scene and conditions may determine the search method to use. For example, the size of the crime scene and the number of people available to conduct the search may play a role in determining the best method to use.

Click here to review five commonly used search methods.

Documentation

Documentation of the scene begins with taking notes from the time of arrival and recording with still and video photography. Sketches are completed at the scene to illustrate relationships between articles of evidence not easily depicted by photography. The following methods of crime scene documentation are used to provide an accurate representation of the scene.

Note taking. Record the condition of the scene as it existed upon arrival. Continuously update notes during the course of the investigation.

Include such factors as:

- Victim and witness statements.
- Individuals present at the scene.
- Lighting conditions.
- Open doors and windows.
- Odors.
- Signs of unusual activity (explain as necessary).
- Date and time indicators, such as newspapers or mail.
- General descriptions of the scene and surrounding area.
- Potential evidentiary items and locations.

Photography and videography. The primary means of crime scene documentation is still-photography. It is important to keep the scene preserved and not move anything until it is photographed. The photographer must be able to testify that the photograph is a true and accurate representation of the scene at the time the photograph was taken. Crime scene photographs should reveal a detailed, chronological story of the scene,

which may need to be presented at a later time.

Sketching. Sketches are used to supplement photographs, especially spatial relationships between objects. Sketches should depict the overall layout of the scene and contain all the necessary information for the investigator to complete a final version.

Types of sketches may include the following:

- Entire scene (the complete scene with measurements).
- Bird's-eye view (an overhead view of the scene).
- Elevation sketch.
- Cross projection sketch (walls, windows, and doors are drawn as though the walls had been folded out flat on the floor).
- Three dimensional sketch.
- Triangulation method (two or more reference points are located. The item of evidence or interest is then documented by measuring along a straight line from the reference points to the item).

Summary

The three types of crime scenes (outdoor, indoor, and conveyance) all have specific protection and collection considerations. The seven step protocol is a general guideline used for securing and processing a crime scene. Interviewing the victim provides information on what types of evidence may be available and how to process the scene. Locating evidence at the scene may require the use of multiple methods and approaches. Documenting the scene is continuous and includes detailed notes, photography, sketches and diagrams.

Module Overview

This training module introduces and describes the following key concepts:

- Priority of evidence collection.
- Control/substrate samples.
- Reference samples.
- Equipment.
- Biological evidence collection procedures.
- Specific collection procedures.
- Evidence marking.
- Packaging.
- Chain of custody.
- Preserving evidence.
- Reporting.
- Testifying.

Collection and packaging methods differ depending on the type of evidence and the material upon which it is found. It is preferable to collect evidence in its original state. If the evidence is fragile or can easily be lost, the entire object should be collected and packaged when size and circumstances permit. Contact a specialist if you are not trained in the required procedure.

Standard operating procedures regarding collection and preservation of biological evidence are defined by each agency and the local forensic laboratory.

Crime scene evidence collection procedures and information to support this module are available in the accompanying document: CRIME SCENE PROCEDURES III.

Collection Priority

Prioritize the order in which evidence will be collected at a burglary scene. Collect biological evidence, trace materials and evidence of a fragile nature **first**.

The **second priority** would be to collect swabs from handled items that have been moved, are out of place or do not belong to the resident.

A **third priority** type of evidence that may be at a burglary scene includes the potentially lower-quality biological evidence.

Circumstances and local agency procedures may dictate the priority process. Investigators should contact their local laboratory for specific collection procedures or policies.

First Priority

Items that potentially contain sufficient amounts of DNA to obtain a profile are the most important evidence and the **first priority** to collect. However, the collection or swabbing of certain items may depend on whether or not residents are available to ask if these items are theirs, or if residents had the opportunity to talk to the responding investigator to indicate which items do or do not belong to them.

Examples of these items are as follows:

- Blood.
- Cigarette butts.
- Bottles, cans and drinking containers not used by the residents (collect the item and submit it to the lab if no liquid remains in the container or use one slightly moistened swab to sample around the mouth opening).
- Hairs found or caught in splintered wood or broken glass at the point of entry.
- Discarded latex gloves.
- Clothing items, bandannas, masks or hats that do not belong to the residents.
- Sunglasses or eyeglasses left behind by the suspect (collect the glasses and submit them to the lab or use one slightly moistened swab to sample the parts that rest on the ear, the bridge of the nose, and the bottoms of the frames that rest on the face underneath the eyes).
- Toothpicks, chewed gum, sunflower seed hulls, lollipop sticks.
- Cell phone left by the suspect (collect the item and submit to the lab, or use one slightly moistened swab to sample around the mouthpiece and a second slightly moistened swab to sample around the earpiece).
- Food items with bite marks — some food samples can degrade quickly at room temperature; sample the area around the bite mark with a slightly moistened swab at the scene (collect the food item and store it frozen).
- Evidence that might have semen on it (e.g., panties removed from a bedroom drawer and found crumpled up in another room).

Note: One alternate swabbing technique is to use a slightly moistened swab for collection, followed by a dry swab. Both swabs should be marked and may be packaged together.

Second Priority

The **second priority** would be to collect swabs from handled items that have been moved, are out of place or do not belong to the resident.

Examples of these are as follows:

- Pry bars.
- Tools.
- Jewelry boxes or watch cases not in their usual location, with the contents missing or scattered (for jewelry boxes that have been moved or the contents removed, use one slightly moistened swab around the edges of the box that would have been touched or held onto when opening it).
- Cash boxes, cash register drawers.
- Keys left behind by suspect.
- Computer connectors or cables left behind if the monitor, printer or the computer was stolen.

To watch a video demonstration of swabbing a jewelry box which cannot be run from within this pdf click this link http://propcrimes.dna.gov/M03/00/b.

When sampling this type of evidence, collect as much sample as possible from a single source on a single swab. If the swab becomes very dirty or damaged in the process, use a second swab. If residual moisture remains on an item after using the first swab, use a second dry swab. Concentrate the biological evidence from one item on one swab, on the tip. Collect control samples per agency guidelines.

To watch a video demonstration of swabbing of computer cables which cannot be run from within this pdf click this link http://propcrimes.dna.gov/M03/00/b.

Third Priority

A **third priority** type of evidence that may be at a burglary scene includes the following:

- Smudged fingerprints (unsuitable for identification) near the point of entry.
- Door knobs on doors leading to the exterior.
- Latches or handles of gates left open.

An example is the handles of tools. Use one slightly moistened swab to sample the handle of the tool. If an item has two ends that could have been handled, such as a tire iron or pry bar, use one swab for each end. Keep the biological evidence collected from one item on one swab, preferably on the tip. Collect control samples per agency guidelines.

Control Samples

Control samples, sometimes referred to as substrate samples, are swabbings or cuttings from an unstained portion of the surface material near the recovered stain. The control sample should be packaged separately and

clearly labeled. A laboratory may use the substrate samples as a control to confirm that the results of the test performed were brought about by the stain and not by the material on which it was deposited. Additionally, the laboratory can use these controls to troubleshoot unexpected results.

To watch a video of a control sample collection procedure which cannot be run from within this pdf click this link http://propcrimes.dna.gov/M03/01.

Reference Sample Collection

Standard/reference samples (oral swabs from all victims) must be collected if a victim is not sure if collected evidence belongs to a suspect. These samples should be collected from all individuals who may be linked to the crime scene where DNA evidence is found or have come in physical contact with the item. Reference samples are used for elimination and comparative analysis. For example, buccal swab samples taken from the suspect and/or victim, a known source, are compared to biological evidence found at the crime scene to eliminate or place them at the scene.

Buccal Swab. Sterile swabs or other buccal collection devices are rubbed against the inside cheek of the individual's mouth to collect cells for analysis.

Procedure:

- Collect oral swabs from possible suspect(s).
- Collect oral swabs from victim(s).
- Collect oral swabs from known references (those with access to the scene, such as homeowners).
- Do not prewet swab.
- Rub dry swab on the inside of cheek until wet. Collect at least two swabs from cheeks.
- Identify item with donor's name on blood tube or swab box.
- Thoroughly air-dry the swab before packaging.

Liquid Blood Sample Procedure:

- Collect in purple-topped vacuum tubes that contain the preservative ethylenediamine tetraacetic acid.
- Identify item with donor's name on blood tube.
- Refrigerate. Do not freeze or store near high heat (above 100° F) to prevent the glass from fracturing.
- Alert evidence officers of refrigerated samples.

Cigarette Butts:

- Select only the cigarette butts that may be of evidentiary value as a secondary reference sample.

- Insure that the cigarette butts are thoroughly air dried before packaging.
- Do NOT handle with your bare fingers.
- Do NOT include the ashes.

Equipment

To collect DNA evidence, the following should be stored in a preassembled response kit:

- Latex gloves and related Personal Protective Equipment (PPE).
- Swabs (sterile), wooden or plastic.
- Swab boxes or other suitable container for packaging of swabs.
- Tweezers.
- Disposable razor blade or scalpel.
- Scissors.
- Distilled water.
- Bleach sterilization solution (1:10), made fresh daily.
- Alcohol pads for cleaning.
- Envelopes or bindle paper.
- Paper wrapping.
- Paper bags.
- Pens/markers.
- Evidence tape.
- Biohazard labels.

Personal Protective Equipment (PPE) to maintain safety and aid in the prevention of cross-contamination includes the following:

- Latex or nitrile gloves.
- Eye protection.
- Paper mask that covers nose and mouth.
- Tyvek white paper body suit.
- Sleeve protectors.
- Shoe covers.
- Hair ne.t

Cleaning Re-usable Implements

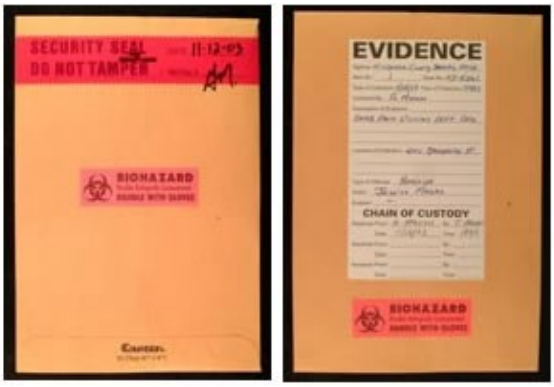
When disposable instruments cannot be used in evidence collection, reusable implements must be properly cleaned. Clean the implements between collection of evidence items with a sterilizing solution, such as bleach and water (1:10) made fresh daily. This procedure includes thorough cleaning with the bleach solution, wiping or rinsing with alcohol or water and drying.

Procedures

Procedures common to all biological evidence collection include the following:

- Submit the entire item, if possible.
- Use a clean or disposable razor blade or scalpel to cut out or scrape the stain.
- Air-dry the stain before packaging (do NOT use heat, fans, or sunlight to dry the stains).
- Collect the control sample using the method for the type of evidence and surface.

- Package each sample separately and label with identifying information and with biohazard designation.



Procedures

The general procedure for packaging biological evidence is as follows:

- Use clean dry implements.
- Label all metal and glass items collected for "Room Temperature Storage," as cold or frozen storage causes condensation on these surfaces, which may dilute biological evidence.
- Air-dry swabs as soon as possible after collection.
- Package all swabs individually in separate containers.
- Store all swabs as soon as possible per agency protocol.
- Do NOT use double-tipped swabs.
- Label as biohazard.

Anytime you transfer material for collection, you create the chance of diluting or contaminating your evidence. All evidence recovered at a crime scene, or received at or during a crime scene investigation, should be inventoried and packaged to prevent cross-contamination prior to leaving the scene. The package should be marked, as well as the item of evidence, if possible.

Remember that wet and dried evidence should not be folded over on itself. Use paper wrapping to prevent contamination during the packaging process to separate and wrap the item. This will protect bloodstain patterns and prevent cross-contamination between stains on one item.

To watch a video demonstration of wrapping a clothing item containing biological evidence which cannot be run from within this pdf click this link http://propcrimes.dna.gov/M03/05.

Placing a laboratory tag on or directly marking certain items of evidence is not always possible due to the type of item, or the condition. Marking an item directly may possibly interfere with subsequent forensic analysis of the item.

Evidence which cannot be tagged, such as soil, hair and stains, should be placed in an appropriate container or envelope. The packaging container should be tagged. The tag should be completed with the following information:

- Agency case number.
- Item number.
- Date recovered or received.

- Investigator's initials.

Blood and Body Fluid Collection

The most common methods used to collect blood and body fluid evidence include the following:

- **Cuttings.** Remove a section of the item containing the stain using a sterile or clean cutting device.

Image courtesy of Kansas Bureau of Investigation

Removing a section of carpet containing a stain using a sterile cutting device

- **Wet absorption.** A sterile swab, gauze pad or threads slightly moistened with distilled water. Concentrate the stain in a localized portion of the swab or pad. When a swab is used, the stain should be concentrated on the tip. The collection medium is pressed or rubbed into the stain and allowed to air-dry. Some laboratories recommend following the first moistened swabbing with a second dry swabbing to ensure thorough sample collection. Both swabs are retained and submitted for analysis.
- **Scraping method.** The sample is scraped with a clean razor blade or scalpel, into a clean piece of paper that can be folded and packaged in a paper envelope. This is a method to be used in a controlled environment (i.e., no wind or traffic) and where the scrapings will not contaminate other evidence.

Open and save a double sided printable version of bindle paper.

To watch a video demonstration of scraping dried blood into bindle paper which cannot be run from within this pdf click this link http://propcrimes.dna.gov/M03/06.

- **Tape-Lifting method.** An optional method for collecting dried blood stains on a nonabsorbent surface is using fingerprint tape. The fingerprint-lifting tape may be placed over the stain and lifted

off. The stain is transferred to the adhesive side of the tape, which may then be secured on a clear piece of acetate for submission to the laboratory. **Note:** When using this method, the collector must ensure the fingerprint tape is not contaminated with other biological materials.

Hair and Fiber

The most common methods used to collect hair and fiber evidence include the following:

- **Visual collection.** On some surfaces, hairs and fibers can be seen with the naked eye. Through use of clean forceps and paper (i.e., trace paper), the sample can be removed from the surface and placed into a clean piece of paper that can be folded and packaged in a paper envelope.
- **Tape lifting.** Trace tapes are available for the collection of trace hair and fiber evidence. The tape is applied to the location of the suspected sample, removed and packaged.
- **Vacuuming.** The area where the suspected samples are located is vacuumed and evidence is caught in a filtered trap attached to the vacuum. These samples are packaged in clean trace paper for submission to the laboratory. Vacuuming is the least desirable collection method because there is a risk of cross-contamination if the equipment is not properly cleaned between each use.

To watch a video demonstration of hair collection with forceps and trace paper which cannot be run from within this pdf click this link http://propcrimes.dna.gov/M03/07.

Wet Stains on Absorbent Surfaces

Procedures for collecting wet stains on absorbent surfaces are as follows:

- Submit the entire item, if possible.
- Use one or more sterile cotton swabs to soak up the stain.
- If the stain is small, concentrate the stain on the tip of the swab.
- Thoroughly air-dry the sample.
- Document that the stain was found wet and identify from where the stain was collected.

To watch a video demonstration of swabbing a wet stain on a piece of wook which cannot be run from within this pdf click this link http://propcrimes.dna.gov/M03/08.

Special Situations

Procedures for collecting wet stains on absorbent substances are as follows:

- Scoop a thin layer of soil (or sand).
- Allow to thoroughly air-dry.
- Package in bindle paper.

Wet evidence in sand

Image courtesy of Kansas Bureau of Investigation

For Liquid Containers:

- Empty liquid containers by poking a hole in the bottom to avoid liquid contact with the mouth area.
- Request test for both DNA and latent fingerprints.
- Mark aluminum cans for "Room Temperature Storage," as cold or frozen storage causes condensation on metal, which may dilute biological evidence.

Wet Stains on Nonabsorbent Surfaces

Collection procedures for wet stains on nonabsorbent surfaces are as follows:

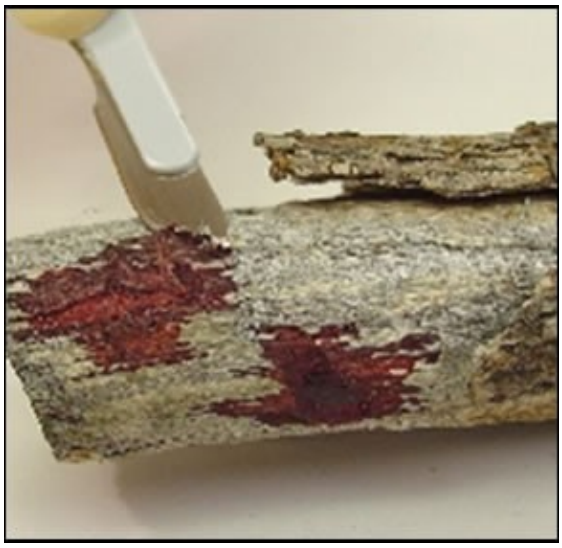
- Use one or more sterile swabs (or sterile gauze for larger stains) to soak up the stain.
- Concentrate the stain on one portion of the tip of the swab.
- Allow to thoroughly air-dry.
- Collect the control sample by slightly moistening the swab with distilled water and rubbing an area of the surface in an unstained region near the stain.

To watch a video demonstration of swabbing blood evidence and collecting a control sample on a nonabsorbent surface which cannot be run from within this pdf click this link http://propcrimes.dna.gov/M03/10.

Dry Stains on Absorbent Surfaces

Collection procedures for dry stains on absorbent surfaces (examples: wood frame and carpet) are as follows:

- Cut out the stained area and package in paper.
- Collect a portion of the unstained area as a control sample.
- Package and label each sample separately.



Shaving dry blood off an absorbent surface

Image courtesy of Kansas Bureau of Investigation

To watch a video demonstration of collecting a dry stain on an absorbent surface which cannot be run from within this pdf click this link http://propcrimes.dna.gov/M03/11.

Dry Stains on Nonabsorbent Surfaces

Collection procedures for dry stains on nonabsorbent surfaces are as follows:

- Submit the entire item, if possible. (Note: If the entire item is submitted and it is a sharp object such as broken glass, it will need to be safely packaged in cardboard and labeled "sharp object enclosed.")
- Use a new or clean scalpel blade to scrape the stains from the surface.
- Collect the flakes onto clean paper and fold the paper in a bindle.
- If the stain is on wood, shave the area of the bloodstain with a new or clean scalpel blade.
- Package each item separately.
- Place sample in a labeled envelope that provides reference information on where the sample was collected.
- Take a control swabbing from unstained areas using a new sterile swab slightly moistened with distilled water. Allow the control swab to air-dry, label and package in paper.
- If determined by your agency protocol, collect the sample with tape using the following procedure:
    1. Place fingerprint tape (do not touch sticky surface with bare hands) over bloodstain and surrounding negative control area.
    2. Rub nonsticky side of tape with a pencil eraser or other blunt object. This is to ensure that good contact is made between the stain and the tape.
    3. Lift the bloodstain like a fingerprint and place the tape on an acetate backing. (Do NOT use a paper backing — paper makes the stain difficult to handle during analysis). The lifting process can be repeated several times on the same stain if necessary.
    4. Label the stain(s) and package individually in a paper envelope.

Advantages: The dilution and contamination potential is minimized by eliminating the use of water as the collection medium; a control is readily collected; it requires little storage space and is a fairly easy technique to perform.

Disadvantages: Investigator must decide which stains to collect; bloodstains do not lift well off certain surfaces. A potential drawback to this method is possible touch DNA contamination if the investigator repeatedly reaches into a common tape lift bag or handles the sample using nonclean techniques.

Collecting a Sample From a Smear

Collecting a sample from a smear is different from collecting from a thicker stain. Use the following procedure:

- Use a slightly moistened (with distilled water), sterile cotton swab and concentrate the substance on the tip of the swab.
- Collect a control sample by swabbing unstained adjacent surface areas with a sterile swab slightly moistened with distilled water.
- Use a slightly moistened swab and follow with a second dry swab for a perspiration smear.
- Allow the swabs to air-dry.
- Label and package evidentiary swabs and control swabs separately in envelopes or bindle paper.

To watch a video demonstration of swabbing a smear which cannot be run from within this pdf click this link http://propcrimes.dna.gov/M03/13.

Evidence Marking

Investigators should accurately and thoroughly document evidence under their control.

Descriptions of evidence include the following:

- Type of item.
- Size of item.
- Manufacturer's markings or serial numbers.
- Noticeable damage or alteration to the item.
- Unusual stains.
- Unusual markings.

Packaging for Transport

Use plastic bags for the transportation of biological evidence only when there are excessive body fluids and possible contamination of people and other evidence items. Use paper packaging if saturation is not a possibility.

Never package wet or moist body fluids in plastic bags for long periods of time. This promotes bacterial growth and evidence contamination, which can lead to DNA degradation.

Transportation and Short-Term Storage

Before collecting any evidence at a crime scene, secure a place for temporary storage. This will help to prevent any degradation or contamination of biological evidence.

Direct sunlight and warmer conditions may cause DNA to degrade more rapidly. Avoid storing evidence in places that may get hot, such as the trunk of a police car. To best preserve biological evidence, store in a cool

dry environment.

Chain of Custody

The chain of custody is a tracking record beginning with detailed scene notes that describe where the evidence was received or collected. Collection techniques, preservation, packaging, transportation, storage and creation of the inventory list are all part of the process used in establishing the chain of custody. The chain of custody is established whenever an investigator takes custody of evidence at a crime scene. The chain is maintained when evidence is received from another officer or detective.

A clear, well-documented chain of custody should be established through a process that includes the following:

- Taking notes, including documentation of the recovery location, the time and date recovered or received, description of the item, condition of the item and any unusual markings on or alterations to the item.
- Marking and packaging the evidence.
- Sealing the evidence.
- Preparing the chain-of-custody record.

The chain-of-custody record for all items collected from the scene must include the following:

- Unique identifier.
- Item description.
- Identity of the person who collected the item.
- Time and date of collection.
- Location where item was found.

Individuals assuming custody of the evidence from collection through analysis sign a chain-of-custody document or otherwise conduct a secure electronic transfer identifying them as contributors to the analysis of the evidentiary materials. When evidence is submitted to a property and evidence section or to a forensic laboratory, a receipt documenting the transfer is obtained.

To maintain an accurate and complete chain of custody:

- Limit the number of individuals handling evidence.
- Confirm that all names, identification numbers, and dates are listed on the chain-of-custody documents.
- Insure that all evidence packaging is properly sealed and marked prior to submission.

- Obtain signed or otherwise secure receipts upon transfer of evidence.

Preserving Evidence

From crime scene to forensic laboratory to courtroom, all evidence must be identified, inventoried and secured to preserve its integrity. It is important to demonstrate that the evidence introduced at trial is the same evidence collected at the crime scene and that access was controlled and documented. An understanding of and adherence to the rules governing chain of custody is vital for an investigator to ensure evidence admissibility in court.

Effective evidence preservation includes appropriate packaging with correct and consistent information on labeling and procedural documentation for all items.

Biological evidence should be air-dried before packaging to minimize degradation. Packaging in paper is preferred; however, some laboratories allow packaging in plastic if the sample is thoroughly dried.

Liquid samples, such as water from a toilet bowl or pipes, should be properly documented and packaged in sterile glass or plastic containers and refrigerated as soon as possible.

Reporting

Elements for evidence submission and laboratory forms may include:

- Agency identification.
- Names of suspect(s) and victim(s).
- Numerical agency case identifier.
- Characterization of the violation.
- Date and location of the crime.
- Investigative summary of the incident.
- Related photographs and other crime scene documentation.
- Description of the items of physical evidence, including the corresponding item number.
- List of requested examinations.
- Notation of interrelated past or current case(s).
- Reference to any relevant previous submission(s).
- Request for expedited treatment of the case.
- Chain of custody, including method of delivery.

Testifying

The well-documented research of forensic DNA analysis methods, along with the National Quality Assurance DNA Standards, limit the challenges against the underlying science used in forensic DNA laboratories.

However, the investigator may encounter challenges originating from evidence identification, note taking, collection procedures and proper chain of custody.

All law enforcement notes, reports, photographs, laboratory analysis reports and chain-of-custody records are kept in the case file, which is made available to the prosecution and is subject to discovery by defense counsel. The chain of custody operates like a chain; if one link is broken, the chain breaks and the evidence may be ruled as inadmissible.

View additional information about testifying.

Summary

Priority of collection is determined by environmental conditions and the nature and potential evidentiary value of the evidence. Standard or reference samples are collected for comparison purposes from individuals who may have accessed the scene. Necessary collection equipment should be preassembled in a response kit. The kit should include personal protection equipment and materials for collecting, preserving and packaging evidence.

Biological evidence requires specific handling to guard against cross- contamination from the investigator or between biological specimens. Collection procedures are determined by the situation, location and the state and type of sample.

Labels list specifics from whom and where evidence was collected and may include biohazard information. The packaging process for biological evidence includes specific precautions to prevent contamination, loss and degradation. Evidence integrity and appropriate storage conditions are critical for evidence preservation. A complete chain of custody and a detailed report are essential components of case documentation.

Courtroom testimony is a critical aspect of the investigator's duties. Correct collection procedures and accurate documentation support the investigator's ability to provide effective testimony.

Module Overview

This training module introduces and describes the following key concepts:

- How CODIS helps solve crimes.
- DNA Database hits.
- Description of CODIS.
- Database level.
- Profile types.
- John Doe warrant.

CODIS software generates investigative leads in cases where biological evidence is recovered from a crime scene. Law enforcement officers have the ability to identify possible suspects when no prior suspect existed.

According to a state of Florida study, 52 percent of database hits against murder and sexual assault cases matched individuals who had prior convictions for burglary.

How Can CODIS Help in Solving Crimes?

CODIS software, when used with the DNA database, is a powerful investigative tool. It has the potential to:

- Link an unknown sample to a convicted offender. This gives the investigator the name of a previously unidentified suspect.
- Link an unknown sample to a solved case. This would also identify a suspect for the investigator.
- Link two or more unsolved cases. Linking unsolved cases can help an investigator look for similarities in the crimes, define geographical areas, compare victim statements, etc. If the crimes occurred in different jurisdictions, linked cases would enable the investigators to compare notes and possibly develop a suspect.
- Exclude suspects. This can often be as important as identifying a suspect. Exclusion of a particular individual can allow the investigator to change the focus of the investigation.

DNA Database Hits

As of October 2007 the profile composition of the National DNA Index System (NDIS) is as follows:

194,785 forensic profiles
5,070,473 convicted offender profiles

The following site has state information on DNA hit counts.

NDIS Statistics - http://www.fbi.gov/hq/lab/codis/clickmap.htm

What is CODIS?

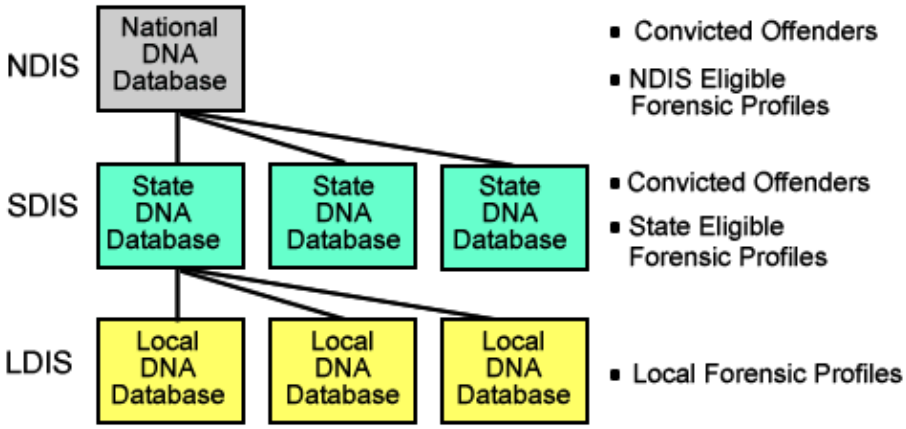
The term CODIS stands for Co mbined D NA I ndex S ystem, which is a computer software program that operates local, state and national DNA databases. The software was established and funded by the FBI. It was developed to enable public forensic laboratories to create searchable databases of authorized DNA profiles.

Laboratories throughout the country share and compare DNA profiles through the national database known as the National DNA Index System, which is managed by the FBI. The CODIS software enables state, local and national law enforcement crime laboratories to compare DNA profiles electronically.

The goals are to link crimes to each other and identify potential suspects by matching DNA profiles from crime scenes with profiles from convicted offenders. Thousands of CODIS matches have linked cases and many cases have been solved by matching crime scene evidence to convicted offender profiles. Searches are conducted and matches are returned to the submitting laboratory.

Database Levels

DNA profiles are entered into CODIS from laboratories at the local (LDIS), state (SDIS) and national (NDIS) levels.



CODIS Architecture

Profile Types

CODIS operates three database levels: local, state and national. Within each level, there are multiple categories known as indices that include convicted offender DNA profiles and unsolved crime scene evidence (forensic profiles), among others.

Convicted Offender Index

Convicted offender profiles account for most of the entries in a state's DNA database. Individual state legislation determines the qualifying offenses for which convicted persons must submit a biological sample for inclusion in the database

Forensic Index

The second most common entry in DNA databases consists of forensic profiles. These are profiles developed from evidence in forensic cases. The forensic profiles are entered via CODIS to search for a match, and generate an investigative lead. Significant numbers of the forensic profiles entered by individual states into CODIS are the probative profiles from cases where the perpetrator is not known, commonly referred to as unsolved cases. Additionally, some states also enter forensic evidence profiles that match the reference profile of the suspect in that case (solved cases).

Other Indices

Based on state laws, some state agencies collect and maintain DNA samples from individuals arrested for certain offenses. Some states and local agencies maintain a suspect database.

John Doe Warrant

The benefits of searching for and supplying DNA profiles to the database include finding leads where none previously existed, linking cases to one another, and identifying suspects. DNA database hits have assisted thousands of investigations. CODIS works by comparing profiles at local, state and national levels. The use of John Doe warrants allows for the prosecution of a case if a suspect is identified after the statute of limitations' time limit expires.

Summary

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- Indiana State Police Crime Scene Unit and the Indiana State Police Laboratory Division.
- Kansas Bureau of Investigation.
- Los Angeles Police Department.
- Orange County Sheriff's Department OCSD.
- Phoenix Police Department.

Websites and Guide

- CODIS - http://www.fbi.gov/hq/lab/html/codis1.htm
- DNA.Gov - http://dna.gov
- NDIS - http://www.fbi.gov/hq/lab/codis/clickmap.htm
- U.S. Department of Justice, Office of Justice Programs, Technical Working Group on Crime Scene Investigation, Crime Scene Investigation: A Reference for Law Enforcement Training - http://www.ncjrs.gov/pdffiles1/nij/200160.pdf

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- U.S. Department of Justice, Office of Justice Programs, Technical Working Group on Crime Scene Investigation, Crime Scene Investigation: A Reference for Law Enforcement Training - http://www.ncjrs.gov/pdffiles1/nij/200160.pdf