

# AUTOSOMAL STR TESTING

## **Point: Autosomal STR analysis – inclusion, exclusion, inconclusive**

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Q: The human body is made up of trillions of cells?

Q: Deoxyribonucleic acid, or DNA, is located within the nucleus of many of these cells?

Q. DNA is passed from parents to their children?

Q: DNA is the same throughout the body?

Q: DNA does not change over time?

Q: DNA is responsible for instructing cells what to do and how to function?

Q: DNA is contained in chromosomes that are within the cell's nucleus?

Q. Each person has 23 pairs of chromosomes?

Q. 22 pairs of autosomal chromosomes and one pair of sex chromosomes?

Q. Autosomal chromosomes are not involved in determining a person's gender?

Q. Autosomal DNA is the primary focus of forensic DNA analysis?

Q. There are specific locations of forensic interest on autosomal chromosomes called loci?

Q: These genetic loci have short segments of DNA called STRs or short tandem repeats?

Q: These STRs are what forensic DNA examiners use to identify the individual source of biological evidence found at a crime scene or on an item of evidence?

Q. No two people will have the same autosomal STR DNA profile for all tested loci except identical twins?

Q: That is why autosomal STR analysis is a valuable tool in criminal investigations?

Q. It has high power of discrimination and can identify an individual?

Q: Autosomal STR analysis can be performed on biological material that contains nucleated cells?

Q. This includes body fluid stains?

Q: The two most common body fluid stains are blood and semen?

Q. Both are rich sources of DNA?

Q. Autosomal STR analysis is routinely performed on these body fluid stains?

Q: Autosomal STR analysis can also be performed on hair, tissue, and saliva?

Q. The first step of autosomal STR analysis is extraction, which is removing DNA from the cells?

Q. The second step is quantitation or determining how much DNA was extracted?

Q. The amount of DNA found on an item of evidence can be critical to understanding what took place during an alleged incident?

Q. For example, a trace amount of DNA indicates a person left behind a small number of cells, which could be due to them only touching an item for a short time?

Q. Or, their trace amount of DNA could have been transferred onto the item by someone else?

Q. Autosomal STR analysis is an extremely sensitive testing method?

Q. It can generate a DNA profile from less than ten cells?

Q. Because of its sensitivity, autosomal STR analysis can be used to detect DNA from skin cells on tools?

Q: Guns?

Q: Cartridge cases?

Q: Doorknobs?

Q: Light switches?

Q: Or any other objects or surfaces at a crime scene?

Q. Autosomal STR analysis can include someone as the source of biological material found at a crime scene?

Q. Autosomal STR analysis can exclude someone as the source of biological material found at a crime scene?

Q: If a DNA profile obtained from biological material that was collected at a crime scene is different from a suspect's DNA profile, then that evidence did not come from that suspect?

Q: If the evidentiary DNA profile is the same as the suspect's DNA profile, then that individual cannot be excluded as the source of DNA found on the evidence?

Q: When a suspect cannot be excluded, a statistical analysis is done to determine the likelihood that the suspect is the source of DNA on the item of evidence?

Q: In autosomal STR analysis, there are three primary results when a DNA profile is compared to a victim or suspect?

Q: Inclusion, exclusion, or inconclusive?

Q. Inclusion means the evidence DNA profile and the known DNA reference profile are the same?

Q. Exclusion means the evidence DNA profile and the known DNA reference profile are different?

Q. An inconclusive result means there isn't sufficient DNA data to create a profile?

Q: Or that the DNA data is uninterpretable?

**Point: DNA analysis can't determine how or when DNA was deposited**

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Q: In this case, the Defendant's DNA was present on the alleged victim's shirt?

Q: The testing cannot determine how his DNA got there?

Q: It cannot tell us when his DNA got there?

Q: For example, if the Defendant's clothing was collected and packaged with the alleged victim's shirt, it's possible that the Defendant's DNA transferred onto the alleged victim's shirt when their clothing was intermingled?

Q: It's possible that the Defendant's DNA transferred to the alleged victim's shirt during casual, innocent contact between them before this alleged incident?

Q: For example, when the two of them were dancing together just hours before this alleged incident?

# Y-STR TESTING

## **Point: Y-STR testing could have excluded the Defendant**

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Q: The alleged victim says that the Defendant had sexual intercourse with her and ejaculated?

Q: Even though you did not find any semen, DNA testing was performed on the alleged victim's vaginal swabs, perineal swabs, and underwear?

Q: You found a mixture of male and female DNA on those items?

Q: There was such a small quantity of male DNA that you could not perform autosomal STR testing?

Q: You could have tested her vaginal swabs using Y-STR DNA testing?

Q: You could have tested her perineal swabs using Y-STR DNA testing?

Q: You could have tested her underwear using Y-STR DNA testing?

Q: Y-STR testing is DNA testing that only generates DNA profiles from male DNA regardless of the presence of female DNA in a sample?

Q: Your laboratory has the capability of performing Y-STR testing?

Q: You've performed Y-STR testing in previous cases?

Q: You've performed Y-STR testing on genital swabs and underwear in previous cases?

Q: You've testified about Y-STR test results in other trials?

Q: Y-STR DNA testing is part of your standard operating procedures?

Q: If you had performed Y-STR testing in this case, the Defendant might have been excluded as the source of male DNA found on her vaginal swabs, perineal swabs, and underwear?

Q: You are here testifying that the male DNA could be from the Defendant without actually confirming that with actual DNA testing?

Q: You are here testifying that the male DNA could be from the Defendant without using all of the DNA testing methods available at your laboratory?

# BIOLOGY OF DNA

DNA is often referred to as the “genetic blueprint” because it contains the instructions that govern our development. The majority of our DNA is the same and determines our physical features such as height, hair color, eye color, and other characteristics. However, there are regions of our DNA with repeating patterns that forensic examiners use to differentiate one person from another. These repeating patterns are known as short tandem repeats (STRs).

All cells, except mature red blood cells, contain DNA. Body fluids and skin cells left behind at a crime scene or on an item of evidence can be used to generate a DNA profile. DNA can be found in the cell’s nucleus or the mitochondria (outside of the nucleus). DNA can be found in autosomal chromosomes or the sex-determining chromosomes (X and Y). In criminal investigations, autosomal STR testing is the preferred testing method because, with the exception of identical twins, no two people have the same autosomal DNA profile.

In some instances, such as sexual assault cases, DNA analysis from the Y chromosome can be helpful, especially if a case involves multiple male DNA contributors. This type of DNA analysis is called Y-STR testing and only detects male DNA. Y chromosomes are passed through the paternal line, so a father and his sons will have the same Y-STR profile.

Mitochondrial DNA (mtDNA) is inherited from the biological mother. All of a mother’s children have the same mtDNA, which is the same for all their relatives in the maternal line. There are thousands of copies of mtDNA in a cell compared to only two parental copies of nuclear DNA. mtDNA analysis is instrumental in cases with unidentified remains, missing persons, and severely degraded biological material where autosomal STR testing is not possible.

# DNA & BIOLOGICAL EVIDENCE AT THE SCENE

## **Point: Investigative value of biological evidence**

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Q: Biological evidence can include hairs, body fluids, and skin cells?

Q: Hairs, body fluids, and skin cells contain DNA?

Q: Head hairs and pubic hairs are common evidence, especially in sexual assault cases?

Q: Body fluids can include vaginal secretions, blood, semen, saliva, and urine?

Q: Biological evidence can link a suspect to an alleged victim?

Q: Biological evidence can link an alleged victim to a crime scene?

Q: Biological evidence can link a crime scene to a suspect?

Q: Biological evidence can help establish an element of the crime?

Q: Biological evidence can be especially critical in sexual assault cases?

Q: Biological evidence can help prove or disprove an alibi?

Q: Biological evidence can support or refute witness statements?

Q: Biological evidence can help establish the identity of a suspect?

## **Point: Crime scene integrity is crucial**

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Q: Biological evidence is one type of evidence that investigators may encounter at a crime scene?

Q: Investigators must use proper techniques for locating biological evidence?

Q: Investigators must use proper techniques for documenting biological evidence?

Q: Investigators must use proper methods for collecting and packaging biological evidence?

Q: This is to maintain the integrity of the evidence?

Q: To avoid contamination and destruction of the evidence?

## **Point: Locating biological evidence**

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Q: When searching for biological evidence at crime scenes, investigators should conduct a general, visual search with the naked eye?

Q: Some evidence may be apparent by simple observation?

Q: There are times that biological evidence will not be readily apparent?

Q: When biological evidence is not readily apparent, the investigator can use other techniques to locate this type of evidence?

Q: An alternate light source (ALS) can assist in locating biological evidence such as body fluid stains?

Q: Using an ALS, investigators can increase their chances of locating biological evidence and body fluid stains?

Q: An ALS is beneficial if the alleged crime's exact location is unknown?

Q: Some types of biological evidence and body fluids have inherent fluorescent properties?

Q: If an investigator does not use an ALS during a crime scene search, they can limit their ability to locate biological evidence?

Q: Different types of biological evidence can be found at a crime scene?

Q: Like blood on a broken window?

Q: Using an alternate light source, semen stains can be found on carpets?

Q: Towels?

Q: Or, bedsheets?

Q: Biological evidence can be found on the alleged victim?

Q: Like a suspect's hair on their sweater?

Q: Like a suspect's semen on their underwear?

Q: Like a suspect's blood and tissue under their fingernails?

Q: Biological evidence can be found on the suspect?

Q: Like saliva from a bite mark on their arm?

Q: Like vaginal fluid on their penis?

Q: Like a victim's blood on their hand?

Q: Once located, investigators must properly document, collect, and package biological evidence?

**Point: Alternate light source (ALS) can help locate semen stains**

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Q: Body fluid stains are not always visible to the naked eye?

Q: Including semen?

Q: An alternate light source (ALS) can be used to locate semen stains at the scene?

Q: An alternate light source (ALS) can be used to locate semen stains on an item of evidence?

Q: ALS can be used to enhance semen stains on a variety of surfaces so they are visible to the naked eye?

Q: Semen stains glow under the ALS?

Q: ALS is an evidence-screening tool?

Q: ALS helps laboratory examiners locate semen stains?

Q: ALS cannot confirm a stain is semen?

Q: After a stain is observed using the ALS, laboratory examiners perform serology tests along with microscopic sperm searches to confirm that a stain is semen?

**Point: Blood can be detected at the scene**

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Q: A presumptive test can be used at the scene to determine if a stain could be blood?

Q: The Kastle-Meyer (KM) test is a common presumptive test for blood?

Q: The KM test is a quick test that can be used to detect blood at a crime scene?

Q: A presumptive test is not a confirmatory test?

Q: A positive presumptive test result is an indication of blood?

Q: If a positive result is obtained using a presumptive blood test, the stain should be collected?

Q: The stain should be sent to the forensic biology laboratory?

Q: The laboratory should confirm that the stain is human blood?

Q: The laboratory should perform DNA testing on the blood stain?



## **Point: Luminol can help identify blood**

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Q: Luminol is a chemical test that can be used to detect blood at a crime scene?

Q: Luminol is used to locate blood that is not visible to the naked eye?

Q: Luminol reacts with hemoglobin in the blood and causes chemiluminescence or a bright, blue-colored glow?

Q: The glow should be photographed to document the pattern of the bloodstains?

Q: The glow should be photographed to document the location of the bloodstains?

Q: The glow should be photographed to document the shape of the bloodstains?

Q: Luminol is very sensitive and will react with minute traces of blood?

Q: However, Luminol is not specific to human blood?

Q: It is used to detect bloodstains that are not visible?

Q: For example, blood stains that have been diluted because of attempted cleaning?

Q: Or, traces of blood from a secondary transfer?

Q: DNA can be detected in bloodstains treated with Luminol?

Q: However, Luminol should be sprayed sparingly?

Q: Luminol should be sprayed sparingly because it can dilute or wash away a bloodstain?

Q: Luminol can dilute or wash away a bloodstain to where DNA can no longer be recovered?

Q: If a positive reaction is obtained using Luminol, those stains should be collected and sent to the forensic biology?

Q: The laboratory should confirm that it is human blood?

Q: The laboratory should perform DNA testing on the area that glowed?

## **Point: Documenting biological evidence**

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Q: Biological evidence should be properly documented before it is collected?

Q: Documenting biological evidence can include note-taking?

Q: Like writing down the exact location of a hair?

Q: Documenting biological evidence can include taking measurements?

Q: Like measuring the size of a bloodstain?

Q: Documenting biological evidence can include photography?

Q: Like photographing a bloodstain pattern on a wall showing the size, shape, and directionality of the individual stains within the pattern?

Q: It is important to thoroughly document biological evidence before it is collected and packaged?

Q: It is crucial to document biological evidence as it appears at the scene in its original location and condition?

### **Point: Collecting and packaging biological evidence**

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Q: Biological evidence should be properly collected before it is sent to the laboratory for testing?

Q: Biological evidence should be properly packaged before it is sent to the laboratory for testing?

Q: Individual hairs should be picked up with gloved fingers or tweezers?

Q: Individual hairs should be wrapped in clean paper?

Q: Individual hairs should be placed in an envelope?

Q: The envelope should be sealed and labeled?

Q: Wet bloodstains should be swabbed with sterile cotton swabs?

Q: The person swabbing the stains should wear gloves?

Q: The swabs should be allowed to dry?

Q: The dried swabs should be placed in individual swab boxes?

Q: The swab boxes should be labeled and placed in an envelope?

Q: The envelope should be labeled and sealed?

Q: Dried bloodstains should be collected with cotton swabs moistened with sterile water?

Q: The swabs should be allowed to dry?

Q: The dried swabs should be placed in individual swab boxes?

Q: The swab boxes should be labeled and placed in an envelope?

Q: The envelope should be labeled and sealed?

Q: Gloves should be changed between each evidence sample that is collected?

Q: Biological evidence should only be packaged in paper bags, envelopes, or cardboard?

Q: Biological evidence should never be packaged in plastic bags or containers?

Q: Plastic packaging can cause the growth of bacteria and microorganisms that can destroy DNA?

### **Point: Methods to collect body fluid stains**

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Q: There are a variety of methods for collecting body fluid stains?

Q: The entire item that contains the body fluid stain can be collected?

Q: Like a shirt or towel?

Q: The body fluid stain can be cut from the item?

Q: Like a bloodstain or semen stain on a carpeted floor?

Q: The body fluid stain can be swabbed from the item?

Q: Like a bloodstain on the wall?

Q: If possible, it is best to collect the entire item that contains the body fluid stain?

Q: That will prevent disturbing the body fluid stain and potentially losing valuable DNA evidence?

Q: Before body fluid stains are collected, they must first be properly documented with photography and notes (i.e., location, measurements, description, appearance, etc.)?

# TOUCH DNA

## **Point: Touch DNA is from direct contact**

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- Q: Touch DNA is sometimes referred to as skin cell DNA?
- Q: Touch DNA is deposited when a person touches another person?
- Q: Touch DNA is left behind when a person touches an object?
- Q: Swabs can be used to collect touch DNA?
- Q: Items with touch DNA should be collected from the scene?
- Q: Items with touch DNA should be collected from an alleged victim?
- Q: Items with touch DNA should be collected from a suspect?

## **Point: Factors affecting deposition and detection of touch DNA**

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- Q: Recovery of touch DNA depends on various factors?
- Q: The rate of cell shedding?
- Q: Dry or moist skin?
- Q: Prior skin contact with other surfaces?
- Q: Hand washing?
- Q: How long the touching occurs?
- Q: How much friction is involved?
- Q: How much force was applied?
- Q: The type of surface touched?
- Q: Rougher surfaces can collect more cells than smooth surfaces?
- Q: Absorbent surfaces can collect more cells than non-absorbent surfaces?
- Q: Persistence is how long DNA can remain on an item?
- Q: Delays between touch DNA deposition and collection can reduce persistence?
- Q: DNA deposited onto a surface can degrade over time?
- Q: Environmental factors can cause DNA to degrade?
- Q: High temperatures?
- Q: Sunlight?

Q: Humidity?

Q: Bacteria?

### **Point: Factors affecting the quantity of touch DNA detected**

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Q: Many factors can affect the quantity of DNA detected on an item of evidence?

Q: DNA can be detected on an item that was touched only once?

Q: DNA can be detected on regularly used items?

Q: The quantity of DNA cannot tell us whether it was deposited by a single touch or by regular use?

Q: Many factors can affect the quantity of DNA detected?

Q: Such as, how much of the skin surface touched an item?

Q: Such as, how much friction was involved in the touching?

Q: Such as, how much force was involved in the touching?

Q: Such as, the amount of time the item was touched?

### **Point: Touch DNA should be considered in all sexual assault cases**

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Q: DNA testing is very sensitive?

Q: DNA testing can detect trace amounts of DNA?

Q: DNA testing can generate a DNA profile from less than ten cells?

Q: Because DNA testing is very sensitive, items that were touched should be collected?

Q: Swabs should be collected from areas of the body that were touched?

Q: Swabs should be collected from clothing that was touched?

# CONDOMS AND CONDOM WRAPPERS

## **Point: Collecting condoms and condom wrappers**

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Q: Condoms can be found at crime scenes?

Q: Condom wrappers can be found at crime scenes?

Q: Condoms and condom wrappers can contain DNA evidence?

Q: Condoms and condom wrappers should be collected using a gloved hand or sterile tweezers?

Q: Condoms should be air-dried before packaging in paper envelopes or paper bags?

Q: Condom wrappers should be packaged in paper envelopes or paper bags?

## **Point: Investigators didn't submit condom wrapper for DNA testing**

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Q: Based on case information your laboratory received, you know the alleged victim reported that the Defendant used a condom?

Q: You know the alleged victim reported the Defendant brought the condom?

Q: You know the alleged victim reported the Defendant opened the condom?

Q: You know a used condom wrapper was collected from the scene?

Q: Investigators provided your laboratory with a copy of the Defendant's statement?

Q: You know the Defendant admitted they had sex?

Q: He said the sex was consensual?

Q: The Defendant said that he did not bring a condom with him?

Q: The Defendant denied touching the condom wrapper?

Q: The Defendant denied opening the condom wrapper?

Q: The Defendant said that the alleged victim provided the condom?

Q: The Defendant said that the alleged victim opened the condom wrapper and put the condom on him?

Q: He said that after she put the condom on him, they had sex?

Q: Your laboratory did not receive the condom wrapper?

Q: If investigators had submitted the condom wrapper to your laboratory, you could have tested it for touch DNA?

Q: Touch DNA is sometimes referred to as skin cell DNA?

Q: Touch DNA is left behind when a person touches an object?

Q: For example, if the Defendant touched the condom wrapper, he would have left behind his DNA?

Q: If the Defendant opened the condom wrapper, he would have left behind his DNA?

Q: If the Defendant's DNA were NOT found on the condom wrapper, that would corroborate that he DID NOT touch the condom wrapper?

Q: If the Defendant's DNA were NOT found on the condom wrapper, that would corroborate that the Defendant DID NOT open the condom wrapper?

Q: If only the alleged victim's DNA were found on the condom wrapper, that would corroborate that she opened the condom wrapper?

Q: Because your laboratory never received or tested the condom wrapper, there's no evidence that the Defendant's DNA was on that item?

Q: One of the major questions, in this case, is who opened the condom wrapper. You would agree that testing the condom wrapper for DNA could help answer that question?

### **Point: Expert did not test condom wrapper for touch DNA**

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Q: Your laboratory received a used condom wrapper?

Q: The wrapper was collected at the scene?

Q: According to the case information provided to your laboratory, the alleged victim said that the Defendant used a condom?

Q: The alleged victim reported that the condom was brought to her house by the Defendant?

Q: The alleged victim reported that the Defendant opened the condom wrapper?

Q: You know from the case information that the Defendant denied touching the condom wrapper?

Q: The Defendant denied opening the condom wrapper?

# LACK OF BODY FLUID EVIDENCE

## **Point: No blood was found despite a report of genital injury**

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Q: You tested the alleged victim's vaginal swabs?

Q: You tested her perineal swabs?

Q: You tested her underwear?

Q: The perineal swabs were collected from the area between her vagina and anus?

Q: You did not find blood on those swabs?

Q: You did not find blood on her vaginal swabs?

Q: You did not find blood on her underwear?

Q: If there had been trauma to her vagina that caused bleeding, you could find blood on her vaginal swabs?

Q: If there had been trauma to her perineum that caused bleeding, you could find blood on her perineal swabs?

Q: If there had been trauma to her vagina and perineum that caused bleeding, you could find blood on her underwear?

Q: The blood would transfer from those areas of her body to her underwear when she put them on?

## **Point: No semen was found despite victim's report of ejaculation**

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Q: You did not find semen on the alleged victim's vaginal swabs?

Q: You did not find semen on her perineal swabs?

Q: You did not find semen on her underwear?

Q: You tested for semen using three different tests?

Q: You tested for acid phosphatase, an enzyme found in semen?

Q: You tested for p30 protein, a protein found in semen?

Q: You searched for sperm under the microscope?

Q: Sperm are the male reproductive cells found in semen?



Q: Based on your education and training, you know that the average male ejaculate contains 100 million sperm?

Q: Pre-ejaculate can contain detectable amounts of seminal proteins and sperm?

Q: Pre-ejaculate is the fluid discharged from the urethra of a man's penis during initial sexual arousal and foreplay?

Q: Your semen testing methods are very sensitive?

Q: You didn't find semen or sperm on the alleged victim's vaginal swabs, perineal swabs, or underwear?

### **Point: Lack of semen doesn't corroborate the victim's story**

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Q: You testified that you received 17 items of evidence?

Q: Of the 17 items, you tested 3?

Q: Before you did any testing, you reviewed the information that investigators provided to your laboratory?

Q: You read the statement of the alleged victim?

Q: She said the Defendant sexually assaulted her and ejaculated on her face, chest, and legs?

Q: You know from her statement that she did not shower after this alleged assault?

Q: The alleged victim said she had semen on the thigh areas of her legs?

Q: She said she put her pants back on after the alleged incident?

Q: You did not find semen on the inside leg areas of her pants?

Q: If there was semen on her thighs and she put on her pants, it would have transferred to the inside of her pants?

Q: She said she had semen on her face?

Q: She said she wiped her face with a Kleenex tissue?

Q: If she wiped her face with a Kleenex, the semen would transfer to the tissue?

Q: You did not find semen on the Kleenex?

Q: She said she wiped her chest with a pillowcase?

Q: If she wiped her chest with a pillowcase, the semen would transfer to the pillowcase?

Q: You did not find semen on the pillowcase?

Q: Transfer would occur because the semen was in liquid form?

Q: It was still wet?

Q: Body fluid stains that are wet and have not dried transfer easily to items they come in contact with?

Q: The semen had not dried on her legs, face, or chest?

Q: Given the lack of semen on her pants, pillowcase, and Kleenex, there is no indication that the Defendant ejaculated?

# CONTAMINATION & DESTRUCTION OF EVIDENCE

## Point: Evidence can be contaminated

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- Q: Evidence may be contaminated after the crime was committed?
- Q: The commingling of items may contaminate evidence?
- Q: Evidence can be contaminated during the crime?
- Q: Evidence can be contaminated during the scene investigation?
- Q: Evidence can be contaminated when it is being documented?
- Q: Evidence can be contaminated when it is being collected?
- Q: Evidence can be contaminated during improper packaging and storage?
- Q: Evidence can be contaminated during laboratory testing?
- Q: Contamination of the crime scene can compromise an investigation?
- Q: Contamination of evidence can compromise a criminal investigation?
- Q: Contamination can mislead investigators?
- Q: Contamination can lead to wrongful convictions?
- Q: Contamination occurs when evidence is introduced into the crime scene that was not previously there?
- Q: Contamination occurs when biological evidence is deposited on an item where it didn't previously exist?
- Q: Witnesses can contaminate the evidence at a crime scene?
- Q: Suspects can contaminate the evidence at a crime scene?
- Q: Innocent bystanders can contaminate the evidence at a crime scene?
- Q: An alleged victim can contaminate the evidence at a crime scene?
- Q: First responders can contaminate the evidence at a crime scene?
- Q: Police officers can contaminate the evidence at a crime scene?
- Q: Crime scene investigators can contaminate the evidence at a crime scene?
- Q: One of the most important ways to limit contamination is by restricting access to the scene?
- Q: Evidence can get contaminated at various stages of the investigation?

Q: Evidence can be contaminated at the crime scene due to improper handling and packaging?

Q: Evidence can be contaminated at the hospital due to improper handling and packaging?

Q: Evidence can be contaminated during transport?

Q: Evidence can be contaminated due to improper storage?

Q: Evidence can be contaminated in the laboratory due to improper handling and packaging?

Q: Everyone who handles the evidence is responsible for guarding against contamination?

### **Point: Investigators must avoid contaminating evidence**

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Q: Crime scene investigators must prevent contamination of evidence at the scene?

Q: They must prevent the transfer of biological evidence from themselves to the crime scene?

Q: Precautions should be taken while processing crime scenes, including the use of personal protective equipment (PPE)?

Q: This equipment should include disposable gloves?

Q: Safety goggles?

Q: Face masks?

Q: Full protective Tyvek suits and booties?

Q: If protective gear is not used, investigators could inadvertently transfer their own biological material and DNA to the crime scene and to items of evidence?

Q: Investigators could inadvertently transfer foreign DNA to the crime scene and to items of evidence?

Q: Preventing contamination is critical because current DNA testing methods can detect trace amounts of DNA?

## **Point: Forensic nurse examiners must avoid contamination**

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Q: Forensic nurse examiners should clean and sanitize all work surfaces?

Q: Forensic nurse examiners should use clean and sterile instruments?

Q: Forensic nurse examiners should wear a mask?

Q: Forensic nurse examiners should wear gloves?

Q: Forensic nurse examiners should change gloves between each item of evidence they collect?

Q: Each body swab collected should be air-dried and should not come in contact with other swabs?

Q: Each item of evidence should be packaged separately?

Q: If these protocols are not followed, evidence can be contaminated?

Q: If these protocols are not followed, DNA evidence can be compromised?

Q: If these protocols are not followed, cross-contamination can occur?

Q: Meaning, biological material, and DNA can be transferred between items?

Q: If these protocols are not followed, the integrity of the DNA test can be questioned?

Q: Due to the sensitivity of current DNA testing methods, forensic nurse examiners collecting samples from alleged victims and suspects should take every precaution to avoid contamination?

## **Point: Improperly packaged evidence can be contaminated**

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Q: Evidence items should be properly packaged?

Q: The packages should be sealed?

Q: Evidence items should not be removed from their original packaging before laboratory personnel examine them?

Q: The packages should be labeled with the description of the item inside?

Q: The packages should be labeled with the location where the evidence was found?

Q: The packages should be labeled with the date and time the evidence was found?

Q: The packages should be labeled with the name of the person who collected them?

Q: Only one evidence item should be in the package?

# THE LAB DID NOT RECEIVE CRUCIAL EVIDENCE

Investigators decide what evidence they send to the laboratory for forensic testing. Sometimes they only submit items that prosecutors or the laboratory advise them to, which can lead to crucial evidence that never gets tested. The defense lawyer must address this issue to show the jury that investigators failed to submit evidence to the laboratory that could have supported the Defendant's statement, refuted the alleged victim's claims, and cast reasonable doubt on the Prosecution's case.

## **Point: Law enforcement did not submit crucial evidence**

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Q: Your lab received evidence in this case?

Q: The investigators sent you evidence based on what the alleged victim reported?

Q: Your lab did not receive the Defendant's underwear?

Q: If you had received his underwear, you could have tested them for DNA?

Q: If the alleged victim had forced her hand down into the Defendant's underwear to touch his penis, her skin cells and DNA could have transferred to the inside of his underwear?

Q: The friction between her skin and the underwear could cause her skin cells and DNA to be deposited on the waistband and inner crotch of his underwear?

Q: If the alleged victim's DNA were found on the inside of his underwear, that would support the Defendant's statement that she put her hand into his underwear?

Q: Your lab did not receive the comforter from the alleged victim's bed?

Q: If you had received her comforter, you could have tested it for body fluids?

Q: If you had received her comforter, you could have tested it for skin cell DNA?

Q: If there was a question of whether or not the Defendant had been on her bed, testing the comforter for his DNA may have helped answer that question?

Q: If the Defendant's DNA was not found on the comforter, that could mean he was never actually on her bed?

Q: Your lab did not receive the fingernail scrapings collected from the alleged victim?

Q: Fingernail scrapings were collected during a sexual assault examination at the hospital?

Q: These fingernail scrapings were included in the kit?

Q: Fingernail scrapings are often collected because the victim might have scratched someone during an assault or struggle?

Q: The fingernail scrapings could contain the blood of an assailant?

Q: The fingernail scrapings could contain the skin tissue of an assailant?

Q: Blood and skin tissue are good sources of DNA?

Q: Fingernail scrapings with blood and skin tissue of another individual could indicate that a struggle occurred?

Q: If the alleged victim's fingernail scrapings do not contain the Defendant's blood or skin tissue, it could mean that she did not scratch him?

Q: If the alleged victim's fingernail scrapings do not contain the Defendant's blood or skin tissue, it could mean that she did not fight him or struggle?

Q: If the alleged victim's fingernail scrapings did not contain the Defendant's DNA, it could mean that she had no physical contact with him?

Q: Your laboratory did not receive the sweatpants the alleged victim was wearing at the time of the incident?

Q: If you had received her sweatpants, you could have tested them for DNA?

Q: If the Defendant had forcefully pulled the sweatpants off her body, he would have touched the waistband area of her sweatpants?

Q: If the Defendant had forcefully pulled the sweatpants off her body with his bare hands, he would have left behind skin cells?

Q: His skin cells would have transferred to the waistband?

Q: You could have tested these skin cells for DNA?

Q: If the Defendant's DNA was not found on the waistband of her sweatpants, that could mean he never actually touched her sweatpants?

Q: That could mean he never actually removed her sweatpants from her body?

Q: That could also mean that she removed her own pants before consensual sex?

# THE DNA LAB DID NOT TEST KEY EVIDENCE

DNA test results can determine the outcome of a trial. The defense must show the jury that the DNA laboratory did not test all relevant items of evidence. In particular, the defense should highlight the items the laboratory chose not to examine that were potentially exculpatory.

## **Point: Bedsheets not tested**

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Q: You received the bedsheets from the alleged victim's bed?

Q: You did not examine or perform any testing on her bedsheets?

Q: You could have tested the bed sheets for body fluids and DNA?

Q: Testing her bedsheets could have helped determine if the Defendant was actually on the bed?

Q: If none of his body fluids or DNA were on the bedsheets, then one could conclude he was never in the bed?

## **Point: Defendant's pubic hair combings not tested**

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Q: You received the Defendant's pubic hair combings?

Q: These were collected during his hospital examination?

Q: These combings were included in his kit?

Q: The purpose of these combings is to recover any pubic hairs originating from a female he might have had sex with?

Q: If any foreign pubic hairs were found in the Defendant's combings, DNA testing could have been performed on those foreign hairs to determine who they came from?

Q: If there were no roots on the foreign pubic hairs, you could have sent the hairs to a laboratory that performs mitochondrial DNA testing?

Q: You can detect mitochondrial DNA from hairs that have no roots?

Q: The Defendant's pubic hair combings were never examined?

Q: DNA testing was never performed on the foreign hairs in his pubic hair combings?