

SANE Module 3: Forensic Evidence Collection

A Special Note to Participants

This course is the third module in the Sexual Assault Nurse Examiner (SANE) Online Course. The SANE Online Course represents twenty hours of a 40-hour New York State Department of Health (NYSDOH) certified Sexual Assault Forensic Examiner (SAFE) Training Program.

The online course is a collaborative effort between the New York State Nurses Association and four certified NYSDOH Sexual Assault Nurse Examiners who provided the curriculum for the online course. The requirements to complete the comprehensive NYSDOH-certified SAFE Training Program are:

- SANE Online Course (20 hours)
- Live clinical course with a certified SANE educator (20 hours)
- Clinical preceptorship (arranged with a SANE educator)

The development of the five online modules was funded in part through a grant from the New State Division of Criminal Justice Services (DCJS). Additional information concerning the SANE Online Course and requirements for completing the SAFE Training Program can be found in Module 1.

NYSNA Continuing Education

The New York State Nurses Association is accredited as a provider of continuing nursing education by the American Nurses Credentialing Center's Commission on Accreditation.

This module has been awarded 4 contact hours and contains two components: online didactic content and an online discussion forum. **Participants must read the online material, contribute to the discussion forum, pass an online exam with at least 80%, and complete an evaluation in order to receive a certificate of completion.**

How to Take This Module

Please take a look at the steps below these will help you to progress through the module.

1. REVIEW THE OBJECTIVES

The objectives provide an overview of the entire module and identify what information will be the focus of the module. Objectives are stated in terms of what you, the participant, will know or be able to do upon successful completion of the module.

2. STUDY EACH SECTION OF THE MODULE IN ORDER

Keep your learning "programmed" by reviewing the content in order. This will help you understand the sections that follow.

You will need to enter the online discussion forum as directed throughout the module. When you see the rotating stop sign, you are expected to enter the online forum to answer questions or engage in discussion with your SANE educator and other participants in the online course. **Participation in the online forum is required and will be monitored by your SANE educator.**

3. COMPLETE THE MODULE EXAM

After studying the module and completing the requested activities in the forum, click on the "Course Exam" option located on the module navigation toolbar. Answer each question by clicking on the button corresponding to the correct answer. All questions must be answered before the exam can be graded; there is only one correct answer per question. You may refer back to the module material by minimizing the exam window.

4. GRADE THE MODULE EXAM

Next, click on "Submit Test." You will know immediately whether you passed or failed. If you do not successfully complete the exam on the first attempt, you may take the exam again. It is highly recommended to review the material for the questions missed **BEFORE** attempting the exam again. If you are unsuccessful on your second attempt, you will need to contact your SANE educator.

5. COMPLETE THE EVALUATION FORM

Upon passing the course exam you will be prompted to complete a course evaluation. You will have access to the certificate of completion **after you have passed the discussion forum, passed the exam, and completed the evaluation.** At this point, you should print the certificate and keep it for your records. You will need to provide a copy of all five certificates to your SANE educator as proof of completion of the 20 hours of online content.

SANE Module 3: Objectives

Upon completion of this module, the participant will be able to:

1. Discuss the importance of evidence collection in sexual assault.
2. Define DNA and its significance in the sexual assault evaluation.
3. List the steps in the NYS Sexual Offense Evidence Collection Kit.
4. Identify techniques or adjunct equipment that may be utilized in the forensic evaluation.
5. Describe the symptoms a victim may exhibit that could be attributed to Drug Facilitated Sexual Assault (DFSA).

SANE Module 3: Introduction

Patients who have been sexually abused may show up at a hospital emergency department seeking medical care and prevention of sexually transmitted infections or pregnancy. They may be directed to the hospital by an advocacy or law enforcement agency. Often they show up not entirely aware of all of the options available to them. One of these options is the collection of forensic evidence.

New York State Public Health Law requires that all hospital emergency departments in New York State develop policies and procedures to appropriately care for sexual assault victims. Forensic evidence collection should be offered to every patient who presents with the complaint of sexual assault. Forensic nurses are utilized to conduct the examination, which is two-pronged and consists of:

- the medical evaluation ,and
- the legal evaluation.

If collected appropriately, the patient's body and clothing may be able to provide important evidence that can be used in the legal investigation of a crime. The two components of the exam are done simultaneously, and, if done correctly, appear seamless to the patient.

This module will describe the steps in the evidence collection process on a patient who may have been sexually assaulted, as well as the rationale and significance of the evidence collected, and how it may be analyzed at a crime lab.

You will also understand the importance of *chain of custody* and *evidence integrity*, from cross contamination issues to evidence security and proper cleaning techniques.

Understanding the dynamics of potential evidence retrieval will help you collect more valuable specimens. As medical professionals, we have been charged with that responsibility for our patients.

Note: The majority of this module was compiled by your SANE facilitator using information from the National Institute of Justice and Office for Victims of Crime, the New York State Department of Health, and the U.S. Department of Justice.

The lesson on **DNA Evidence** was extracted from the following sources:

- National Institute of Justice and Office for Victims of Crime (2001)
- New York State Division of Criminal Justice Services (n.d.)
- U.S. Department of Justice (n.d.), *Basic biology...*
- U.S. Department of Justice (n.d.), *Forensic laboratories...*

The lesson on **History of Forensic DNA Analysis** was extracted from U.S. Department of Justice (n.d.), *History of forensic DNA analysis*.

The lesson on **Analyzing DNA Evidence** was extracted from the following sources:

- U.S. Department of Justice (n.d.), *Analyzing DNA...*
- U.S. Department of Justice (n.d.), *DNA typing...*
- U.S. Department of Justice (n.d.), *Mitochondrial...*
- U.S. Department of Justice (n.d.), *STR analysis*
- U.S. Department of Justice (n.d.), *Y-Chromosome...*

The lesson on **Unsolved and Post-Conviction Cases** was extracted from National Institute of Justice and Office for Victims of Crime (2001).

The lesson on **DNA Evidence Collection** was extracted from the following sources:

- New York State Department of Health (2004)
- U.S. Department of Justice (n.d.), *Possible results...*

The sections comprising the **New York State Sexual Offense Evidence Collection Kit** are from New York State Department of Health (2004).

The first paragraph in the lesson on **Chain of Custody** was adapted from New York State Department of Health (2004).

The lesson on **Drug-Facilitated Sexual Assault** was adapted from New York State Department of Health (2004).

Full references for the sources named above are available in the reference list at the end of this module.

A Word about the Activities of this Module

A private, online discussion forum has been set-up for your region of New York State. At various points in this online module you will be asked to read case studies, watch a video, and provide feedback on presented questions. You should complete the discussion board postings **in sequence** as you come across them in the module content. It may be helpful to keep the course window and discussion forum window open at the same time so you can move more quickly between the module and the forum. When you enter the discussion forum, the first topic provides instructions on how to post your responses.

When you see the rotating stop sign you will have access to a link that directs you to the discussion forum entrance page, where you will be prompted for a username and password. Enter the username and password assigned to you. Next, click on your region-specific forum and enter the appropriate password. As a reminder, your SANE educator e-mailed username and password information at the time of your course enrollment.

We encourage you to read each other's postings and respond. **Reminder!** Your participation in the discussion forum will be monitored by your educator.

SANE Module 3: About the Author

Anne Galloway, RN, SANE-A, SANE-P

Ms. Galloway is the SANE program Director for Vera House, Inc. in Syracuse, New York. She has been the Director since the SANE program began in 1997. In that role, she oversees all aspects of the program, including grant writing, clinical oversight, recruitment, and clinical care for patients. She has also worked with abused children and in an emergency department. She prepared this module using her clinical expertise and information extracted from the National Institute of Justice and Office for Victims of Crime, the New York State Department of Health, and the U.S. Department of Justice.

Components of Evidence

What is Evidence?

Locard's Exchange Principle states that whenever two objects come into contact, a transfer of material will occur (U.S. Department of Justice, 1999).

With this in mind, and based on the patient's assault history, evidence may be transferred that can be collected and analyzed by a crime lab. Important evidentiary material may include:

- Semen
- Saliva
- Hair
- Fibers
- Blood

While transfer of evidence may occur during the assault, it's important to remember that additional transfer and loss of evidence may occur after the incident, and may be greatly affected by the activities or post-assault hygiene of the victim.

Important questions to ask your patient related to post-assault activities:

- Did you shower bathe or wash?
- Did you urinate or defecate?
- Did you have anything to eat or drink?
- Did you brush your teeth, chew gum or smoke a cigarette?
- Did you remove or insert a tampon or diaphragm?
- Did you vomit?

Semen, blood, and saliva may be used to extract DNA to identify the donor. Presence of hair and fibers or other trace evidence may corroborate the patient's history of the assault.

Consider the following case study:

Debbie Smith was a young mother raped by a stranger, taken from her home, and dragged to a wooded area behind her house. Her police officer husband slept in the home, after a night shift at work. The attacker threatened the woman; he knew where she lived and promised to come back if she went to the police.

After he left, she woke her husband, asking him not to report it, and wanting desperately to shower. Her husband convinced her to go to the hospital instead to have a rape kit collected.

The evidence obtained from her body and clothing, the "crime scene", included specimens that contained the DNA of the perpetrator. They would eventually be analyzed and entered into CODIS, a computerized system that catalogs and compares forensic evidence to DNA collected from criminals. Six long years later, the detectives got a hit. A man who was in prison for another crime was charged with and convicted of the rape of Debbie Smith based on DNA evidence.

Note. Adapted from "A First Step Toward Healing: Crime Victim Debbie Smith's Story." DNA Initiative, n.d. Retrieved March 9, 2009, from http://www.dna.gov/case_studies/debbie_smith.



Activity #1

Please go to the Denver District Attorney (DA) Web site (<http://grants.denverda.org/fcpei/videos/dnacriticalissuesworkingwithvictims.htm>) and watch the video "DNA: Critical Issues for Those Who Work with Victims." The video is approximately 20 minutes long.

After watching the video, close the Denver DA Web site. Please go to the discussion forum and post your responses to the following:

- How did you feel when listening to the victims?
- What did you learn from them?

DNA is widely accepted as an important investigative tool in the prosecution of many crimes, including sexual assault. Sexual assault usually involves the transfer of biologic evidence, such as semen, saliva or blood. All of these specimens contain the "donor's" DNA. Better than fingerprints, DNA contains the genetic make-up of an individual, and if collected, preserved and analyzed appropriately, can link the donor to the victim with astounding accuracy.

DNA Evidence

What is DNA?

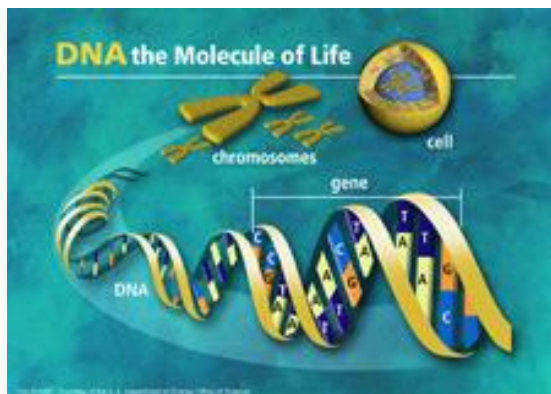


Figure 1. *DNA the Molecule of Life.*

Downloaded from the USA.gov, DNA Initiative Web site: <http://www.dna.gov/basics/biology/>

Deoxyribonucleic acid or DNA, is the genetic material present in the cells of all living organisms. An individual's entire genetic makeup is comprised of this fundamental building block. Every cell in the human body which contains a nucleus contains the same DNA. Therefore, the DNA in a person's blood is the same as the DNA in their skin cells, semen, and saliva.

Four building blocks which are called bases make up the DNA strand. The building blocks you may recall from anatomy and physiology, are Cytosine, Guanine, Thymine and Adenine (or C, G, T, and A). It is the order or sequence of these building blocks that determines each person's genetic characteristics.

The following examples contain a person's DNA: blood, semen, skin cells, tissue, organs, muscle, brain cells, bone, teeth, hair, saliva, mucus, perspiration, fingernails, urine, and feces.

The Significance of DNA

Perhaps the most significant advance in criminal investigation since the advent of fingerprint identification is the use of DNA technology to help convict criminals or eliminate persons as suspects. DNA analyses on saliva, skin tissue, blood, hair, and semen can now be reliably used to link criminals to crimes. Increasingly accepted during the past 10 years, DNA technology is widely used by police, prosecutors, defense counsel, and courts in the United States (National Judicial Education Program & American Prosecutors Research Institute, 2002).

An authoritative study on the forensic uses of DNA, conducted by the National Research Council, National Academy of Sciences (1992), has noted that:

...the reliability of DNA evidence will permit it to exonerate some people who would have been wrongfully accused or convicted without it. Therefore, DNA identification is not only a way of securing convictions; it is also a way of excluding suspects who might otherwise be falsely charged with and convicted of serious crimes. (p. 156)

Coined to be the fingerprint of the 21st Century, DNA is a powerful crime-fighting tool that helps convict the guilty, exonerate the innocent and bring justice to victims. To aid in this process, the Federal Bureau of Investigation (FBI) created a national computer software program called the Combined DNA Index

System or CODIS to catalog DNA samples. There are two different types of samples that can be entered into the system: DNA profiles found at crime scenes such as evidence from a sexual assault victim; and DNA profiles of individuals convicted of violent crimes. In addition, each state has their own databank, which is periodically uploaded into CODIS.

The New York State databank was created to maintain DNA profiles of convicted offenders so that law enforcement officials can identify the perpetrators of crimes when DNA evidence is retrieved from a crime scene. The databank began limited operations in 1996, when individuals convicted of homicide and certain sex-related crimes were required to submit a DNA sample. The databank was expanded in 1999 and again in 2004, but still only required samples from 14 percent of convictions in the state until the most recent expansion was approved in June 2006. Through this dramatic expansion, law enforcement officials will have a greater opportunity to solve and prevent crime.

In June of 2006, the New York State Legislature took a tremendous step forward in bringing New York's criminal justice policies into the 21st century. Now, 46 percent of Penal Law convictions in New York State are required to submit a DNA sample for inclusion in the state's databank, including all felonies, and 30 percent of misdemeanors. If the suspect is not known to the victim, the DNA collected from the forensic examination can be entered into the New York State databank, which will then be uploaded into CODIS. If there is a DNA profile in CODIS that matches the sample from the victim, this would constitute a "hit". Further investigation would be conducted to assure the accuracy of the preliminary findings.

Please visit the New York State Division of Criminal Justice Services (DCJS) Web site (<http://www.criminaljustice.state.ny.us/forensic/dnaoffenses.htm>) to review the listing of offenses which require the submission of DNA.



Key Points to Remember

- ✓ Combined DNA Index System or CODIS is the FBI's databank to catalog DNA samples.
- ✓ 46% of Penal Law convictions in NYS are required to submit a DNA sample.

The Value of DNA Evidence

The power of DNA in the realm of a criminal investigation is due to the fact that, with the exception of identical twins, no two people have the same DNA. Therefore, DNA evidence collected from a crime scene can be linked to a suspect or can eliminate a suspect from suspicion. For example, during a sexual assault, biological evidence may be collected from the victim's body or the crime scene which may contain the DNA of the perpetrator such as hair, skin cells, semen, or blood. When properly collected, DNA can be compared with known samples to place a suspect at the scene of the crime. In addition, if no suspect exists, a DNA profile from crime scene evidence can be entered into CODIS to identify a suspect anywhere in the United States or to link serial crimes to each other.

The effective use of DNA as evidence may also require the collection and analysis of elimination samples to determine the exact source of the DNA. Elimination samples may be taken from anyone who had lawful access to the crime scene and may have left biological material. When investigating a rape case, for example, it may be necessary to obtain an elimination sample from everyone who had consensual intercourse with the victim within 96 hours of the alleged assault to account for all DNA found on the victim or at the crime scene. Comparing DNA profiles from the evidence with elimination samples may help clarify the results.

How is DNA Used?

Specimens collected from the patient's body or the crime scene where the sexual assault occurred can be analyzed and compared to known DNA samples. For example, if a patient describes sexual assault with penile penetration, the examiner should collect swabs from sites that may have secretions from the suspect. These swabs are then sent to the crime laboratory, if appropriate, analyzed and identified as to what type of secretion they hold, and if they are found to be a biologic specimen, they are analyzed for the presence of DNA. If DNA is found, it can then be compared to a known sample, such as the suspect's. If it is determined to be the same, this corroborates the patient's history that the suspect's DNA was deposited on the patient's body. It does not determine if a sexual assault occurred, only that the suspect left his DNA on the patient. It is one piece of the puzzle in the investigation of a sexual crime, albeit an important piece.

Consider the following case study.

A 21-year-old college student presented to the emergency department a day after she had gone out to a party with friends. She drank 5-6 alcoholic beverages in a 2-3 hour timeframe, and remembers being with a male friend in his room. She has limited memory of one or two other males in the room. She remembers one of the men on top of her, and recalls someone sucking on her breasts. When she woke up, she was alone in her own dorm room.

She doesn't think she consented to having sex. She reported to the police, and when they questioned the male friend, he admitted to having intercourse with her, and stated that she consented. He said there were no other males in the room with them.

The SANE collected evidence with the patient's consent. One of the specimens she collected were dried secretion swabs from both nipples. In addition, she collected vaginal and anal swabs. The forensic analysis by the crime lab revealed no DNA from the vaginal or anal swabs. However, there were three different DNA profiles from saliva collected from the victim's nipples.

Note. From the author's personal clinical experience.

Evidence Collection

It is imperative that anyone involved in the collection or analysis of DNA evidence be aware of the important issues involved in identifying, collecting, transporting, and storing DNA evidence. This includes victim service providers, who may come into contact with a victim and need to understand the basic premise of preservation of evidence as well as crime scene technicians, nurse examiners, and other medical personnel. If DNA evidence is not initially identified at the crime scene or on the victim, it may not be collected, or it may become contaminated or degraded.

Victims of sexual assault should be instructed not to change clothes, shower, or wash any part of their body after the assault. In addition, they should avoid eating, drinking or smoking after the assault. All of these activities may eliminate important evidence. Such evidence as semen, saliva, and skin cells may be found on clothing or bedding, under fingernails, or in the vaginal, anal, or oral region.

A medical examination should be conducted immediately after the assault to assess and treat any injuries, document medical and assault history, document physical findings, test for sexually transmitted diseases (the subject of the next module), and collect forensic evidence, such as fingernail scrapings and hair. Typically, the vaginal cavity, mouth, anus, or other parts of the body that may have come into contact with the assailant are examined. The optimal evaluation will be conducted by a physician or nurse examiner who has received additional education in conducting the forensic evaluation.

Reference samples of the victim's blood or saliva should also be collected to serve as a control standard. Additional reference samples of the victim's head and pubic hair may also be collected if hair analysis is required. A control standard is used to compare known DNA from the victim with that of other DNA evidence found at the crime scene to determine possible suspect(s).

Given the sensitive nature of DNA evidence, victim service providers should always contact crime laboratory personnel or evidence technicians when procedural collection questions arise.

Contamination and Preservation Issues

While DNA evidence, if stored properly, can be analyzed for many years after it is collected; if it is not collected properly contamination issues may affect the results. DNA evidence can become contaminated when DNA from another source gets mixed with DNA relevant to the case. It is imperative that precautions are taken to prevent contamination of any evidence that may be present. For this reason, examiners, investigators and laboratory personnel should:

- Wear disposable gloves at all times when examining the patient and handling the evidence.
- Change gloves frequently to prevent cross contamination.
- Use clean instruments.
- Pay close attention to swabs once collected, to be sure that they do not come into contact with any other objects. This is especially important when air-drying.
- Limit the number of people in the exam room during the collection procedure.
- Limit the number of people who have contact with the evidence kit.

Environmental factors, such as heat and humidity, can also accelerate the degradation of DNA. For example, wet or moist evidence that is packaged in plastic will provide a growth environment for bacteria that can destroy DNA evidence.

Therefore, biological evidence should be thoroughly air dried, packaged in paper, and properly labeled. Handled in this manner, DNA can be stored for years without risk of extensive degradation, even at room temperature. For long-term storage issues, contact the local crime laboratory.

History of Forensic DNA Analysis

DNA typing, since it was introduced in the mid-1980s, has revolutionized forensic science and the ability of law enforcement to match perpetrators with crime scenes. Thousands of cases have been closed and innocent suspects freed with guilty ones punished because of the power of a silent biological witness at the crime scene.

“DNA fingerprinting” or DNA typing (profiling) as it is now known, was first described in 1985 by an English geneticist named Alec Jeffreys. Dr. Jeffreys found that certain regions of DNA contained DNA sequences that were repeated over and over again next to each other. He also discovered that the number of repeated sections present in a sample could differ from individual to individual. By developing a technique to examine the length variation of these DNA repeat sequences, Dr. Jeffreys created the ability to perform human identity tests.

These DNA repeat regions became known as VNTRs, which stands for *variable number of tandem repeats*. The technique used by Dr. Jeffreys to examine the VNTRs was called *restriction fragment length polymorphism* (RFLP) because it involved the use of a restriction enzyme to cut the regions of DNA surrounding the VNTRs. This RFLP method was first used to help in an English immigration case and shortly thereafter to solve a double homicide case. Since that time, human identity testing using DNA typing methods has been widespread. The past 15 years have seen tremendous growth in the use of DNA evidence in crime scene investigations as well as paternity testing. Today over 150 public forensic laboratories and several dozen private paternity testing laboratories conduct hundreds of thousands of DNA tests annually in the United States. In addition, most countries in Europe and Asia have forensic DNA programs. The number of laboratories around the world conducting DNA testing will continue to grow as the technique gains in popularity within the law enforcement community.

Analyzing DNA Evidence

Several basic steps are performed during DNA testing regardless of the type of test being done. The general procedure includes:

1. The isolation of the DNA from an evidence sample containing DNA of unknown origin, and generally at a later time, the isolation of DNA from a sample (e.g., blood) from a known individual;
2. The processing of the DNA so that test results may be obtained;
3. The determination of the DNA test results (or types), from specific regions of the DNA; and
4. The comparison and interpretation of the test results from the unknown and known samples to determine whether the known individual is not the source of the DNA or is included as a possible source of the DNA.

Any probative biological sample that has been stored dry or frozen, regardless of age, may be considered for DNA analysis.

Each additional test at a previously untested locus (location or site) in the DNA provides another opportunity for the result of "exclusion" if the known individual being used for comparison is not the source of the DNA from an evidence sample of unknown origin. If, however, the known individual is the source of the DNA on the evidence sample, additional testing will continue only to include that individual as a possible source of the DNA. When a sufficient number of tests have been performed in which an individual cannot be excluded as the source of the DNA by any of the tests, a point is reached at which the tests have excluded virtually the world's population and the unique identification of that individual as the source of the DNA has been achieved.

Types of Analysis

DNA Typing – PCR

The evolution of DNA testing advanced significantly when Dr. Kary Mullis discovered that DNA could be copied in the laboratory much as it is in the natural world.

The copying process, known as *polymerase chain reaction* (PCR), uses an enzyme (polymerase) to replicate DNA regions in a test tube. By repeating the copying process, a small number of DNA molecules can be reliably increased up to billions within several hours.



Figure 2. *Blood Sample Sizes of RFLP vs. PCR*
Downloaded from the USA.gov, DNA Initiative Web site: <http://www.dna.gov/basics/analysis/pcr>

RFLP analysis requires a biological sample about the size of a quarter, but PCR can be used to reproduce millions of copies of the DNA contained in a few skin cells. Since PCR analysis requires only a minute quantity of DNA, it can enable the laboratory to analyze highly degraded evidence for DNA. On

the other hand, because the sensitive PCR technique replicates any and all of the DNA contained in an evidence sample, greater attention to contamination issues is necessary when identifying, collecting, and preserving DNA evidence. These factors may be particularly important in the evaluation of unsolved cases in which evidence might have been improperly collected or stored.

STR Analysis

Short tandem repeat (STR) technology is a forensic analysis that evaluates specific regions (loci) that are found on nuclear DNA. STR is the most commonly used form of analysis. The variable (polymorphic) nature of the STR regions that are analyzed for forensic testing intensifies the discrimination between one DNA profile and another. For example, the likelihood that any two individuals (except identical twins) will have the same 13-loci DNA profile can be as high as 1 in 1 billion or greater.

The Federal Bureau of Investigation (FBI) has chosen 13 specific STR loci to serve as the standard for CODIS. The purpose of establishing a core set of STR loci is to ensure that all forensic laboratories can establish uniform DNA databases and, more importantly, share valuable forensic information. If the forensic or convicted offender CODIS index is to be used in the investigative stages of unsolved cases, DNA profiles must be generated by using STR technology and the specific 13 core STR loci selected by the FBI.

Y-Chromosome Analysis

Several genetic markers have been identified on the Y chromosome that can be used in forensic applications. Y-chromosome markers target only the male fraction of a biological sample. Therefore, this technique can be very valuable if the laboratory detects complex mixtures (multiple male contributors) within a biological evidence sample. Because the Y chromosome is transmitted directly from a father to all of his sons, it can also be used to trace family relationships among males. Advancements in Y-chromosome testing may eventually eliminate the need for laboratories to extract and separate semen and vaginal cells (for example, from a vaginal swab of a rape kit) prior to analysis.

Mitochondrial Analysis (mtDNA)

Mitochondrial DNA (mtDNA) analysis allows forensic laboratories to develop DNA profiles from evidence that may not be suitable for RFLP or STR analysis. While RFLP and PCR techniques analyze DNA extracted from the nucleus of a cell, mtDNA technology analyzes DNA found in a different part of the cell, the mitochondrion (see exhibit 1). Old remains and evidence lacking nucleated cells--such as hair shafts, bones, and teeth--that are unamenable to STR and RFLP testing may yield results if mtDNA analysis is performed. For this reason, mtDNA testing can be very valuable to the investigation of an unsolved case. For example, a cold case log may show that biological evidence in the form of blood, semen, and hair was collected in a particular case, but that all were improperly stored for a long period of time.

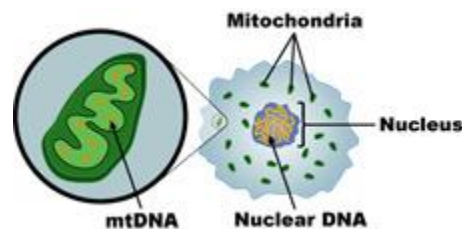


Figure 3. *Nuclear DNA and Mitochondrial DNA*

Downloaded from the USA.gov, DNA Initiative Web site: <http://www.dna.gov/basics/analysis/mitochondrial>

Although PCR analysis sometimes enables the crime laboratory to generate a DNA profile from very degraded evidence, it is possible that the blood and semen would be so highly degraded that nuclear DNA analysis would not yield a DNA profile. However, the hair shaft could be subjected to mtDNA

analysis and thus be the key to solving the case. Finally, it is important to note that all maternal relatives (for example, a person's mother or maternal grandmother) have identical mtDNA. This enables unidentified remains to be analyzed and compared to the mtDNA profile of any maternal relative for the purpose of aiding missing persons or unidentified remains investigations. Although mtDNA analysis can be very valuable to the investigation of criminal cases, laboratory personnel should always be involved in the process.



Key Points to Remember

- ✓ STR is the most commonly used form of analysis.
- ✓ The FBI has chosen 13 specific STR loci to serve as the standard for CODIS.

Unsolved and Post-conviction Cases

Advanced DNA technology, such as PCR, makes it possible to obtain conclusive results in cases in which previous testing might have been inconclusive. This can result in the identification of suspects in previously unsolvable cases or the exoneration of those wrongfully convicted. It is important to realize that while testing or retesting may exonerate an individual, exclusionary results may not necessarily prove actual innocence. Prosecutors, defense counsel, the court, and law enforcement should confer on the need for testing on a case-by-case basis.

Using CODIS To Solve Crime

CODIS uses two indexes to generate investigative leads in crimes that contain biological evidence. The forensic index contains DNA profiles from biological evidence left at crime scenes, and the offender index contains DNA profiles of individuals convicted of violent crime. Each state in the nation has a DNA database law that defines which convicted offenders must have their profiles entered into CODIS; some States even require that DNA profiles from all felons be entered into the database. CODIS enables federal, state, and local forensic crime laboratories to work together—between jurisdictions and across state lines—to solve crimes.

Locations and Sources of DNA Evidence

Since only a few cells are needed for a useful DNA sample, Table 1 identifies some areas at the crime scene or on the victim that may contain valuable DNA evidence. Remember, even though a stain cannot be seen, there may be enough cells for DNA typing. Furthermore, DNA does more than just identify the source of the sample; it can place a known individual at a crime scene, in a home, or in a room where the suspect claimed not to have been. The more victim service providers know about properly identifying, collecting, and preserving DNA evidence, the more powerful a tool it becomes.

Possible Location of DNA Evidence	Source of DNA
Bite mark or area licked	Saliva
Fingernail scrapings	Blood or skin cells
Inside or outside surface of used condom	Semen or skin cells
Blankets, sheets, pillows, or other bed linens	Semen, sweat, hair, or saliva
Clothing, including undergarments worn during <i>and</i> after the assault	Hair, semen, blood, or sweat
Hat, bandanna, or mask	Sweat, skin cells, hair, or saliva
Tissue, washcloth, or similar item	Saliva, semen, hair, skin cells, or blood
Cigarette butt; toothpick; or rim of bottle, can, or glass	Saliva
Dental floss	Semen, skin cells, or saliva
Tape or ligature	Skin cells, saliva, or hair

Note. From National Institute of Justice and Office for Victims of Crime (2001)

DNA Evidence Collection

Using today's DNA identification technology, an individual may be identified with virtual certainty. Of course, as with any scientific method, there may be circumstances that only permit a less precise association. For example, when an evidence stain is degraded or very limited in size, a full analysis may not be able to be performed. This rarely occurs now, because only a trace amount of biological material is required for laboratory analysis that can result in a DNA profile. For example, DNA identification profiles are routinely detectable from saliva recovered from a cigarette butt or a bite mark, or from the cellular material adhering to the root portion of a single hair. A suspect's DNA profile may be determined from blood, semen, saliva, hair, or other body tissue that may be recovered in connection with a criminal incident. In cases involving sexual assault, these kinds of evidentiary material are typically recovered from the body and clothing of the victim.

The DNA profile may be used to:

- Identify the perpetrator of the crime
- Show evidence of intimate contact between the perpetrator and the victim
- Link crimes that have been committed by the same individual

The technology has been used to clear innocent suspects and to exonerate persons wrongfully convicted of crimes.

All states, including New York, have passed DNA database legislation in recognition of the enormous potential of forensic DNA technology to solve crimes more quickly and to identify the perpetrators of crimes with greater certainty. DNA profiles are obtained not only from designated convicted felons, but from physical evidence recovered from the victim (body and clothing), or at scenes of crimes – presumably from the perpetrator of the crime. DNA profiles are entered into the state data bank, and routinely uploaded to the national data bank. Used effectively, the data banks have the potential to substantially reduce the total hours spent by investigators in eliminating suspects and identifying the offender - especially in cases involving sexual assault. For personal privacy considerations, it is mandated that DNA specimens taken from an offender, and the resulting DNA identification profile, may only be used for identification purposes in connection with a criminal investigation.

The efforts of specially trained sexual assault forensic examiners will assist in ensuring the proper collection and preservation of DNA evidence and increase the likelihood that the perpetrator of a sexual assault will be identified.

Possible Results From DNA Tests

Inclusions

When the results obtained from the standard sample from a known individual are all consistent with or are all present in the results from the unknown crime scene sample, then the results are considered an *inclusion or nonexclusion*. The term "*match*" is also commonly used when the test results are consistent with the results from a known individual. That individual is included (cannot be excluded) as a possible source of the DNA found in the sample. Often, statistical frequencies regarding the rarity of the particular set of genetic information observed in the unknown evidence sample and for a known individual are provided for various population groups.

It is possible for a falsely accused individual to be included as a source of a sample, particularly if the test system used only tests at one or a few loci. In this situation, additional testing at more loci should be performed with the remaining evidence and/or DNA.

In some cases where inclusions are reported, the results are not meaningful or are inconclusive for that particular case from a legal perspective. Situations where this might apply are when the results obtained

are all consistent with the individual from whom the samples were collected (e.g., victim's results only on vaginal swabs taken from the victim, defendant's results only on a bloodstain on defendant's clothing).

Exclusions

When the results obtained from the standard sample from a known individual are not all present in the results from the unknown crime scene sample, the results are considered an *exclusion*, a *non-match*, or *non-inclusion*. With limited exceptions, an exclusion of an individual at any one genetic region eliminates that individual as a source of the DNA found in the sample.

In some cases where an exclusion is reported, it may be necessary to do additional testing for that exclusion to be meaningful to the case or to provide evidence for exoneration. A situation where this might apply is when the defendant is excluded as a donor of the DNA in a sexual assault case, but no samples are available from the victim and/or consensual partners.

In gathering the patient's history, information regarding last sexual activity and the identity of the partner may be important to exclude the partner if a DNA profile is found. Consider the following case study.

A patient reports that she was sexually assaulted while exiting a parking garage this evening. She reports vaginal penetration and ejaculation by the assailant, who she did not recognize.

During the history, the SANE asks about recent sexual activity. The patient states she had consensual intercourse with her boyfriend the previous evening.

Note. From the author's personal clinical experience.

Inconclusive Results

Results may be interpreted as *inconclusive* for several reasons. These include situations where no results or only partial results are obtained from the sample due to the limited amount of suitable human DNA or where results are obtained from an unknown crime scene sample but there are no samples from known individuals available for comparison. In the latter case, the results would be suitable for comparison once an appropriate sample for comparison is tested.

Forensic Laboratories

The crime lab systems in operation across the country vary in structure. Public crime labs may be federal-, state-, county-, or city-sponsored. Many public labs are associated with a law enforcement entity; some are associated with a district attorney's office, while others are independent government entities. Some forensic laboratories are privately held companies.

Not all laboratories are capable of providing comprehensive and complete forensic services. Some do not have the capability to conduct DNA testing and may need to contract out their DNA cases to other agencies or private corporations.

Not all laboratories are capable of the same DNA testing either. Most DNA labs have the capability to conduct testing on nuclear DNA, which is the single copy of DNA that exists in every cell nucleus. A select few specialize in Y-STR testing, which is DNA conducted on the Y-chromosome, which is found only in males.

Others specialize in testing mitochondrial DNA (or mtDNA), which is found in every cell of the body regardless of the presence of a nucleus.



Key Point to Remember

- ✓ Not all laboratories are capable of the same DNA testing.

The New York State Sexual Offense Evidence Collection Kit

The New York State Division of Criminal Justice Services (DCJS) updated the Sexual Offense Evidence Collection Kit in October 2008 to reflect recent changes and updates in DNA analysis. The kit can be collected up to 96 hours after a sexual assault, and is available to every hospital emergency department in New York State, free of charge.

The kit will allow the collection of evidence that may contain DNA; however, there are steps that also allow for collection of other types of evidence, such as fiber or debris that may be found on the victim or his/her clothing.

It is important to change your gloves between each step to prevent cross contamination of evidence.

Note: All photos in this lesson are used with permission and are courtesy of **Joseph C. Galloway**.

Figure 4. Sexual Offense Evidence Collection Kit

Additional items that you may need for the evidence collection process are: exam table paper or two clean bed sheets; paper bags, in various sizes; additional sterile swabs; and plain white stationary envelopes.

The patient must consent to the evidence collection procedure, and can decline any of the steps at any time (module 2 of this program).

The following are the instructions for the NYS Sexual Offense Evidence Collection Kit. It is highly recommended that you obtain a kit for review purposes. **The kit consists of 15 steps.** Each step includes instructions for the collection procedure. In addition to the instructions, DCJS has repeated the instructions for each step on the corresponding envelope in the kit. Each part of the kit will be reviewed again in the clinical practicum.



Figure 5. Contents of Sexual Offense Evidence Collection Kit

STEP 1

Evidence Collection

Oral Swabs and Smear

The first step allows for oral swabs and smear. The contents of the envelope include:

SANE Module 3: Forensic Evidence Collection

- Two sterile swabs
- One swab box
- One slide in a slide mailer

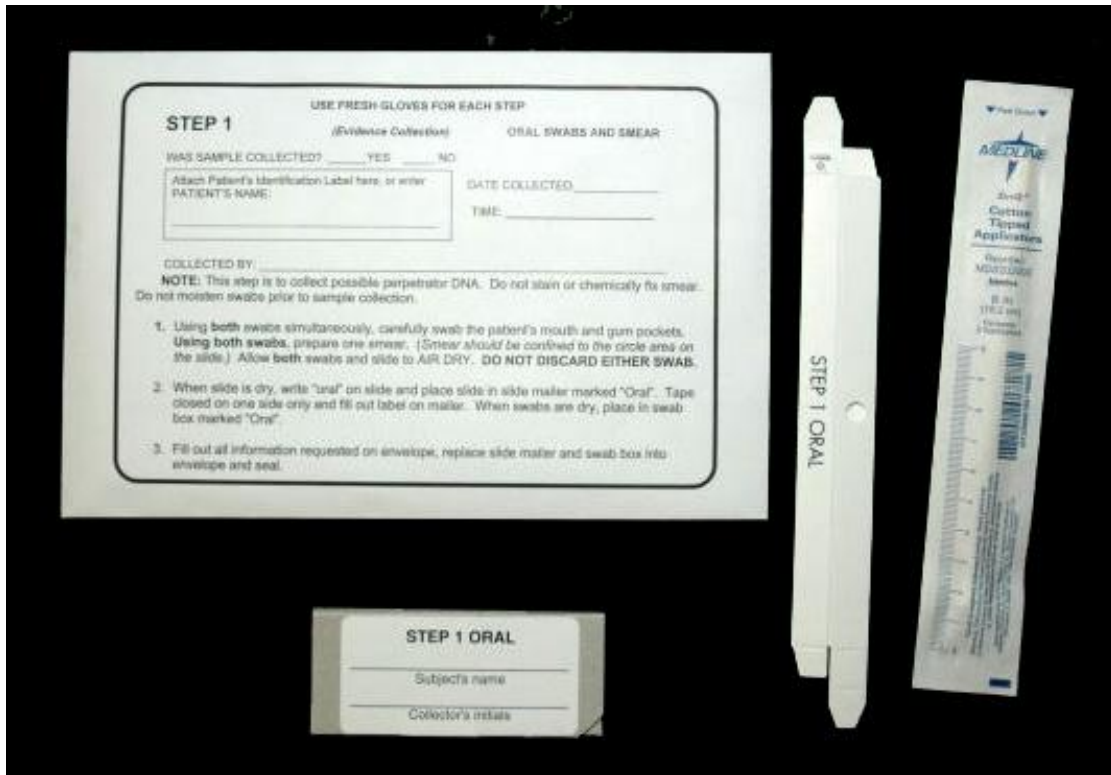


Figure 6. Contents of Step 1 Envelope

This step is to collect possible perpetrator DNA. Do not stain or chemically fix the smear. Do not moisten swabs prior to sample collection. Upon completion of this step ask patient to thoroughly rinse mouth with water.

1. Remove all items from envelope. Using **both** swabs simultaneously, carefully swab the patient's mouth and gum pockets. **Using both swabs**, prepare one smear. (*Smear should be confined to the circle area on the slide.*) Allow both swabs and smear to air dry. **DO NOT DISCARD EITHER SWAB**. Place swabs in swab box marked "Oral".
2. When slide is dry, write "Oral" on slide and place slide in slide mailer marked "Oral". Tape closed on one side only, and fill out label on mailer.
3. Fill out all information requested on envelope; replace both slide mailer and swab box into envelope and seal.

This test is done after obtaining patient consent and often before the interview and physical examination. The patient can then rinse his or her mouth, receive timely treatment and prophylaxis, and participate in the interview with no danger of losing oral evidence.

STEP 2

Control Sample

Buccal Specimen for Patient DNA Sample

The second step is the buccal sample. The contents of the envelope include:

- One special swab
- One swab box

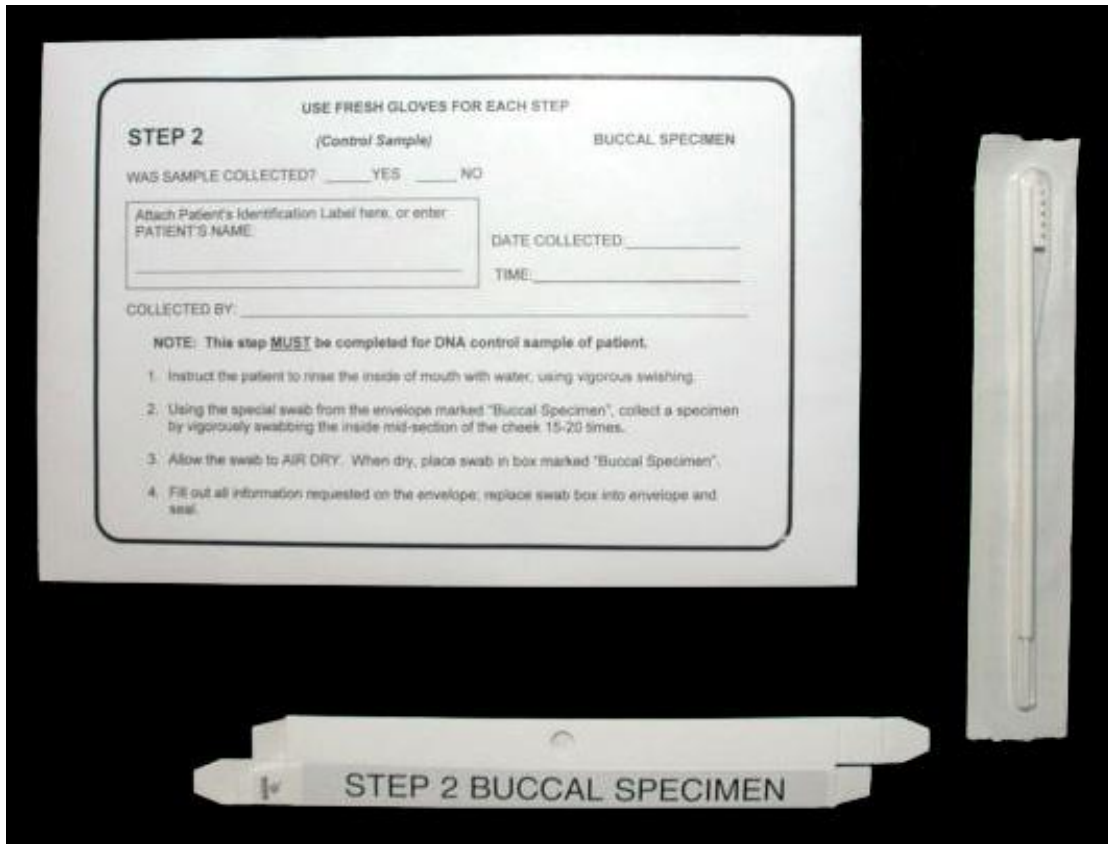


Figure 7. Contents of Step 2 Envelope

Note: This step MUST be completed for DNA control sample of the patient.

1. Instruct the patient to rinse the inside of his or her mouth with water, using vigorous swishing.
2. Using the special swab from the envelope marked "Buccal Specimen", collect a specimen by vigorously swabbing the inside mid-section of the cheek 15-20 times.
3. Allow the swab to AIR DRY. When dry, place the swab in the box provided.
4. Fill out all information requested on the envelope; replace the swab box in the envelope and seal.

STEP 3

Evidence Collection

Trace Evidence

Trace evidence allows for collection of debris or microscopic evidence that may be on the patient's body or clothing. You will need to use exam table paper as described, or two cloth bed sheets for this step.

USE FRESH GLOVES FOR EACH STEP

STEP 3 *(Evidence Collection)* TRACE EVIDENCE

WAS SAMPLE COLLECTED? YES NO

Attach Patient's Identification Label here, or enter
PATIENT'S NAME:

DATE COLLECTED: _____

TIME: _____

COLLECTED BY: _____

1. To minimize the loss of evidence, place one sheet of exam table paper on the floor and then place another piece of exam table paper on top of that. The patient should disrobe over the top exam table paper, preferably in the presence of the examiner.
2. Fill out all information requested on envelope, carefully fold **only** top exam table paper and place into envelope and seal.
3. Discard bottom exam table paper.

Figure 8. *Instructions on Step 3 Envelope*

1. To minimize the loss of evidence, place one sheet of exam table paper on the floor and then place another piece of exam table paper on top of that. The patient should undress over the top exam table paper, preferably in the presence of the examiner.
2. Fill out all information requested on the envelope, carefully fold **only** the top piece of paper and place into envelope and seal.
3. Discard bottom piece of exam table paper.

STEP 4	Evidence Collection
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Clothing Collection

There is no envelope for this step; however you will need to use clean paper bags to package and seal the clothing, if appropriate.

It is important to ask the patient if he or she has changed their clothing since the incident. Clothing may provide important evidence. If the victim has changed clothes after the assault, it is recommended that an investigator go to the victim's residence to obtain clothing worn at the time of the assault. The victim may also be asked to bring the clothing to the investigator at the police station.

The collection process should begin with having the patient stand over two pieces of table paper placed one on top of the other (or hospital bed sheets if table paper is not available). The patient then should stand on the table paper and undress, placing each article of clothing removed into a separate, clean paper bag. Be careful not to shake the clothing as it is removed because microscopic evidence may be lost. If you are helping the patient undress or are assisting in placing the clothing in the paper bags, be sure to wear gloves, and change them in between handling each article of clothing.

Once the clothing is placed in the paper bags, the patient can don a hospital gown. The underwear that the patient was wearing can be placed into an envelope that is provided inside the evidence kit. All additional articles of clothing will require separate paper bags, which are not included in the kit.

The clothing bags should then be properly sealed, and labeled with the following information:

- Patient's name
- Date and time of collection
- Examiner's name
- Brief description of the item enclosed
- Number of the bag written as "1 of 3" for instance if there are three bags of clothing collected

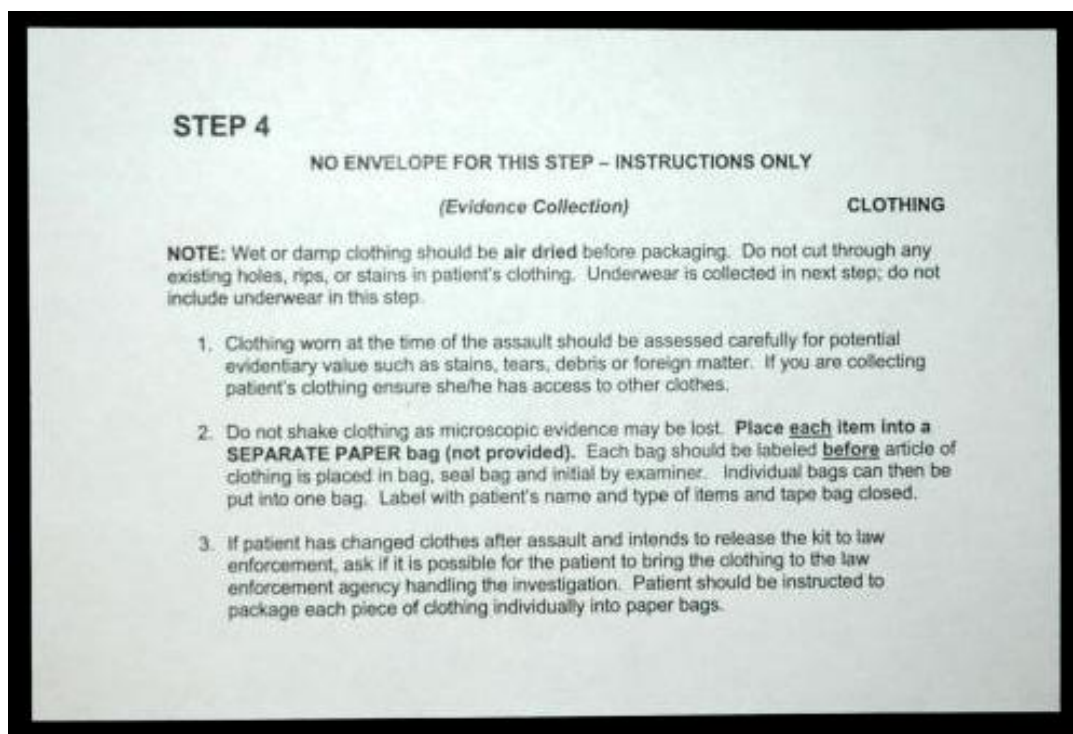


Figure 9. Instructions for Step 4

NOTE: Wet or damp clothing should be air dried before packaging. Do not cut through any existing holes, rips or stains in patients clothing. Do not include underwear in this step as it is collected in the next step.

1. Clothing worn at the time of the assault should be assessed carefully for evidentiary value such as stains, tears, debris or foreign matter. If you are collecting patient's clothing ensure that he/she has access to other clothes.
2. Do not shake clothing as microscopic evidence may be lost. **Place each item into a separate paper bag (not provided).** Each bag should be labeled with patient's name, the date and time of collection and a description of the article of clothing before the clothing is placed in the bag; seal bag and have the examiner initial the bag.
3. If patient has changed clothes after assault and intends to release the kit to law enforcement, ask if it is possible for the patient to bring the clothing to the law enforcement agency handling the investigation. Patient should be instructed to package each piece of clothing individually into paper bags.

The hospital or exam site should arrange to have appropriate clothing and shoes available. **No patient should ever leave the examination site in an examining gown.**

STEP 5

Evidence Collection

Underwear

Underwear, the article of clothing closest to the genital area, may have important DNA evidence. Underwear worn during or shortly after the assault should be collected, with the patient's consent.

Figure 10. Instructions on Step 5 Envelope

NOTE: Wet or damp underwear should be air dried before packaging. Do not cut through existing holes, rips, or stains in patient's underwear.

1. Patient's underwear should be collected regardless if it was worn at the time of assault.
2. Fill out all information requested on envelope; place underwear into envelope and seal.

Ensure underwear envelope is placed in kit.

STEP 6

Evidence Collection

Debris Collection

Debris found on the patient's clothing, hair or body should be collected for this step. It is generally a good idea to photograph the debris before it is removed to document the location.

This envelope can also be used for collection of other items, such as tampons or peri-pads. However, these items should be air dried and placed in a separate envelope if other debris is also collected.

The contents of the envelope include:

- One paper bindle



Figure 11. Contents of Step 6 Envelope

1. Remove paper bindle from Debris Collection envelope. Unfold and place on a flat surface. Collect any foreign material found on the patient's body (leaves, fibers, glass, hair etc.) and place in center of paper bindle. Refold in a manner to retain debris.
2. Fill out all information requested on envelope; replace bindle into envelope and seal.

STEP 7

Evidence Collection

Dried Secretions and/or Bitemarks

The patient's history will be very important in this collection process. Acts such as licking, biting or kissing, as well as ejaculation may leave dried secretion areas on the patient's skin. A Wood's lamp or ultraviolet light source should be used before collecting this step to aid in identifying dried secretions. However, even if the ultraviolet light source does not produce fluorescence, and the history indicates a possible secretion, this step should be collected.

In addition, if a lesion consistent with a bite mark is found on the patient, the lesion should be photographed with and without a measurement tool such as an ABFO (American Board of Forensic Odontology) ruler to denote the size of the mark prior to swabbing the area for possible DNA evidence.

The contents of the envelope include:

- Four sterile swabs
- Two swab boxes

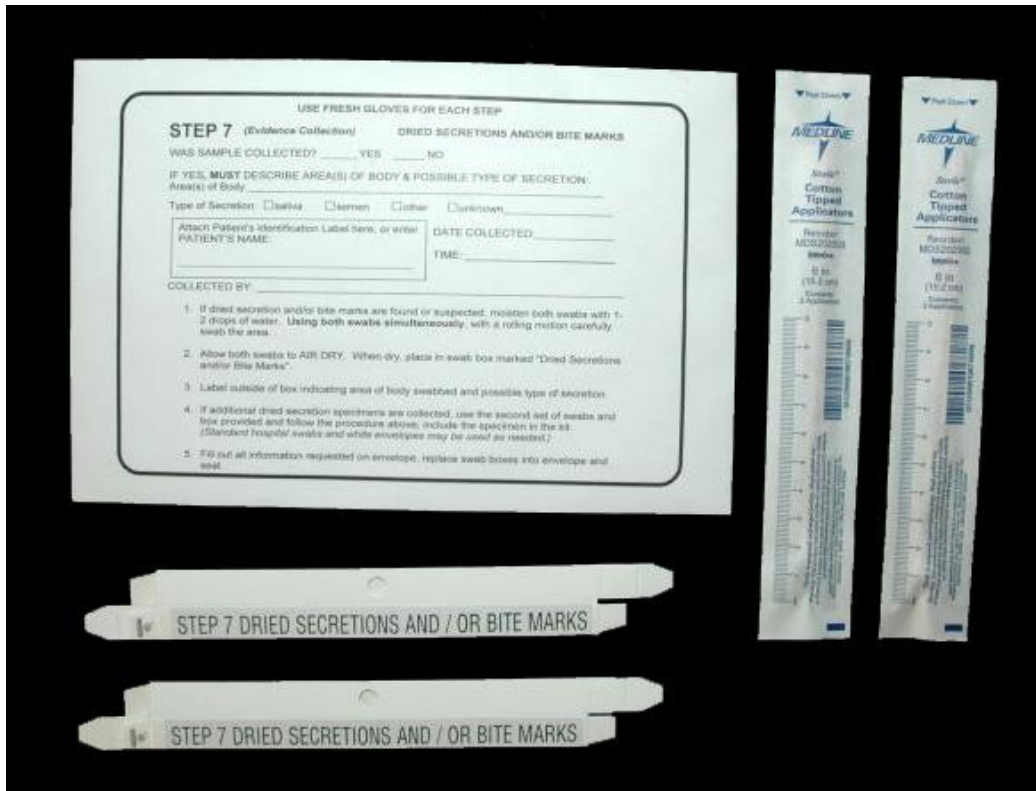


Figure 12. Contents of Step 7 Envelope

1. If dried secretions and/or bite marks are found or suspected, moisten both swabs with 1-2 drops of water. Using both swabs simultaneously, with a rolling motion carefully swab the area. Allow both swabs to air dry.
2. When dry, place both swabs in swab box marked "Dried secretions and/or Bite marks". Label box indicating area of the body swabbed and possible type of secretion. If additional dried secretion specimens are collected, use the second set of swabs and box provided. If still more swabs and boxes are needed, you may use standard hospital swabs and plain white stationary envelopes in lieu of the boxes.
3. Fill out all information requested on the envelope; replace swab boxes into envelope and seal.

Where there is evidence of semen or other matted material on pubic or head hair, it may be collected in the same manner as other dried secretions (see Step 7). The swab is then placed in a small paper envelope and labeled "possible secretion sample from head (or pubic) hair." Although the specimen can be collected by cutting off the matted material, **it is important to obtain the patient's permission prior to cutting hair.**

Fingernail Scrapings

Trace evidence may be present under a patient's fingernails and may contain fibers, dirt, debris or DNA from the perpetrator.

The contents of the envelope include:

- Two paper bindles
- Two wooden scrapers

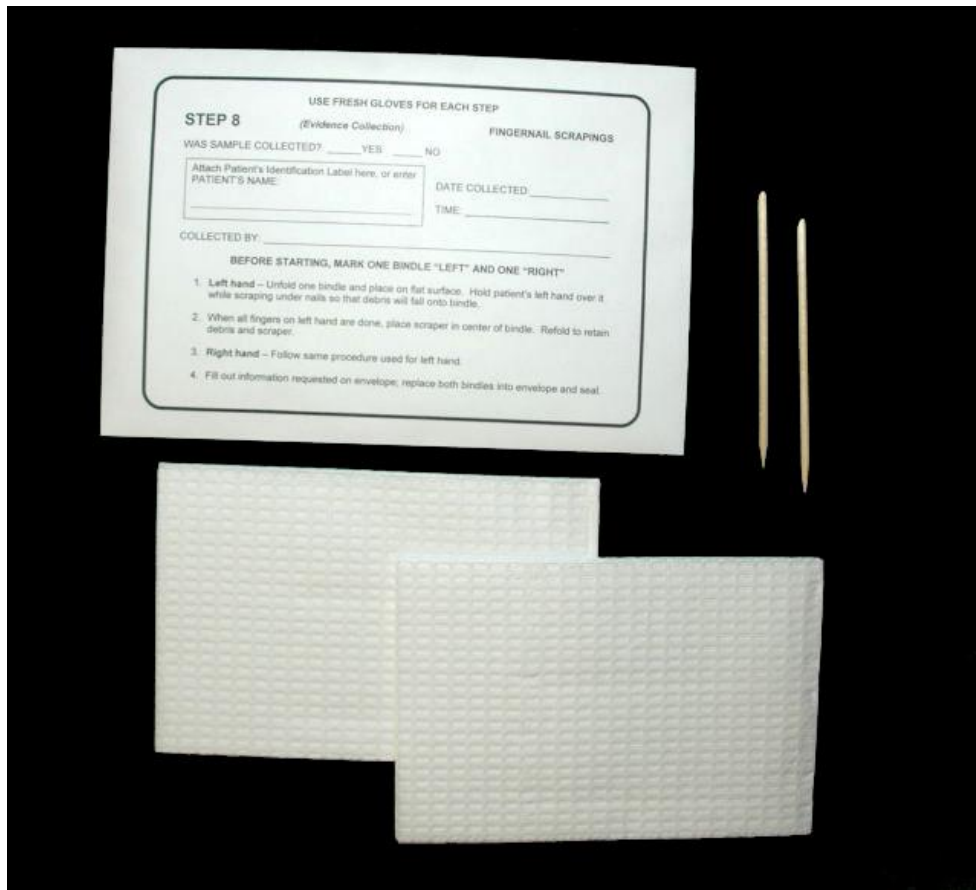


Figure 13a. Contents of Step 8 Envelope



Figure 13b. Marking Bindle



Figure 13c. Scraper in Center of Bindle

1. Remove both paper bindles and scrapers from envelope. Mark one bindle "Left" and one "Right".
2. Left-hand: Unfold one bindle and place on flat surface. Have patient place hand on bindle. Hold each finger over bindle while scraping gently under each nail with the stick provided so that any debris present will fall onto it.
3. After all fingers on left hand are done, place scraper in center of bindle, refold to retain debris and scraper.
4. Right hand: Follow same procedure used for left hand.
5. Fill out all information requested on envelope; replace both bindles into envelope and seal.

If the patient's nails are very short, another option to the collection procedure is to use two sterile swabs moistened with 1-2 drops of water; swab the area along the juncture of the nail and skin to collect this sample. The swabs should be air-dried and placed in two separate plain white envelopes, one labeled "Right" and one labeled "Left"; these should both then be placed in the evidence envelope, and an explanation of these steps documented on the envelope.

STEP 9	Control Sample
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Pulled Head Hairs

Pulled hair standards for evidence collection are considered by many to be very traumatic to the victims of sexual assault. The examiner must use his/her professional judgment regarding whether or not to complete this step, based upon the physical and/or emotional well-being and preference of the victim. Hairs can be pulled at a later date, if needed. The victim should be aware that hair collected at a later date may not be as conclusive as if it were collected at the time of the initial exam. Give victim the option of collecting the sample themselves.

Be sure to check with your jurisdictional policy before collecting this sample as not all areas routinely collect this sample. Head hair standards are typically used to compare to any hairs found on the victims' clothing or at the crime scene.

The contents of the envelope include:

- One paper bindle

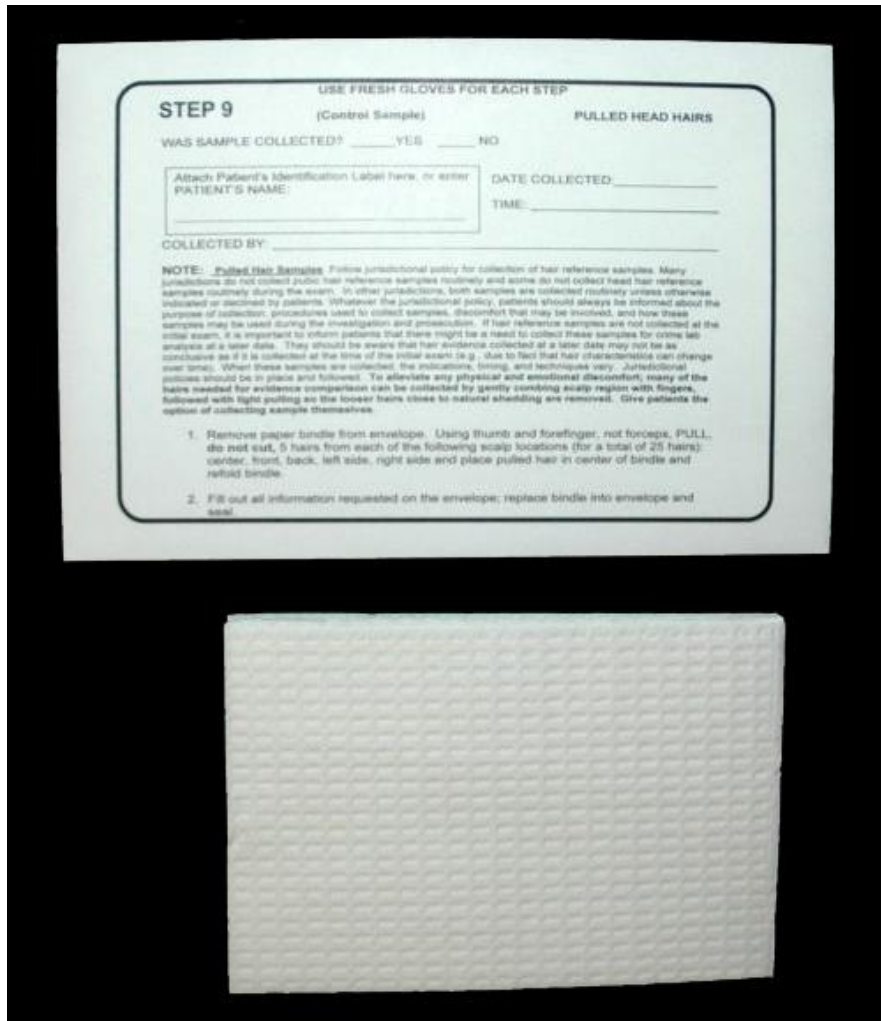


Figure 14. Contents of Step 9 Envelope

Note: To alleviate any physical and emotional discomfort; many of the hairs needed for evidence comparison can be collected by gently combing scalp region with fingers, followed with light pulling so the looser hairs close to natural shedding are removed. Give patients the option of collecting sample themselves.

1. Remove paper bindle from envelope. Using thumb and forefinger, not forceps, PULL, do not cut, 5 hairs from each of the following scalp locations for a total of 25 hairs: Center, Front, Back; Left side; Right side. Place pulled hair in center of bindle and refold bindle.
2. Fill out all information requested on the envelope. Replace bindle into envelope and seal.

STEP 10

Evidence Collection

Pubic Hair Combing

Pubic hair combings are collected to capture possible debris or dried secretions found in the pubic region. This step should be completed on both male and female patients with their consent. If the patient shaves the pubic hair, this step can be omitted, with an explanation on the envelope for why it was not done.

The contents of the envelope include:

- One paper bindle
- One comb



Figure 15a. Contents of Step 10 Envelope



Figure 15b. Comb in Center of Bindle



Figure 15c. Refold Bindle to Retain Comb

1. Remove paper bindle from envelope and place beneath patient's genital area. Using the comb provided, comb pubic hair in downward strokes so that any loose hair or debris will fall onto bindle. To reduce embarrassment and increase their sense of control, the patient may prefer to do the combing.
2. Carefully remove bindle. Place comb in center of bindle and refold in a manner to retain comb and any evidence present.
3. Fill out information requested on envelope; replace bindle in envelope and seal.

STEP 11

Control Sample

Pulled Pubic Hair

It is recommended that pubic hair standards **not** be pulled during the initial medical exam. They can be pulled at a later date (if the prosecution requests these samples and the victim consents to the procedure).

Be sure to check with your jurisdictional policy before collecting this sample as not all areas routinely collect this sample. Pubic hair standards are typically used to compare to any hairs found on the victims' clothing or at the crime scene.

The contents of the envelope include:

- One paper bindle



Figure 16. Contents of Step 11 Envelope

Note: To alleviate any physical and emotional discomfort; many of the hairs needed for evidence comparison can be collected by gently combing the pubic region with fingers, followed with light pulling so the looser hairs close to natural shedding are removed. Give patients the option of collection sample themselves.

1. Remove paper bindle from envelope. Using thumb and forefinger, not forceps, PULL, do not cut, 15 full length hairs from various areas of the pubic region; place pulled pubic hair in center of bindle and refold bindle.
2. Fill out all information requested on envelope; replace bindle into envelope and seal.

STEP 12

Evidence Collection

Perianal/Anal Swabs and Smear

The contents of the envelope include:

- Four swabs
- Two swab boxes
- One slide in a slide mailer

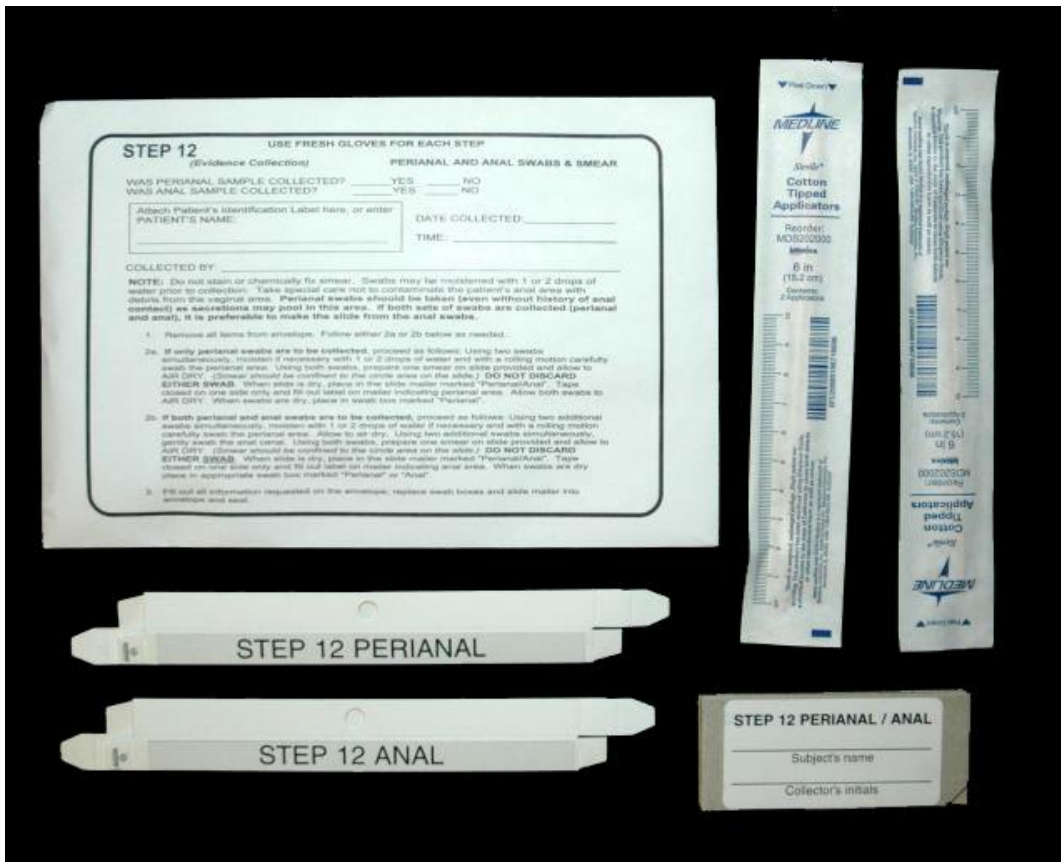


Figure 17. Contents of Step 12 Envelope

NOTE: Do not stain or chemically fix smear. Swabs may be moistened with 1-2 drops of water prior to collection. Take special care not to contaminate the patient's anal area with debris from the vaginal area. **Perianal swabs should be collected even without history of anal contact as secretions may pool in this area. If both sets of swabs are collected (perianal and anal) it is preferable to make the slide from the anal swabs.**

1. Remove all items from envelope. Follow either 2a or 2b below as indicated.
- 2a. **If only perianal swabs are to be collected**, proceed as follows: Using two swabs simultaneously, moisten with 1-2 drops of water and with a rolling motion carefully swab the perianal area. Using both swabs prepare one smear on slide provided and allow to air dry. (*Smear should be confined to the circle area on the slide.*) **DO NOT DISCARD EITHER SWAB.** When slide is dry, place in the slide mailer marked "Perianal/Anal". Tape closed on one side only and fill out label on mailer indicating "Perianal area". Allow both swabs to air dry. When swabs are dry place in swab box marked "Perianal".
- 2b. **If both perianal and anal swabs are to be collected**, proceed as follows: Using two swabs simultaneously, moisten with 1-2 drops of water, and with a rolling motion carefully swab the perianal area. Allow swabs to air dry. Using two additional swabs, gently swab the anal canal. Using both swabs simultaneously prepare one smear on slide provided and allow to air dry. (*Smear should be confined to the circle area on the slide.*) **DO NOT DISCARD EITHER SWAB.** When slide is dry, place in the slide mailer marked "Perianal/Anal". Tape closed on one side only and fill out label on mailer indicating "ANAL AREA". When swabs are dry place in appropriate swab box marked "Perianal" or "Anal".

- Fill out all information requested on envelope; replace swab boxes and slide mailer into envelope and seal.

STEP 13

Evidence Collection

Vulvar or Penile Swabs and Smear

The contents of the envelope include:

- Two swabs
- One swab box
- One slide in a slide mailer



Figure 18. Contents of Step 13 Envelope

- Remove all items from envelope. Moisten swabs with 1-2 drops of water. **Using both swabs simultaneously** with a rolling motion carefully swab the external genitalia including the labial folds between the labia majora and labia minora in the female patient.

For male patients, swab the penis and scrotum. Using both swabs simultaneously, prepare one smear on the slide provided and allow to air dry. (*Smear should be confined to the circle area on the slide.*) **DO NOT DISCARD EITHER SWAB.** Allow both swabs to AIR DRY.

- When swabs and slide are dry, place swabs in box marked “Vulvar / Penile”. Place slide in slide mailer marked “Vulvar/Penile”. Tape closed on one side only and fill out label on mailer. Circle

appropriate collection on swab box and slide mailer

3. Fill out all information on envelope to include possible type of secretion; replace swab box and slide mailer into envelope and seal.

STEP 14

Evidence Collection

Vaginal Swabs and Smear

The contents of the envelope include:

- Four swabs
- Two swab boxes
- One slide in a slide mailer



Figure 19. Contents of Step 14 Envelope

NOTE: Do not stain or chemically fix smear. Do not moisten swabs prior to sample collection. Take special care not to contaminate the patient's vaginal area with any debris from the anal area.

*It is generally unnecessary to use a speculum when evaluating injuries and collecting specimens in a pre-pubescent or young adolescent female. **NEVER USE AN ADULT SPECULUM WHEN EXAMINING THESE PATIENTS.** Even a small pediatric speculum may cause further trauma. Specimens for culture and forensic analysis may be obtained by using a cotton-tipped applicator. In pre-pubescent children, a vaginal (not cervical) specimen is appropriate for STD culture. In cases where extensive injury or foreign bodies cannot be ruled out, or if the exam might cause further trauma to the child, or the child is too distressed to cooperate for the exam, an Examination Under Anesthesia (EUA) should be considered.*

1. Remove all items from envelope. **Using two swabs simultaneously**, carefully swab the vaginal vault. Allow both swabs to air dry. When dry, place in swab box marked "Vaginal".
2. Using two additional swabs, repeat the swabbing procedure of the vaginal vault. Prepare one smear on the slide provided and allow to air dry. (*Smear should be confined to the circle area on the slide*). **DO NOT DISCARD EITHER SWAB**. When slide is dry, place in the slide mailer marked "vaginal". Tape closed on one side only and fill out label on mailer. When swabs are dry place in swab box marked "Vaginal". **If a speculum is used for this step, do not remove until next step is completed.**
3. Fill out all information on envelope; replace swab boxes and slide mailer into envelope and seal.

STEP 15

Evidence Collection

Cervical Swabs and Smear

The contents of the envelope include:

- Four swabs
- Two swab boxes
- One slide in a slide mailer



Figure 20. Contents of Step15 Envelope

NOTE: This step is particularly important if more than 12 hours have passed since the assault. Do not moisten swabs prior to sample collection. **DO NOT COLLECT ON PREPUBERTAL CHILDREN.**

1. Remove all items from envelope. Using two swabs simultaneously, carefully swab the cervix and cervical os. Allow both swabs to air dry. When dry, place in swab box marked "Cervical".
2. Using two additional swabs, repeat the swabbing procedure of the cervix and os. Prepare one smear on the slide provided and allow to air dry. (*Smear should be confined to the circle area on the slide*). **DO NOT DISCARD EITHER SWAB**. When slide is dry, place in the slide mailer marked "Cervical". Tape closed on one side only and fill out label on mailer. When swabs are dry, place in swab box marked "Cervical".
3. Fill out all information on envelope; replace swab boxes and slide mailer into envelope and seal.

Final Instructions

- Make sure each envelope used contains all requested items and information. Envelopes which were not used should bear a mark in the "NO" box next to the "Was sample collected?" line.
- Remove the Police Evidence Seal from the box. Return all evidence envelopes and instruction sheet to the kit box. If photographs were taken, do not include them in the kit. Include photos in the patient's medical record, or release to the investigating officer as determined by your institution's policy.
- Do not include blood or urine in this kit. Sign the Police Evidence Seal and use it to seal the box.
- Fill out information requested on top of box in space provided for Hospital Personnel.
- Give sealed kit and clothing bags to the investigating officer. If officer is not present, place sealed kit in a secure area, in accordance with established protocol. Just as it is the responsibility of each facility to properly collect evidence in sexual assault cases, it is also their responsibility to ensure that evidence is properly maintained, and the chain of custody is documented. New York State Public Health Law 2805-I (Appendix A of the Protocol for the Care of the Adult Patient Reporting Sexual Assault) requires that evidence be secured for a minimum of thirty days.



Key Points to Remember

- ✓ The evidence kit can be collected up to 96 hours after a sexual assault.
- ✓ Change gloves between each step to prevent cross contamination.
- ✓ Patient must consent to the evidence collection procedure and can decline any steps, at any time.
- ✓ Document time each step is collected on the respective envelope.
- ✓ Allow all swabs and smears to air dry before packaging.
- ✓ Allow underwear and clothing to air dry before packaging.
- ✓ Only use paper bags to package clothing (not included in kit).
- ✓ Check your jurisdictional policy before collecting samples of pulled head and/or pubic hairs as not all areas routinely collect these samples.
- ✓ It is recommended that pubic hair standards not be pulled during the initial medical exam.
- ✓ In pre-pubescent children, a vaginal (not cervical) specimen is appropriate for STD culture.

What if There is No DNA?

Is it possible to collect evidence appropriately and not find DNA? Of course it is, and there may be several reasons why this may be so.

- The suspect used a condom.
- Improper collection techniques were used by the examiner.
- Post-assault hygiene activities may have eliminated any DNA.
- There may have been an extended time period between the assault and the exam.
- There may have not been any contact. While false allegations are rare, this still must be considered when no DNA is found.

How are other types of evidence important to the investigation?

While DNA may not have been detected, for instance, in the case of the suspect wearing a condom and not otherwise leaving his DNA on the victim (i.e., no oral contact), other evidence may be important in corroborating the patient's history of sexual assault. The patient's history will help us to focus our exam and evidence collection.

Some examples of other types of evidence that may be collected include:

- Trace evidence left on the victim's clothing or body, such as fibers from the carpet where an assault took place or trace evidence found underneath the victim's fingernails.
- Dirt or debris from an assault that occurred outside.
- Marks or abrasions on the victim's body consistent with being assaulted in a car or another confined space.
- Marks or abrasions consistent with a history of being physically assaulted.

Chain of Custody

What is It and Why is It Important?

The "chain of custody" is a legal term describing the movement, location, and succession of people responsible for the evidence (New York State Department of Health, 2004). In order for the evidence that you collect to be accepted as evidence in a trial, the succession of events related to the integrity of the evidence must be able to be reproduced. An evidence collection kit and the specimens it contains must be accounted for from the moment collection begins until the moment it is introduced in court as evidence. Once the evidence kit is opened, it cannot be left unattended. The examiner must not allow any other person to have contact with the evidence. It must not be left with the victim or the victim's family or friends.

Never leave the patient alone with the evidence. Under no circumstances is a patient, family member, or support person (e.g., advocate) allowed to handle or transport evidence after it has been collected. Maintaining the chain of custody during the examination is the sole responsibility of the examiner, and requires no outside assistance.

Once the evidence has been collected, it must be properly labeled and sealed, and either released to the police or secured in a locked cabinet or refrigerator. The agency with jurisdiction is the agency that covers the area where the incident occurred. Again, as has been discussed in Module 2, you must have the patient's consent to release the evidence to the police. The only exception to this is in the case of child abuse when the parent guardian consent is not necessary if they are the suspects.

Each item of evidence must be labeled with the initials of everyone who handled it, the date, a description and source of the specimen, the name of the examiner, and the name of the patient. Evidence not included in the kit (e.g., clothing, photographs, etc.) must be individually packaged, sealed and labeled with a description of the item. Providers must have specific protocols in place to insure confidentiality and maintain the chain of custody of the evidence.

Every hospital must have a policy to address the method of evidence security. While the sexual offense evidence collection kit does not need to be refrigerated, a Drug Facilitated kit or the contents in it (blood and urine) must be refrigerated. Documentation of when the kit was secured in the cabinet or refrigerator, who has access to the refrigerator and when it is released or destroyed must all be available. If the integrity of the evidence cannot be documented or if there is any question as to how it was collected or secured, the evidence may not be allowed, regardless of what was found in the analysis by the crime lab.

Cleaning Procedures

It is important to assure proper cleaning procedures are employed to prevent contamination of specimens. Since DNA is only destroyed by bleach, this is the only disinfectant recommended for use. Other disinfectants are not sufficient; therefore, cleaning all equipment before and after each case with a 10% bleach solution is imperative in preventing cross contamination between cases (Prince & Andrus, 1992).

Ultraviolet Light Source

A Wood's Lamp, or ultraviolet light can be used during the evidentiary examination to scan the victim's body for dried or moist secretions, stains, fluorescent fibers or foreign materials not readily visible in white light (Crowley, 1999). The ultraviolet light should be used in a darkened room. Areas of fluorescence should be considered as areas to collect dried secretion specimens from. It is important to remember that fluorescence is not always achieved or positive and the patient's history should guide you in the collection of these specimens.

Colposcope

The colposcope was first used in the examination of children who had been sexually abused. The colposcope is an excellent light source for use during the genital exam. Utilization of the colposcope to augment the genital exam of the sexual assault victim is a non-invasive technique. Any trauma seen grossly is depicted even more clearly; previously undetected microtrauma can often be seen with the aid of the colposcope (Crowley, 1999).

The colposcope also allows the examiner to photograph or videotape the genital exam, for evidentiary documentation or for peer review purposes.

Toluidine Blue Dye

Toluidine Blue dye, which is a nuclear stain, and adheres to abraded skin and microlacerations, can be a useful adjunct to the acute exam, especially where photocolposcopy is not available. To be effective, it must be carefully and judiciously applied and conservatively interpreted. It can be quite useful in providing good visual depictions of genital trauma (Crowley, 1999). Please refer to Figures 21a-c.

Note: The images in the sections on Toluidine Blue dye, the Foley catheter technique, and the swab technique are from *Color Atlas of Sexual Assault*, by B. W. Girardin, D. K. Faugno, P. C. Seneski, L. Slaughter, and M. Whelan, 1997, pp. 102 and 121. Copyright 1997 by Mosby, Inc., and used with permission.



Toluidine Blue Application Site

Figure 21a. Application site for Toluidine Blue dye

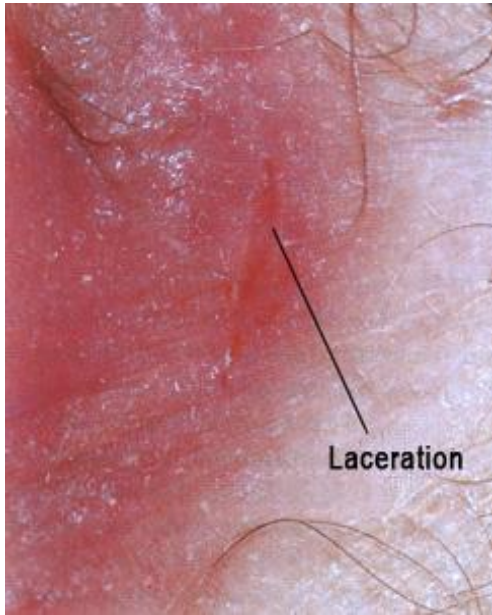


Figure 21b. Laceration before Toluidine Blue dye

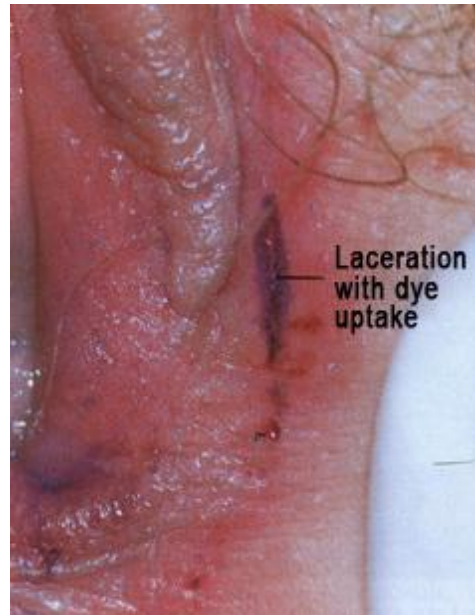


Figure 21c. Laceration after Toluidine Blue dye

Foley Catheter technique

A Foley catheter can be inserted into the vaginal introitus and inflated with 40-50 cc of air (see Figure 22), then gently pulled back to allow the hymenal edges to flatten out and be examined for tears or lacerations (Slaughter, Brown, Crowley, & Peck, 1997). This technique is especially useful in adolescents, and should not be attempted in pre-pubertal children.

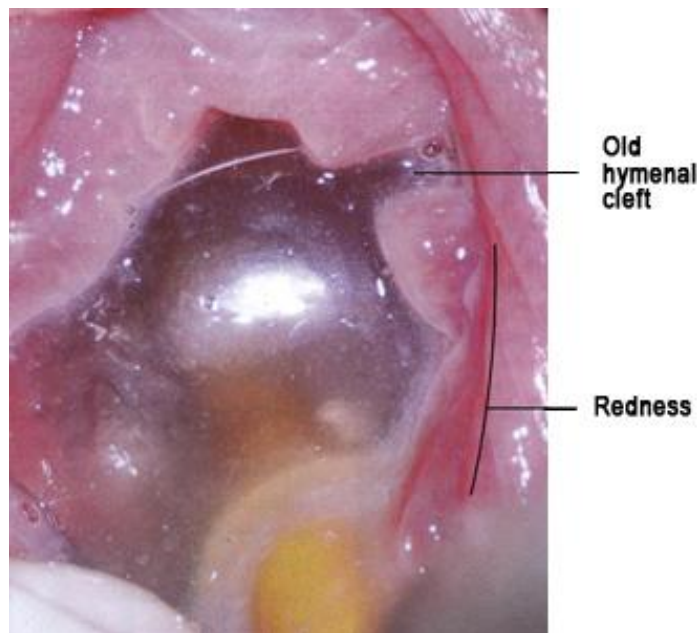


Figure 22. Foley balloon technique

Swab Technique

Similarly, a balloon covered swab can be inserted into the vaginal opening, allowing the hymen to flatten out.



Figure 23. *Balloon-covered swab technique*



Key Points to Remember

- ✓ Never leave the patient alone with the evidence.
- ✓ Under no circumstances is a patient, family member, or support person (e.g., advocate) allowed to handle or transport evidence.
- ✓ Maintaining the chain of custody during the examination is the sole responsibility of the examiner, and requires no outside assistance.

Drug-Facilitated Sexual Assault (DFSA)

Types of Drugs Used

There has been an increase in the use of some drugs, e.g., (gamma hydroxybutyrate [GHB], Ketamine, flunitrazepam (Rohypnol), Benadryl) to render a person incapacitated and more susceptible to sexual assault. Some of these drugs are available over-the-counter. Ingestion of drugs can result in a loss of consciousness and an inability to resist. Some drugs cause memory loss and incapacitation. Many victims of drug-facilitated sexual assault may not remember the assault itself.

Consider the following case study:

A 31-year-old female "Cindy" presents to the emergency department concerned that she may have been sexually assaulted two nights ago. Her history includes going out to a bar with friends, having one to two beers, and waking up in a motel room naked in bed. There was no one else in the motel room. She gathered her clothes and called a friend to pick her up and take her home. The friend had been out with her the night before, and told "Cindy" that she had gone to the bathroom; when she returned "Cindy" was gone. She said that she had been dancing with a guy and seemed to be having a good time.

Cindy asks if she can be examined to see if she had had sex. After the SANE discusses the exam process and the limitations of the findings, "Cindy" decides to have the exam. She denies voluntarily ingesting any other drugs other than the alcohol.

Note. From the author's personal clinical experience.

One of the most difficult scenarios a SANE may face is the patient who presents not knowing whether or not they were sexually assaulted. Lapse of memory combined with a feeling that something may have happened may discourage some victims from ever reporting. Sexual assault is defined as forced sexual contact without consent. Lack of consent may be attributed to voluntary or involuntary consumption of alcohol or drugs.

If a patient presents with a scenario similar to the case study of Cindy, drug facilitation should be suspected. Other symptoms that may alert us to this phenomenon include:

- If the patient remembers taking a drink but cannot remember what happened for a period of time after he/she consumed the drink.
- If the patient feels as though someone had sex with him/her, but cannot recall any or all of the incident.
- If the patient feels a lot more intoxicated than his/her response to the amount of alcohol he/she consumed.
- If the patient woke up feeling very hung over or fuzzy, experiencing memory lapse and cannot account for a period of time.
- If the patient wakes up in a strange or different location and does not know how he/she got there.
- If the patient's clothes are absent, inside out, disheveled or not his/hers.
- If the patient has "snapshots" or "cameo memories" of what happened.

Some symptoms may still be present when the patient is speaking to you. The examiner must recognize the possibility of drug-facilitated sexual assault and act quickly to provide necessary care to the patient and preserve evidence. In November 2003, the New York State Division of Criminal Justice Services (DCJS) announced the availability of a standardized DFSA evidence collection kit. The kits are provided free to hospitals in New York State and should be used only in cases where there is a suspicion of drug facilitated sexual assault. The collection must be done within 96 hours of the ingestion of the suspected drug. Permission must be obtained from the victim (a consent form is included in the DFSA kit).

Collection of Urine

The victim's first urine is critical. Do not use the clean catch method of urine collection and collect as much urine as possible, up to 100 ml. If your facility does not have any Drug Facilitated Sexual Assault kits available, use two gray-top test tubes and a standard sterile urine collection cup to obtain the samples. If less than 96 hours has elapsed since the time of the assault, a urine sample should be obtained from the patient immediately but not before the New York State Sexual Assault Evidence Collection Kit is used. Securing blood or urine for testing for drug facilitated sexual assault should only occur when there seems to be medical indications of their use or a statement of their use by the patient. When collected, specimens should be labeled, packaged, and sealed according to the protocol and procedures established at your facility. Do not place these specimens in the evidence collection kit.

Many drugs are detectable in the urine for at least 96 hours; therefore, the patient should be advised to openly discuss any recent ingestion of prescription or recreational drugs, so that the history will accurately explain the presence of those drugs in her urine toxicology screening. The patient must be counseled that testing her blood or urine for "rape drugs" may also show the presence of prescription or recreational drugs. Specific patient consent must be obtained for this testing.

More DFSA Drugs in Use

The procedures for toxicology testing vary depending on the area of the state where the examination takes place. The facility should contact the local crime laboratory beforehand and establish a mutually acceptable protocol for collecting, packaging, storing, and transporting these specimens.

The mainstream media has led the general public, including investigators and prosecutors to believe that there are only three or four drugs used to commit drug facilitated crimes (LeBeau, 2008). The ones commonly discussed include GHB, Rohypnol, and Ketamine. In reality, there are over 50 drugs known or suspected to have been used to commit such crimes (LeBeau, 2008). These drugs include:

- Alcohol, which is the most commonly identified drug used
- Benzodiazepines (e.g., Rohypnol, diazepam, clonazepam)
- Barbituates (e.g., Pentobarbital, Secobarbital)
- Antidepressants (e.g., amitriptyline, imipramine)
- Over-the-counter medications (e.g., Dextromethorphan, Diphenhydramine)
- Opiates and narcotics (e.g., Codeine, Hydromorphone)
- A class of miscellaneous drugs (e.g., Valproic acid, PCP, Clonidine)

Most are fast-acting, strong central nervous system depressants that mimic ethanol intoxication (LeBeau, 2008) Because the central nervous system effects of these drugs tend to imitate one another, it is highly unlikely that one can determine the drug used in a DFSA case simply by symptoms alone (LeBeau, 2008).

If any drug deserves the title "rape drug" it is alcohol. Scott-Ham and Burton (2005) highlighted that 81% of reported sexual assaults were positive for alcohol. The amounts of alcohol detected were alarming – enough to cause disorientation, potential memory loss or loss of consciousness.

Quick identification of a possible drug facilitated sexual assault can improve the chances of detection of the causative agent. Proper collection and preservation of urine and blood samples is imperative in increasing these chances. New York State has developed a specific kit for the collection of blood and urine.

Documentation of the DFSA

These are some important facts to remember when documenting the history related to a possible DFSA:

- The patient may present many hours, or even days after a possible ingestion of drugs.
- Small amounts of a drug may be used to incapacitate a victim, especially when used in conjunction with alcohol.
- Hospital analysis is not sensitive enough to detect the small amounts that may have been ingested.
- The drugs suspected in these crimes are quickly metabolized through the system.
- The drug and its metabolites, or the by-product of the breakdown of the drug, may be more concentrated in urine.

Being aware of the possibility of DFSA can help us to test for and possibly obtain positive results for some of these drugs.



Activity #2

Recall “Cindy” from the previous case study. There are numerous important questions that should be asked. What questions would you want to ask “Cindy”? Please go to the discussion forum and post your response.

It is important that the patient be informed of the process of testing for drugs used to facilitate a sexual assault. Any drugs voluntarily ingested by the patient may also show up in the analysis. Many patients in this situation are concerned that they will be charged with illicit drug use, and may be discouraged from reporting or allowing their blood / urine to be tested.

If they do consent to having their specimens tested, the DFSA kit can be collected up to 96 hours after the suspected time of ingestion of a drug. You should collect the first available urine of at least 100 milliliters, and 7-10 milliliters of blood in two grey top tubes containing sodium fluoride. These containers are available in the DFSA kit. The urine and blood must be refrigerated immediately following collection to decrease the further breakdown of the drug.



Key Points to Remember

- ✓ The victim’s first urine is critical.
- ✓ There are over 50 drugs known or suspected to have been used to commit drug facilitated crimes.

Ethical Considerations

A Nursing Dilemma

The SANE is often put in clinical situations that may not have a clear answer. Let's put what you have learned from this module and your knowledge of ethical practice to work in the following case study.

A 27-year-old female is brought to the emergency department by the police. She reported to them that she had been sexually assaulted. The officer asks to speak to you in private. He states that the history that the patient provided didn't sound right, and she eventually told him that the sex was consensual and she was afraid to tell her husband. He then tells you that he won't be going forward with the investigation and not to bother to collect evidence.

When you bring the patient to the examination room, you ask her why she came to the hospital. She tells you that she had been sexually assaulted and wants an exam and evidence collection.

Note. From the author's personal clinical experience.



Activity #3

Please go to the discussion forum and post your responses to the following:

- Describe what you would say if the patient asks you what the officer told you?
- Should you ask if she was really raped or if it was consensual? Provide a rationale for your response.
- Should you collect evidence? Why or why not?
- Are you required to release the evidence to the police? Why or why not?
- What can you tell the patient about lying, if anything?

Conclusion

Medical professionals provide care to patients who have been sexually assaulted, and our scope of care must include the forensic evaluation and collection of potential evidence with the assumption that it will be used in the criminal justice investigation. We must be prepared to appropriately collect this evidence from our patient's body, the "crime scene". Our collection procedures will be enhanced by our understanding of the implications of that evidence, from the collection, to the analysis and the meaning of the results.

Our patients deserve to be cared for by practitioners with a solid knowledge base.

Reminder! If you have not already completed the required activities for the discussion forum please post your responses **BEFORE** attempting the examination.

Resources

Additional resources recommended by the module facilitator include:

Advice for nurses on drug-related sexual assault. (2006). *Nursing Standard*, 21(12), 11.

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Du Mont, J. E., Macdonald, S. M. N., Rotbard, N., Asllani, E. B. S., Bainbridge, D. B. S., & Cohen, M. M. (2009). Factors associated with suspected drug-facilitated sexual assault. *CMAJ Canadian Medical Association Journal*, 180(5), 513-519.

Elliott, Suzanne, M. R. N. C., Msn, & Cnp. (2008). Drug-facilitated sexual assault: Educating women about the risks. *Nursing for Women's Health*, 12(1), 30-37.

French, K., Beynon, C., & Delaforce, J. (2007). Alcohol is the true 'rape drug'. *Nursing Standard*, 21(29), 26-27.

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Ledray, L. E. (2008). Alcohol and sexual assault: What can/should we do in the emergency department? *Journal of Forensic Nursing*, 4(2), 91-93.

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- National Judicial Education Program (Producer), & American Prosecutors Research Institute (Director). (2002). *Understanding sexual violence: Prosecuting rape and sexual assault cases*. [Motion Picture]. NOW Legal Defense and Education Fund.
- National Research Council, National Academy of Sciences. (1992). *DNA technology in Forensic Science*. Washington, D.C.: National Academy Press.
- New York State Department of Health. (2004). *Protocol for the acute care of the adult patient reporting sexual assault*. (DNA Evidence Collection Revised 10/08). Retrieved March 9, 2009, from http://www.health.state.ny.us/professionals/protocols_and_guidelines/sexual_assault/docs/adult_protocol.pdf
- New York State Division of Criminal Justice. (n.d.). *DNA - Fingerprint of the 21st Century*. Retrieved March 9, 2009, from <http://www.criminaljustice.state.ny.us/forensic/index.htm>
- Prince, A. M., & Andrus, L. (1992). PCR: How to kill unwanted DNA. *Biotechniques*, 12(3), 358-359, 360.
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SANE Module 3: Forensic Evidence Collection
Module Exam

After studying the downloaded course and completing the exam, you need to enter your answers online. **Answers cannot be graded from this downloadable version of the module.** To enter your answers online, go to e-leaRN's Web site, www.elearnonline.net and click on the Login/My Account button. As a returning student, login using the username and password you created, click on the "Go to Course" link, and proceed to the exam.

1. New York State recommends collecting forensic evidence on sexual assault victims for how many hours after the assault?
 - a. 48 hours
 - b. 96 hours
 - c. 14 days
 - d. 30 days

2. What type of evidence may be found on a sexual assault victim?
 - a. Semen
 - b. Saliva
 - c. Fibers
 - d. All of the above

3. A patient wants evidence collected but not released to the police. How long is the hospital required to hold the evidence?
 - a. 96 hours
 - b. 48 hours
 - c. 30 days
 - d. 14 days

4. What is DNA?
 - a. Deoxyribonucleic acid
 - b. Genetic makeup of an individual
 - c. Important evidence
 - d. All of the above

5. What is the most common substance found to be used in drug facilitated crimes?
 - a. Alcohol
 - b. GHB
 - c. Rohypnol
 - d. Ecstasy

6. How should clothing be packaged as evidence?
 - a. Damp, in plastic bags
 - b. Damp, in paper bags
 - c. Dry, in plastic bags
 - d. Dry, in paper bags

7. What crimes require the submission of DNA in New York State?
 - a. All felonies
 - b. All misdemeanors
 - c. 30% of all misdemeanors
 - d. a and c

8. How long after suspected ingestion should you collect specimens for the DFSA kit?
 - a. Up to 12 hours
 - b. Up to 48 hours
 - c. Up to 96 hours
 - d. Up to 30 days

9. What is currently the most common type of DNA testing?
 - a. STR analysis
 - b. Y-chromosome analysis
 - c. Mitochondrial analysis
 - d. None of the above

10. What activities should a victim avoid after a sexual assault?
 - a. Bathing
 - b. Sleeping
 - c. Eating
 - d. a and c

11. What are important points to remember when collecting evidence?
 - a. Wash your hands between each step
 - b. The Sexual Offense Evidence Collection kit must be refrigerated
 - c. Evidence should be dry before packaging
 - d. All of the above

12. How many steps are in the NYS Sexual Offense Evidence Collection Kit?
 - a. 10
 - b. 15
 - c. 20
 - d. 25

13. Why are pubic hair combings collected?
 - a. Known hair standards
 - b. To collect microscopic debris
 - c. To collect victim DNA
 - d. All of the above

14. Where is the swab smeared on the slide in the oral collection step?
 - a. In the circle in the center of the slide
 - b. On the frosted area of the slide
 - c. On both sides of the slide
 - d. None of the above

15. What should be used to clean equipment after a forensic exam?
- Lysol
 - Bleach
 - Soap and water
 - None of the above
16. What does toluidine blue dye adhere to?
- Microlacerations
 - Abraded skin
 - Intact skin
 - a and b
17. How is the colposcope used in a forensic exam?
- Diagnosis of pathology
 - Magnification
 - Photo-documentation
 - b and c
18. What are important points to remember to maintain chain of custody?
- Evidence must be properly sealed and labeled
 - Secure cabinet or refrigerator must be available
 - Kit can be released to the police with patient consent
 - All of the above
19. Which of the following symptoms could be attributed to a drug facilitated sexual assault?
- Feeling very hung-over
 - Cameo events of what happened
 - No memory of events
 - All of the above
20. How much urine should be collected for the DFSA kit?
- 100 ml
 - 30 ml
 - 10 ml
 - 7 ml