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Focus on Police and the Community

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The Cover: *SAT officers on patrol stop to make friends with a youth from the neighborhood. See article p. 2.*

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William S. Sessions, Director

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Serological Evidence in Sexual Assault Investigations

By
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Note: The following article presents a purely scientific approach to sexual assault evidence collection. The scientific step-by-step procedures that are explained here should always be accompanied by supportive treatment of the victim. It should also be noted that the investigating officer will be responsible for both overseeing the execution of the medical procedures described and managing the collection of the physical evidence.

Police officers throughout the United States routinely handle and oversee sexual assault investigations. Yet, these officers rarely receive training on the proper methods to be used for sexual assault evidence collection and preservation. As a result, valuable physical evidence may either be overlooked or inadvertently allowed to deteriorate biologically. This article establishes proper evidence collection and preservation protocol in sexual assault matters and demonstrates how modern forensic serology can aid in the eventual successful prosecution of the assailant.

After the Assault

A sexual assault has been committed. Upon arriving at the scene, an officer usually encounters a distraught, possibly hysterical, victim in the first psychological coping stages after an intrusively brutal assault. At this time, the

victim is not usually receptive to examination, even though the ideal time to collect body fluid evidence is immediately following the assault. This best evidence of the crime is present, but unfortunately, it is degrading with every elapsed minute. It is crucial that the officer be aware of the need for immediate examination in order to ensure that evidence is collected properly.

The victim should be transported expeditiously to a local hospital or rape trauma center where trained nurses or physicians can gather the appropriate physical evidence. The investigating officer is not only responsible for accompanying the victim through the phases of the examination but must also oversee the collection and preservation of medical evidence. By being fully aware of the procedures that should take place and the evidence that can be collected, the officer will be able to ensure that the case is as complete as possible.

During this examination period, health professionals should accumulate and catalog physical evidence. The completeness of the physical examination depends on the care, consideration, and thoroughness of the examining physician. As much evidence as possible should be obtained from the victim. However, if the health professional does not gather all of the available background data, the investigating officer can and should step in to make sure that it is elicited entirely from the victim.

Interviewing the Victim

The initial victim interview is notoriously the most incomplete in sexual assault matters. The excuses are numerous. The victim is hysterical and has to be sedated. The doctor or nurse is not willing to delve into any particulars of the assault for fear that it will further upset the victim. The investigating officer is embarrassed or unsure of the situation. Yet, regardless of these various problems, a full and complete description of the assault is crucial to obtain the physical evidence needed for a successful scientific analysis.

Obvious questions regarding the date, time and location of the assault, as well as the description or identity of the subject and the general circumstances of the assault, are rarely missed. However, the less obvious questions can be just as important. The interviewer should ascertain whether the victim bathed, showered, douched, urinated, defecated, vomited, brushed teeth, or gargled with mouthwash at any time after the assault and prior to the examination. If any of these activities were performed, the probability of obtaining useful serological results could be greatly diminished.

The physician should then discuss the basics of the assault. It should be determined from the interview whether penile penetration of the vagina, anus or mouth was attempted and/or successful, as well as if the perpetrator ejaculated at any time. If penetration was unsuccessful or not attempted in certain orifices, the physician may opt not to collect evidence from the unviolated areas. The physician must realize that it may be difficult or impossible for a victim to know whether the suspect ejaculated or there may be a psychologically induced reluctance by the victim to admit during the early post-assault period that ejaculation occurred. In these instances, failure to collect samples from all body cavities may result in lost body fluid evidence.

The extent of oral/genital sexual contact, whether fellatio or

> ***"...proper evidence collection and preservation protocol... can aid in the eventual successful prosecution of the assailant."***

Special Agent Grispino is assigned to the Serology Unit, Laboratory Division, FBI Headquarters.

cunnilingus, should be evaluated. If contact was indicated, the medical examiner should externally swab the genital area for later serological analysis. It would also be important to determine whether the assailant used a lubricant or condom during the assault or whether the victim was menstruating.

The victim should also be asked about the particulars and extent of any consensual intercourse within a 72-hour period prior to the assault. The final serological conclusions reached from the scientific analysis of the physical evidence of the assault may be greatly affected by previous consensual sexual activity and resultant body fluid mixtures. It would then be important to obtain blood and saliva samples from the previous partner(s) for comparison and elimination purposes.

The presence and extent of any injuries to the assailant inflicted by the victim is also extremely important. The suspect may have bled on the victim from a victim-inflicted injury during the struggle. A victim during menstruation could also transfer blood to the suspect during vaginal assault, which could be serologically identified in the suspect's underwear.

After all background information is obtained from the victim, the staff nurse and attending physician should conduct a thorough pelvic examination of the victim. All signs of pelvic injury should be documented, either in drawing or photographic form. After the background information has been gathered, the next step is to collect physical evidence from the victim as carefully and thoroughly as possible.

Collecting Physical Evidence

Many of the items used for evidence collection are available in sexual assault kits. However, these commercial kits vary widely, and basic minimums should be considered.

Vaginal, oral and/or anal swabs should be taken from the victim using sterile cotton swabs. These swabs should then be air-dried, appropriately labeled, initialed by the examiner and packaged separately. In most assaults involving vaginal penetration, two to four vaginal swabs and two cervical swabs are adequate for analysis. In cases of oral or anal sodomy, oral or anal swabs should be obtained from the victim. Two clean swabs taken from the same package as the unstained control swabs should be submitted to show that any useful serology results obtained during analysis were due to body fluids and not any contaminant initially on the swabs.

> ***"...it is absolutely essential that the investigators and the prosecutor understand...the capabilities, as well as the limitations, of forensic serology."***

Smear slides, unfixed and unstained, are sometimes useful for demonstrating the presence of sperm cells (spermatozoa). Vaginal, oral and/or anal smear slides should be obtained from the victim using the same swabs mentioned above. The smear slides should be appropriately labeled and should indicate which individual swab was used to create which microscope smear slide. Examining physicians in some jurisdictions prepare and microscopically examine smear slides to determine the presence of motile sperm cells indicative of recent sexual activity. In such cases, examining physicians may be required to testify in court proceedings regarding their observations. In any event, stained and fixed smear slides are useless for further serological analysis and should not be submitted to crime laboratories.

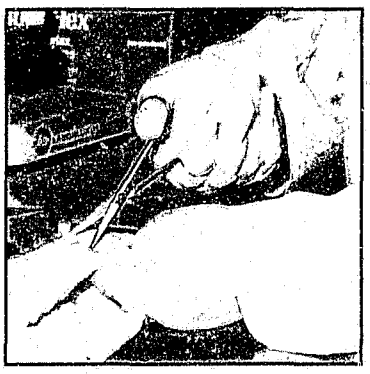
Pubic combings should be taken from the victim to identify any foreign hairs or fibers that may have been transferred during the assault. The physician should comb the pubic area and submit the comb and any resultant debris in an appropriately marked, sealed envelope. Head hair combings should be obtained from the victim in cases where other evidence is insufficient to show interpersonal contact. Pubic and head hair combings should also be obtained from the suspect if appropriate to the investigation.

Any obvious debris (soil, fibers, hair, grass, etc.) observed during the examination of the victim should be collected and submitted in a separate envelope describing the location of the debris. The examining physician should also scrape all residue from under the fingernails of each hand of the victim and place the residue in a specimen envelope or clip the fingernails and place the clippings in separately labeled envelopes.

Using a sterile pad that has been moistened lightly with distilled water, the physician should swab the vulva and the inner portion of the victim's thighs adjacent to the vaginal area. The genital swabbing pad should then be air-dried and submitted for laboratory analysis in an appropriately labeled specimen envelope.

The physician should swab any dried secretions observed during the examination of the victim, i.e., saliva around bite marks, using a sterile pad that has been moistened lightly with distilled water. The pad should also be air-dried and submitted for analysis. In

The Role of Serology



Forensic serology is best defined as the science involving the identification and characterization of blood, semen, and other body fluids, usually found in dried stain form, on items of physical evidence. Because of its supportive nature to the prosecution, it is absolutely essential that the investigators and the prosecutor understand, at least in general terms, the capabilities, as well as the limitations, of forensic serology.

Under most conventional serology protocols, items of physical evidence in sexual assault cases are scientifically screened for the presence of human semen and blood. Semen is identified where sperm cells are microscopically identified and/or a semen-specific protein associated with human semen, known as p30 or prostatic antigen, is determined to be present in extracts of dried stains under examination.

Once the presence of semen is established, the stain extracts may be analyzed for the presence or absence of blood group substances. Eighty percent of the general population secrete chemicals (blood group substances) into their body fluids that are consistent with their red blood cell ABO type. In these people, known as secretors, analysis of their saliva, vaginal secretions, or semen will indicate whether they belong to blood group A, B, AB or O.

If human blood is identified on an item, attempts may be made to determine whether the blood is of A, B, AB or O. Then, depending upon the size of the dried stain, it may be analyzed using electrophoresis to determine as many genetic marker protein types as possible. In order for any of this to make sense, known blood and saliva samples from both the victim and suspect of the sexual assault must be submitted for analysis and comparison purposes.

The known blood samples may be grouped as to A-B-O blood type and assorted genetic enzyme markers. The serologist may also attempt to determine if the individual is a secretor from analysis of the liquid blood and/or dried saliva standard.

Once all of the scientific information is assembled, the serology examiner may be able to make expert conclusions from the findings. Forensic serology is a comparison science. If all of the information from the analysis of the questioned samples is identical to that obtained from the known blood and saliva samples from the suspect, then the serologist can conclude that the suspect was a possible source of the deposited semen or blood stain. If, however, one element of the profile differs, then the serologist may be able to absolutely exclude the suspect as a source of that body fluid. It is further emphasized that without known standards from the victim, suspect(s) and any other involved parties for comparison, the effective serological analysis of items of evidence from the assault may be rendered meaningless.

Using this technology, the best that a serologist may be able to say is that the suspect is a possible depositor of the body fluid. This is because other potential suspects in the general population may share the same A-B-O blood type, secretor status, and enzyme profile, although the implementation of DNA testing in forensic samples has dramatically altered this thinking.

cases where dried blood or encrusted semen is observed, the material should be scraped from the body into a specimen envelope and submitted for analysis. Encrusted matter should never be re-hydrated, since it dilutes the sample. The location of each sample should be noted on a body diagram. Pubic or head hair containing encrusted semen should be carefully clipped and placed in a labeled specimen envelope.

In the event of oral ejaculation, gagging, swallowing or regurgitation during the assault may force air carrying semen through the nasal passages. The victim should blow her nose, very hard, several times into the center of filter paper. The resultant nasal mucous sample should be allowed to air dry and then submitted for analysis.

Standards

Head hair and pubic hair standard samples should be obtained from the victim and any suspects developed from the sexual assault investigation. The hair samples should be pulled with the bulb intact, not clipped. Head hair samples should be taken from four separate areas of the scalp. Twenty-five full-length hairs are generally considered adequate to represent an individual's hair characteristics.

Liquid blood samples should also be obtained from the victim, any consensual sexual partners from at least 72 hours prior to the assault, and any developed suspects. Known blood and saliva samples from a suspect in a sexual assault case must usually be obtained through a court order issued by a judge or local magistrate. Blood samples from each individual should be collected in both red-topped and purple-topped blood collection tubes. Red-topped tubes are used for traditional serological analysis, such as ABO grouping, secretor status and enzyme electrophoresis. A red-topped tube indicates that the collected blood is exposed to no preservatives or blood anticoagulants. Purple-topped tubes are used for DNA profiling only. These tubes contain a chemical chelator (EDTA) that inhibits the action of enzymes that would normally act to break down the DNA molecules in the blood samples. In the event that toxicology examinations will be requested, an additional blood sample taken in a grey-topped tube (containing sodium fluoride) and a 10 cc. urine sample should also be collected. All of the collected blood and urine should be refrigerated, not frozen, and submitted for analysis as soon as possible.

> ***"Probative value and relevance to the investigation are the watchwords in collecting and preserving the evidence...."***

Dried saliva samples should also be obtained from the victim, from consensual sexual partners from at least 72 hours prior to the assault, and from any developed suspects. The donor should expectorate on filter paper to produce a stain approximately 1 1/2 inches in diameter. Saliva should be clean and undiluted. Prior to giving the sample, the donor must have abstained from eating (food, gum, chewing tobacco), drinking and smoking for about 30 minutes. The stain should be circled in pencil before the drying is complete. When the samples have air-dried completely, they should be placed in a specimen envelope that has been dated and initialed.

Miscellaneous Samples

The officer should make sure that the clothing worn by the victim during the sexual assault is collected. The victim should always disrobe over examination paper. The victim's panties, pantyhose, jeans, shirt, shoes, socks, dress, or nightgown should be separated and individually packaged as appropriate. Any physical evidence from the crime scene that may bear suspected semen stains, such as bed sheets, towels, wash cloths, paper towels, toilet paper or tissue paper, should also be collected. The examination paper should also be submitted for analysis in the event that hair or fiber mixtures from the assault fell from the victim while disrobing.

The collected items should be clearly described for the laboratory, including whether the items came in contact with the victim and/or suspect before, during, and/or after the assault. Stained areas believed to exhibit evidence of the assault should be described or highlighted. For example, only a small area on a bedsheet may be relevant to the investigation. Therefore, forensic examination of the entire bedsheet for

semen may not only be unnecessary and wasteful of forensic services but may also dilute the effectiveness of the examination.

Preservation and Packaging

Bacteria begin to degrade biological fluids immediately after deposition. They especially thrive on the rich nutrients present in semen. If unchecked, contaminant bacteria can completely destroy DNA and other genetic markers of value. To counteract this phenomenon in all of the above instances in which moist body fluids are collected, it is imperative that the samples be completely dried. After drying, the specimen(s) should be placed into breathable paper bags or envelopes and frozen or refrigerated until submitted to the laboratory for analysis.

All collected items of evidence should be properly catalogued with preserved chain-of-custody records for court presentation purposes. All items should be dated and initialed by the collector. In cases where samples were taken by health professionals, they should identify, date and initial the items and hand the evidence to the investigating officer. Whenever possible, collection of known blood, urine and saliva samples should be performed under the supervision of the investigating police officer.

Conclusion

Each sexual assault occurs under circumstances unique to the victim, the crime scene, and the suspect. If extensive information is provided to the examiner in the crime laboratory, the examiner can

DNA Profiling

Deoxyribonucleic acid (DNA) is an organic substance found primarily in the chromosomes within the nuclei of cells. Using electrophoresis and radioactive probing techniques, a DNA profile can be developed from dried blood and semen stains.

DNA profiling is the FBI Laboratory's primary method of choice for the serological analysis of physical evidence from violent personal crimes. This technology has revolutionized the processing of serological evidence and has superceded traditional serology techniques in its associative value.

Currently, the FBI Laboratory screens probative items of evidence in sexual assault matters, such as vaginal, oral, and anal swabs and panties from the victim, for the presence of semen. At the conclusion of this analysis, the remaining stain may be submitted for DNA profiling. If human semen is identified, the sample is submitted for DNA analysis.

DNA profiles in the questioned samples are compared side by side with the DNA profiles in the known blood samples from the victim and suspect. If the patterns on the suspect's blood profile match those generated from the questioned samples, the serologist can testify that the semen or blood was deposited by the suspect or a member of a group of individuals who share this profile. As with conventional serology, if DNA profiles do not match, the serologist can absolutely exclude the suspect as the contributor of that DNA sample.

Many U.S. crime laboratories do not possess the capability to conduct DNA testing. Therefore, investigators and prosecutors should become familiar with the capabilities of their local laboratories in this regard. The current protocol used at the FBI Laboratory necessitates an 8- to 10-week time period from initial DNA extraction to final probing results in each case sample. Additional delays may also exist due to high caseload and the requirement for analysis in other forensic disciplines. DNA analysis may be more time-consuming and labor intensive than traditional serology techniques; however, the results may be far more significant or informative. The law enforcement community must be aware that DNA analysis of forensic samples is a lengthy process and trial continuances may be necessary.

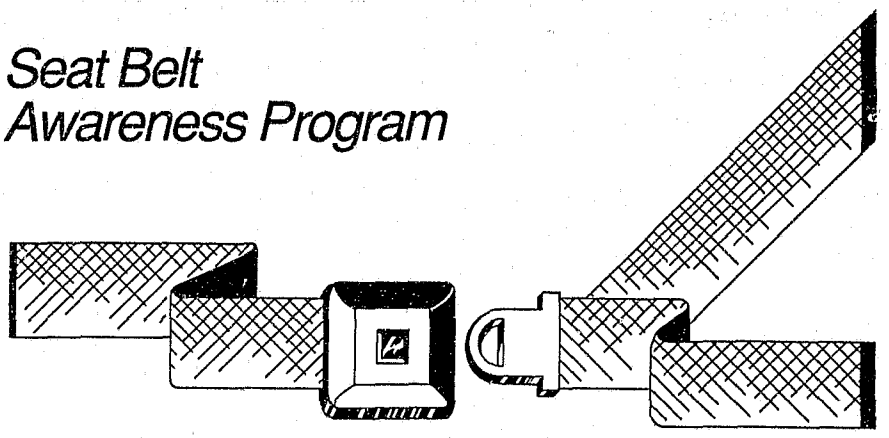
conduct a more thorough and complete scientific analysis. Probative value and relevance to the investigation are the watchwords in collecting and preserving the evidence of a sexual assault. If collected materials are stored in plastic bags under room temperature for any extent of time, the biodegrading action of contaminant bacteria may jeopardize conclusive test results. Sexual assault evidence kits with all of the above-mentioned materials are commercially available and stocked by hospitals and rape crisis centers.

Proper collection, identification, packaging and storing of evidence in sexual assault investigations will greatly improve the chances for a successful prosecution of the perpetrator, as long as the investigating officer follows up with good communication and contact with the laboratory examiner in all stages of the case. The evidence sent to the forensic laboratory should be accompanied by a transmittal letter that completely describes the facts of the crime, the inventory of the evidence seized, and the scientific examinations requested. It is suggested that the report of the initial examining physician be included along with the evidence.

Criminal investigators and prosecutors must familiarize themselves with proper procedures concerning the collection, identification, and packaging of serological evidence, as well as to establish effective communication with the examiner. By doing this, and by understanding the practical capabilities and limitations of modern forensic serology, the interests of justice can be best served with a successful prosecution of the perpetrator in a sexual assault. LEB

Police Practices

Seat Belt Awareness Program



The use of seat belts is probably the best available protection for automobile drivers and passengers from serious injury or death due to accidents. State administrators consider the use of seat belts so vital to the well-being of citizens that most States have mandated the use of these safety devices for all front-seat occupants. Yet, voluntary compliance with seat belt laws is waning. In fact, during spot checks, police officers in South Windsor, Connecticut, observed that only 1 person out of every 15 wore a seat belt. The question then raised is, "What can law enforcement do to make the general public aware of the seat belt law and then get citizens to comply with it?"

To address the problem, the South Windsor Police Department implemented a Seat Belt Awareness Program. This is an educational/enforcement program designed to encourage residents to use seat belts.

Program Development

The first hurdle, funding the project, was cleared when the Connecticut Safety Belt Coalition granted the necessary monies to cover the cost of the program. This non-profit safety group that encourages safety belt use also gave the department educational information that stressed voluntary compliance with State law.

In addition, a local business joined in this community program. It provided the department with free merchandise give-aways to encourage seat belt use.

Program Implementation

The Seat Belt Awareness Program ran during the month of August 1989. During the first 2 weeks, the department issued press releases informing residents of the program, why it was being implemented, how the program would be conducted, and where officers would be stationed.

Starting with the third week, officers conducted informational stops. Occupants of vehicles stopped during this period, who were not wearing seat belts, were given a verbal warning and an information packet. The packet contained printed materials that