

UTILIZING DNA TECHNOLOGY
IN SEX CRIME INVESTIGATIONS

Article

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Police can quit worrying about circumstantial evidence and about eye witness identification. And they can forget about looking for the smoking gun. Now genetic evidence allows law enforcement officers to place a suspect at the scene of a crime with one in a million accuracy. DNA fingerprinting will revolutionize the way law enforcement uses forensic evidence to link a suspect to a crime.

One in every four women will be raped during her lifetime. A sexual assault occurs once every 6.4 minutes. The National Crime Victimization Survey estimates that there were approximately 433,000 rapes and sexual assaults in 1995 in the United States. Each year more than 60,000 rapes are committed against women older than fifty years of age.¹ In these violent crimes, blood, hair, semen or other tissues are often left at the scene from either the victim or the suspect. Forensic scientists can now examine this biological evidence and determine with almost certainty whether it came from a given individual.² New procedures in DNA analysis require only the minutest biological samples and yield quick results. Currently, there are DNA data banks available to assist criminal investigators in suspect identification. Police can search these data banks against evidence obtained in their cases to identify a suspect. The challenge for law enforcement administrators will be determining the best strategies to utilize this continuously advancing technology to investigate sexual assault crimes.

DNA fingerprinting, as it is commonly called, received wide recognition during the much publicized criminal and civil trials of O.J. Simpson. In both of these cases, the DNA evidence

established that Simpson, who was accused in the double murders of Nicole Brown Simpson and Ronald Goldman, was present at the scene at the time of the murders.³ In Simpson's criminal trial, the defense attorneys chose not to attack the credibility to the DNA evidence, instead focusing on the possibility of evidence mishandling, laboratory contamination, or the planting of evidence by crooked police detectives.⁴ Even though the DNA evidence failed to convict Simpson at his criminal trial, it was powerful in the civil trial one year later. In the civil trial, Simpson was found liable for the deaths of both Ron Goldman and Nicole Brown Simpson.⁵ Again, Simpson's defense lawyers refused to debate the credibility of the DNA evidence.

After years of debate, lawyers and scientists now ultimately agree that DNA testing has the power to positively match blood, semen, hair, and other biological evidence recovered at crime scenes to a given individual.⁶

A person's genetic code is contained in their DNA, and DNA profiling is the process of using DNA for identification purposes. DNA is a nucleic acid found in the center of a cell. It is the primary component of chromosomes, the structures that transmit hereditary information generationally. Each DNA molecule is a long double stranded chain made of components called nucleotide. This genetic material is unique to an individual, except in the case of identical twins, and it provides a source of identification that is of unparalleled reliability. DNA samples can be taken from blood, hair, semen, saliva, or even small flakes of skin. In sex crime investigations, semen or pubic hairs left behind by the suspect and collected from the victim or the crime scene can easily provide DNA evidence needed to identify a suspect. After laboratory processing, the DNA profiles appear like bar codes on an X-ray image. Expert analysis can either exonerate a suspect or provide irrefutable evidence of guilt.⁷

Law enforcement's use of DNA technology in criminal investigations began in 1986 in the English midlands. Police asked for help from Dr. Alec Jeffereys of Leicester University in England. Jeffereys, who coined the term DNA fingerprints, was asked to verify a suspect's confession for responsibility in the serial rape and murder of two young girls. The DNA tests proved that the suspect could not have committed the murders. Because the crimes were so heinous and the public outrage was so great, the police were able to voluntarily obtain blood samples from more than 5,500 men in the region. However, none of the samples matched those recovered from the victims and the crime scenes. At the same time the police were considering expanding their DNA dragnet to include men living in more distant regions, a new clue was uncovered. A conversation was overheard in a local pub, where one man revealed that he had donated two samples of blood, one in his own name and one in the name of a co-worker. Police questioned the man, who readily identified his co-worker. The co-worker was arrested. His DNA was analyzed and found to match the suspect's DNA. The co-worker confessed and was convicted of the crimes.⁸

The first use of DNA in a criminal case in the United States was that of Tommy Lee Andrews. Andrews was convicted of rape in the Circuit Court of Orange County Florida after tests revealed that his DNA obtained from a blood sample matched that of semen traces recovered from a rape victim. The 1989 multiple rape and murder trials of Timothy Wilson Spencer in Virginia, were the first cases in which DNA evidence led to guilty verdicts resulting in the death penalty. The guilty verdicts were largely based on DNA evidence matching his DNA to that of semen found in several victims. These convictions were upheld by the Virginia Supreme Court.⁹

Because of the successes associated with DNA profiling, the DNA Identification Act of 1994 provided substantial funding to improve the quality and availability of DNA analysis for law enforcement identification purposes. This act also provided for a DNA index that would allow for quick matches with DNA samples already on file for law enforcement purposes only.¹⁰

A study conducted in 1996 by National Research Council of the National Academy of Sciences suggested that DNA identification would be widely used to exonerate persons who had been wrongly accused or convicted. Not only can DNA identification be used to convict the guilty, it can be used to free the innocent.¹¹

Also, in 1996, the National Institute of Justice released a report entitled, “Convicted by Juries, Exonerated by Science.” This comprehensive report lends statistical support to the earlier suggestions made by the National Academy of Sciences. This report announced that DNA testing was the most significant technical breakthrough in twentieth-century forensic science.¹² This report chronicled twenty eight cases in which post conviction DNA testing exonerated defendants. In each of these cases, the defendants had received lengthy sentences.

During the past year, numerous cases have been reported in the media about convictions that have been overturned because of DNA testing. Recently, DNA testing cleared a man jailed for fifteen years on a charge of rape. The case dates back to May 8, 1985, when a woman was raped inside her apartment by a man she described as having blond hair. Jeffery Pierce, who has blond hair, was doing landscaping work in the apartment complex. At the time of the incident, the police pointed out Pierce to the victim from a short distance away, but she ruled him out as her attacker. However, ten months later she identified him in a photo line-up. He was arrested and charged with rape. When Pierce was convicted, his wife divorced him and moved to another

city to raise their infant twin sons. Last year, after maintaining his innocence for fifteen years, Pierce won approval to have the evidence in the case submitted for independent DNA testing. Pierce was positively ruled out as the perpetrator, and his conviction was overturned. Pierce will soon meet his two sons, whom he has only seen through photographs since they were infants.¹³

DNA testing has also been used with increased frequency to identify and convict suspects. In Houston, forty year old Michael Blane Brasher was charged in the 1982 rape and strangulation death of a fourteen year old female. Brasher was a prime suspect at the time but nobody could identify him. Last year Brasher provided a blood sample in connection to a traffic arrest, and DNA testing matched it to semen collected from the girl's body.¹⁴ In Orlando, Florida, Franklin Reed was arrested for the rape and murder of a thirteen year old girl. Reed was originally cleared of suspicion, but a recent blood sample he provided matched DNA evidence in the crime.¹⁵ DNA identification can clearly rule out an innocent person, however if a person is guilty, DNA evidence can often establish guilt when no other evidence can.

During the past few years there have been exciting and dramatic changes in DNA analysis. A new process for testing DNA has been developed to enhance the use of DNA analysis in forensic investigations. This improved process is known as PCR-STR (Polymerase chain-reaction, short tandem repeats) and has enabled forensic scientists to identify DNA from objects that just a few years ago would have been considered impossible.¹⁶ Through this process, sweat, skin flakes and other microscopic trace evidence is now suitable for analysis. The process involves the replication of the tiniest DNA sample to obtain sufficient quantities for analysis. The original extraction of DNA is quickly replicated several million times, allowing DNA typing from the smallest, degraded samples. More important, this process can be automated by using

fluorescent chemicals in the replication process. A laser generated fluorescent signal from the DNA can then be transmitted to a computer and analyzed to produce DNA profile information. Robotic workstations are currently available to process DNA samples. The entire process of DNA analysis can be automated, thus eliminating the possibility of error or intentional manipulation of data. The components needed for complete automation are currently available but must yet be integrated. Once DNA analysis is automated, every criminal case with biological evidence could be analyzed without the normal concerns of cost, time and technical limitations.¹⁷

A team of engineering and genetic students at the University of Michigan in Ann Arbor, Michigan has created a laboratory on a chip. This device is a glass and silicon chip, the size of a paper clip, that analyzes DNA quicker and cheaper than conventional laboratory methods. The chip includes a system for metering, measuring and mixing microscopic liquid DNA samples with reagents, and moving the sample through a climate controlled reaction chamber, where the DNA molecules are separated by size and the results are read by an onboard fluorescence.¹⁸ Almost all the necessary components are contained on a single glass and silicon wafer. This chip technology has promise to be the key component in simple, portable DNA analysis that will make DNA analysis widely available, offering increased speed, decreased cost of equipment and lower labor costs. This DNA testing chip, when purchased in large quantities, may be as low as six dollars per device.¹⁹ Another DNA chip has been developed at the Whitehead Institute for Biomedical Research. This device can perform a DNA analysis in two minutes.²⁰ That technology is one hundred times faster than the analysis performed in the O.J. Simpson case. This rapid and accurate DNA testing holds extreme promise for law enforcement as it can allow

for portable analysis in the field and at crime scenes.

In the last few years, many states have invested in creating data banks of DNA profiles of persons convicted of sex offences and certain other felonies. With these data banks, law enforcement can now use DNA technology not only to assist in establishing the guilt of known suspects, but also in solving crimes where the offender's identity was unknown and the case impossible to solve by other means.²¹ Almost every state in the country now has a DNA database law that requires convicted sex offenders to submit a blood sample for DNA profiling. In 1998, the California legislature, citing the importance of DNA identification in sex crimes, created the DNA and Forensic Identification Data Base and Data Bank Act. The purpose of the data bank is to assist federal, state, and local criminal justice agencies, with the rapid detection and prosecution of persons responsible for sex offenses and other violent crimes. The Department of Justice is responsible for administering the DNA laboratories and for ensuring that the Department of Correction and the Department of the Youth Authority submit the required DNA samples.

In California, there are over 20,000 unsolved sexual assault cases with biological evidence that have not been analyzed for the presence of DNA. The Governor's Office, along with the Office of the Attorney General, has established the Cold Hit program. This program was designed to analyze biological evidence in all sexual assault cases, with special emphasis on those cases in which the statute of limitations is soon to expire. Funding from the state has allowed local law enforcement agencies to process backlogged evidence through public and private laboratories for entry into the state DNA data bank. Currently, there are 168,047 DNA profiles in the DNA data bank. When the DNA profile from an unsolved crime sample matches a

profile in the database, it results in a cold hit. A cold hit is a case that has been solved through DNA testing that would not have otherwise been solved. To date, there have been thirty six cold hits.²²

In February 2001, the Cold Hit program produced a record of five hits in one day. One of the men identified by DNA match, wanted on rape charges, is currently in a Texas jail awaiting trial on a similar charge. Two other men are linked to rapes in southern California. One man is linked to a rape in the San Francisco area, and a fifth man is linked to a rape and murder of a woman in the Sacramento area over twenty years ago.²³

The FBI has developed a system called the Combined DNA Index System (CODIS) for storage and comparison of DNA records. This project will merge all state data banks into a centralized data base. DNA comparisons between states and across the nation will become increasingly common.

DNA technology is extremely well suited for forensic use in sex crime investigation for several reasons. First, sex crimes generally yield biological evidence that is generally rich in DNA that can be analyzed and profiled. Secondly, the sex offender population is largely known. Most states have laws that require the tracking and monitoring of convicted sex offenders. Most states also have laws that require convicted sex offenders submit DNA samples for profiling and inclusion into known offender DNA data banks. Finally, technology is available to quickly and accurately analyze the DNA from crimes scenes and compare it to data banks of known offenders to identify a suspect.

Recidivism rates for sex offenders are high, making it crucial that their offenses be thoroughly investigated with the latest in DNA technology. Quick identification and

apprehension of sex offenders is critical for ensuring public safety. However, local law enforcement has been slow to embrace and fully utilize DNA technology. Personnel throughout the criminal justice system lack training and understanding of DNA and its relevance in sex crime investigation. There has been a lack of coordination amongst allied agencies in using available DNA technology.

The law enforcement leader has an opportunity to make a significant impact how DNA technology is used in the investigation of sex crimes. They can facilitate change, not only within their agency, but often in concert with changes in allied agencies. The management staff within the department has a responsibility to assist the agency head in the development of a plan to incorporate this advanced technology into crime fighting efforts. The success of utilizing this advanced technology will be dependent on the vision and planning of the leadership.

Full use of DNA technology in the investigations of sex crimes is not without associated costs. Agencies can expect costs associated with the training of personnel, actual DNA analysis, and purchasing of necessary materials and equipment to facilitate DNA testing. However, to help offset costs, research should be conducted on the availability of technology grants through both state and federal governments. Alternative training methods, such as use of video tapes and CD ROM, should be considered. Research should be conducted with private serological laboratories to determine the lowest costs for analysis in the event state facilities are not available. Private laboratories may be agreeable to contracting for less than customary fees to establish credibility in court.

The public has an expectation that law enforcement agencies will use all available means

to provide for public safety. Failing to do so may also cause the agency to experience a loss of public trust and confidence. Although there may be increased costs with implementing use of advanced DNA technology, the costs associated with not using the technology may be more menacing.

Law enforcement is continuously being challenged to incorporate new advancing technologies to enhance its delivery of service and crime fighting efforts. In jurisdictions where advanced DNA technology has been used, there has been a positive impact on the identification and apprehension of suspects involved in sex crimes. Agencies that are able to successfully integrate the use of new technologies will take a leadership role in defining the future of law enforcement.

The following is a list of recommendations that leaders should consider when developing a plan to incorporate use of DNA technology in investigations of sex offenses.

- Law enforcement leadership must work closely with federal, state, and local elected officials to ensure that they understand the importance of DNA technology and take action to address issues of financial resources.
- Law enforcement leadership must work with other allied agencies to develop streamlined processes for getting biological samples from the scene to the laboratory and to the data base for comparison.
- There should be continual training in DNA technology for officers, detectives, management staff, civilian evidence technicians and other personnel who are either involved directly or peripherally with DNA evidence.
- Agencies should aggressively pursue funding sources that would facilitate processing of

DNA evidence.

- Agencies should support each other publicly as they work to address the issue.
- Agencies should aggressively pursue funding that would provide for new available experimental technology that could prove effective in utilizing DNA profiling.
- Ongoing research should be conducted on available DNA technology to determine new and additional ways to incorporate DNA technology into sex crimes investigation.
- The population of known sex offenders should be carefully monitored to ensure compliance with registration requirements and confirm that they have provided DNA samples for the data base.
- Law enforcement leaders should work through professional associations such as, California Police Chiefs' Association, California Peace Officers' Association and Peace Officers' Research Association of California (PORAC) to support legislation requiring a statewide committee to oversee the processes for collection of DNA samples, DNA profiling, data base entry, and database use.
- Law enforcement leaders should support legislation that provides for coordination of state agencies' efforts regarding independent responsibilities.
- Law enforcement leaders must initiate legislation that provides sanctions against jurisdictions for failing to comply with existing state regulations regarding DNA profiling.
- Local law enforcement agencies should develop internal policy regarding how sex crimes investigations with unknown suspects shall be conducted to ensure full use of DNA technology.

- Local law enforcement agencies should assign a sexual assault detective to work as a liaison with the regional crime lab to facilitate DNA analysis, profiling, and effective queries of the database.

DNA technology has advanced with lightning speed during the past five years. These advancements in DNA technology can give law enforcement the edge in solving crimes that otherwise would go unsolved. The blending of computer technology, with DNA technology, allows for quick comparisons between suspect DNA profiles with known offender DNA profiles. The use of this technology can result in the quick identification and apprehension of suspects. The use of this advanced technology must be maximized if law enforcement leaders are committed to controlling serious crimes in their communities. The challenges in creating liaisons, establishing procedures, and securing equipment to facilitate the use of DNA technology are great, but the benefits for the community greater. Law enforcement leadership must take an aggressive role to ensure that the tremendous advancements in DNA technology are fully utilized in the agencies investigative processes. DNA technology has promise to be the greatest crime fighting tool of all. Law enforcement leaders must put this technology to work. The quicker that is done, the safer our communities will be.

ENDNOTES

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