DNA Databases: Changing The Way We Do CSI

Article

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The Combined DNA Index System (CODIS) is an electronic database of DNA profiles that can identify suspects. It is similar to the Automated Fingerprint Identification System (AFIS) database used for fingerprint identification. Just as fingerprints found at a crime scene can be run through AFIS in search for a suspect whose prints have been entered into the system or prints found at another crime scene, DNA profiles can be entered into CODIS.

In 1990, CODIS began as a pilot program and grew to a national DNA index for law enforcement that became operational in 1998. With the formation of the National Missing Persons DNA Database Program that was funded by Congress in 1999, collection of mitochondrial DNA samples from maternal relatives of missing persons were added to the CODIS system.

In 2001, the federal convicted offender program was initiated using nuclear DNA profiles from convicted felons, adding them to the CODIS system. These profiles are now available to compare against mitochondrial DNA samples found at the scene of various crimes. With this new DNA technology, the forensic index system is used to compare DNA found at crime scenes and links it together, even though there are no known suspects. Matches made between the systems contained within CODIS are sent to qualified DNA analysts responsible for validation or to refute the match. Follow-up with case investigators can then lead ultimately to the arrest of the suspect.

The working group for the National Commission on the Future of DNA Evidence on crime scene investigation began in 1998. The work group was responsible for the completion of a brochure titled "*What Every Law Enforcement Officer Should Know About DNA Evidence*." The brochure consists of a brief explanation of what DNA is and

what the CODIS system is all about. Other subjects that are covered in the handout are evidence collection, preservation, identification, contamination, transportation, storage, and location of DNA evidence. A unique feature of the brochure is a card that can be attached to a field officer's notebook to be used as a reminder while at a crime scene. Another emphasis on the card is a list of precautionary measures to be taken when collecting evidence.

Many law enforcement agencies contract out major crime scene investigation to the local sheriff's department crime lab, an adjoining jurisdiction's lab, or the California Department of Justice. Some departments have their own forensic science units, but the ability to conduct DNA typing and analysis is limited to sophisticated crime labs with trained specialists. After speaking with Russell Baldwin of the Orange County Forensic Science Services, it was clear the crime labs are overwhelmed with evidence waiting to be processed for DNA analysis. There is a common 3-6 month waiting period for evidence processing.

Crime scene technicians and investigators are focusing more and more on the collection of evidence that contains DNA. With that focus comes more evidence and an increase in the number of samples to be included in the CODIS system. As technicians grow in their expertise on collection of DNA evidence, less serious offenses will have DNA-based forensic evidence collected.

Several states are passing legislation to include a wider variety of criminal offences for DNA sample inclusion. State DNA databases are being linked with the federal CODIS system. There is talk about including and sharing on an international

basis. With more samples in the system, more positive identifications and crime scene matches will occur.

If changes are not made in how law enforcement conducts crime scene investigation, valuable DNA evidence will not be collected. At the root of the issue is how crime scenes are processed and evidence is collected. DNA databases are going to continue to expand. For law enforcement to take full advantage of this tool for evidence and suspect identification, changes are going to have to be addressed.

Several trends have emerged and have had an effect on how crime scenes are processed. The costs of processing crime scenes, collecting and storing evidence, and gathering DNA samples from convicted felons also increasing.

The overall cost of prosecution will be going down over the next 10 years as expanding DNA databases, crime scene evidence, and increased technology could result in more guilty pleas and plea-bargains. This could result in fewer trials and fast prosecutions.

Five years ago, DNA evidence was being used to match known suspects to crime scenes, primarily in sexual assault, rape and homicide cases. A trend has been seen in the examination of cold case evidence that contains DNA. The use of short tandem repeats (STRs) has caused an increase in DNA sample inclusion into the CODIS system and cold case hits. With the trend towards the expansion of the CODIS system, the focus toward DNA evidence collection will increase. The possible future changes in the law to include DNA profiles of all convicted felons will also have a positive impact on the usefulness of the CODIS system.

Training and specialization in the collection and analysis of DNA has been lacking in the past five years. Forensic specialists have been doing their best to keep up with the rapid by growing technology and discovery relating to DNA science. The average peace officer or civilian crime scene investigator has not been able to keep up with current trends and rapid changes. The need for more advanced training and the apparent lack thereof is a problem that will need to be addressed. Law enforcement will see tremendous growth in the specialization of DNA and training offered to field personnel.

Technology in the area of DNA is changing rapidly. The criminal justice system can only keep up if it places resources towards this growing field. By limiting specific crimes to be included into the DNA database, law enforcement has been able to keep pace with the need for sample entry from specific crime scenes. Law enforcement couldn't have done it all at once. One needs to climb the ladder, a step at a time.

Eventually, DNA typing technology will enable law enforcement to conduct in-field identification of individuals comparing their DNA against CODIS, or other international databases. Once that technology is available, it will also be possible to locate evidence at a crime scene, conduct an infield profile match, and then enter that match into the CODIS database. The vision of what law enforcement wants to become in the future of the use of DNA databases can be measured by the results of their performance.

DNA databases continue to grow and expand. One day, they may even be used for field identification of individuals and immediate identification of forensic evidence. The advances in DNA profiling will ultimately result in a process that will enable trained

and qualified technicians to analyze forensic evidence while at the crime scene. Once evidence that contains DNA is examined and a DNA profile is identified, that profile can be sent from the scene to the CODIS system using wireless communication technology. If a preliminary match is made comparing DNA with current database profiles, identification can be made and either a mug photo or DMV photo could be accessed and given to investigators immediately.

Using this scenario, the speed in which dangerous suspects could be taken into custody would be greatly enhanced. Wrongly accused suspects could be immediately eliminated in the field, avoiding long trials and unnecessary costs.

Some law enforcement agencies have their own crime scene investigation unit and crime lab. The extent of the capability of these crime labs varies and many departments contract with other large agencies to perform crime scene investigation. They usually limit this extra cost to high profile serious offenses like homicide. Most larger law enforcement agencies already have the lab capability to process DNA evidence but are overwhelmed with the volume evidence to be processed.

The goal is for law enforcement to maximize its ability to identify, collect, preserve, transport, and store DNA evidence so it can be compared to and entered into CODIS. To accomplish this goal, law enforcement will need to reevaluate and expand current operational budgets. The basic CSI officer will need to attend more in depth training that addresses DNA issues. Property storage and evidence lockers will also need to expand. Current methods will need to be adjusted to adhere to changing case law and storage requirements. The CODIS system will grow in its effectiveness as law enforcement improves its ability to use DNA to identify and convict suspects, recover

and identify missing persons, match serial offenders to various crime scenes, and ultimately conduct in-field identification.

It has taken years to enter all the DNA profiles into the CODIS system. As local, state, and federal laboratories catch up with the backlog of cold cases and DNA samples, the system will be able to handle future legislation that will include samples from all convicted felons. This couldn't have been done at the inception of the program. The amount of cold case examination should eventually decrease.

To achieve the full use and effectiveness of the CODIS system, law enforcement must take it one step at a time. The first step of awareness of DNA evidence has been achieved by the publication of the brochure, "*What Every Law Enforcement Officer Should Know About DNA Evidence*." It has been difficult to standardize DNA training due to the different state mandates and the rapid technological changes. The knowledge level is minimal with respect to DNA evidence and collection procedures. In the past, the only time DNA was collected was during crime scene investigations, usually conducted by forensic technicians and personnel involved in serious crime follow-up, like rape and homicide.

Computer-based training needs to be created to address the various needs of all law enforcement and prosecution stakeholders involved. Small organizations get a fair amount of training as far as criminal investigations are concerned but nothing specific most of the time with respect to the DNA evidence collection. It is the objective of training is to ensure that officers know about DNA evidence and know how to maintain control of the crime scene and collect it.

It is apparent the CODIS system will continue to expand and the line-level officer will need training and expertise in DNA evidence identification and collection. An alternative strategy may be pooling resources and establishing a mutual aid task force that will respond to various crime scenes that in the past have been handled by field officers and less trained technicians. Law enforcement agencies need to either make new experts to handle the increase in DNA evidence collection, or make better use of the current resources by sharing personnel. Either way, the increased use of the CODIS system will cause an increase in cost for all law enforcement agencies.

The benefit of a new focus on DNA evidence collection should be an increased efficiency in criminal investigation. Many law enforcement agencies do not experience an amount of serious crimes to support a full time lab with trained and qualified personnel. As DNA evidence becomes the day-to-day standard for evidence collection at all crime scenes, agencies will need to expand their current lab capabilities. The obstacles will continue to be a lack of funds and inadequate training for current CSI personnel.

There must be a collaborative effort between local law enforcement, CODIS-based crime labs, and the local prosecutor. If any of these current stakeholders resists the expanded use of CODIS to process all crime scenes, CODIS will be ineffectual.

Implementation will generally be initiated by new discoveries in DNA technology and their application to criminal investigations. The benefit will be apparent to all stakeholders involved that forensic DNA is an effective tool for solving crime and is here to stay. As the public grows more familiar and accepting of DNA evidence, law enforcement leaders, from mere public pressure, will need to keep up with technology. The citizens they serve will demand it. Political pressure will also result in the passing of

broader legislation for wider inclusion of samples from convicted criminals into the CODIS system.

At this point, law enforcement agencies possess adequate resources and personnel to process crime scenes and recover forensic DNA evidence on serious offenses. Law enforcement managers should prepare for the discovery of new DNA technology that will expand their crime solving potential. Part of that preparation will be the need to budget sufficient resources to expand current crime labs, train and equip crime scene investigators, and purchase field equipment that, once it is offered, will be very expensive.

The CODIS system has proven to be a successful tool in bringing criminals to justice, protecting the rights of falsely accused individuals, and the identification of missing children. The overall effectiveness of this tool can only be measured by its maximum potential use. The CODIS system will never be used to its potential without current first responders, follow-up CSI investigators, and forensic specialists being better trained and equipped.

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