

CODIS: A NATIONAL INDEX OF DNA IDENTIFICATION RECORDS

Keith L. Monson[†] and John R. Brown[‡]

[†]Forensic Science Research and Training Center, FBI Academy, Quantico, VA 22135

[‡]DNA National Database Office, FBI Laboratory, Washington, DC 20535

Introduction

In 1990 the FBI began development of a national DNA identification index, CODIS. The concept driving this development is the rarity of a DNA profile obtained from the successful analysis of body fluid stains left at crime scenes. Given the recidivistic nature of rape and other violent crimes, and the fact that body fluids of the perpetrator are left at crime scenes, a national computer-based system of storing and comparing DNA records can result in the successful application of DNA profiling in the fight to prosecute and deter violent criminal behavior. There are now several examples of forensic DNA testing generating previously unavailable investigative leads. Also, this powerful forensic technique has been used to successfully prosecute/adjudicate cases involving the same subject after these cases have been linked together by DNA evidence.

CODIS, a fully integrated local/state/national law enforcement system of DNA records, will establish four files of DNA records: the forensic index, the convicted offender index, the missing persons index, and the population file. DNA records will be forwarded electronically among the indexes. These files will exist at local, state, and national levels, and will be used in the generation of investigative leads by identifying DNA associations among records in the indexes to the DNA record obtained during an investigation of a violent crime or missing person case. The population file, consisting of anonymous DNA profiles, will assist in the statistical interpretation of DNA profiles from case work. The local laboratory retains ownership of its DNA records, and therefore, in addition to determining which forensic DNA profiles are forwarded to the state and national indexes, it also controls which of its submitted DNA records are subsequently removed. The DNA records in each index include only the specimen identification number, the DNA profile and information related to the analytical conditions of the DNA analysis. No personally identifying information or other information unrelated to the identification purposes of the index are included with the DNA record.

The FBI is collaborating with thirteen pilot state and local crime laboratories in ten states¹ which are implementing their respective states' convicted offender laws. Periodic meetings report CODIS development progress and ensure that the needs of the forensic community are met in establishing and maintaining a national DNA identification index. The CODIS pilot laboratories receive development releases of the software for testing. Upon successful completion of testing by the FBI and the CODIS pilot laboratories, the software is implemented in case work and convicted offender DNA profiling.

The Forensic Index

Only the DNA profiles derived from crime scene evidence that cannot be attributed to either the victim or another innocent individual (like the consensual sex partner of a victim)

will be contained in the forensic index. The local, state, and national forensic indexes will contain the unaccounted for DNA profile(s) from unknown suspect cases as well as DNA profiles derived from the crime scene or other otherwise lawfully obtained evidence in cases where a DNA match has been made and the investigators have identified a suspect. The forensic index will not contain DNA profiles derived from blood exemplars from victims, suspects, or other individuals.

The forensic index is the key to the effectiveness of CODIS. CODIS will conduct regular searches of the forensic index at all three levels (national, state and local) for DNA matches. A verified link between a case for which there is no suspect, and another case, whether or not it has a named suspect, facilitates coordination of investigative activities in a way that may lead to the identification of a serial offender. A match among two or more cases, all of which have the same suspect, can provide additional evidence that will lead to stronger prosecutions. In some cases, the courts may sentence the serial offender using different sentencing standards than if the offender was considered a first-time/one-time offender.

The Convicted Offender Index

The convicted offender index will exist at the national level and in states that have enacted legislation enabling them to maintain such an index. Twenty-two states² have enacted legislation that requires individuals convicted of certain crimes, generally including homicide and/or sexual assaults, to provide a sample of their blood for DNA profiling. After the DNA record from crime scene evidence in an unknown suspect case is forwarded to state and national CODIS forensic files, it will be searched against the convicted offender indexes. A match in the convicted offender index will result in a potentially significant new lead for the police investigating the unknown suspect case.

The Population File

The national population file includes DNA records derived from population studies conducted by the CODIS subscribers. These anonymous population DNA records are the basis for the statistical assessment of the significance of a DNA match in case work. The local laboratory has access to national population DNA records in two forms: as raw population data and as statistically processed results. The national CODIS system will perform fixed bin, floating bin, and direct count statistical methods using population groupings which have been previously tested for Hardy-Weinberg proportions and linkage equilibrium. In this way, nationally standardized and validated methods of assessing the statistical significance of a DNA match are available to the local laboratory on a larger number of population DNA records.

The Missing Person Index

The missing person index will exist at the local, state, and national CODIS levels. It will contain the DNA profiles of recovered persons or body parts whose identities are sought by investigators. The missing person index will also contain DNA records of close relatives of missing persons, provided voluntarily or under court order. Searches will be conducted by applying genetic principles of inheritance. Upon resolution of a missing person investigation with a DNA match or through other investigative means, the DNA profiles of living missing persons and their relatives will be expunged from the CODIS indexes. The DNA records from living missing persons and the relatives of missing persons will not be used in the search for criminal suspects.

Quality Assurance and Privacy Protection

The establishment of a national computer system of DNA identification records raises public concerns regarding privacy. The FBI is designing the national DNA identification index and the procedures for its operation to ensure that any intrusion of personal privacy is limited to the greatest extent possible. The DNA records compiled from convicted offenders and crime scenes must remain secure from unauthorized interception and tampering. Some issues related to personal privacy are also operational concerns: CODIS must be both effective and efficient, otherwise false leads that waste limited investigative resources can result.

A detailed description of CODIS, the rules under which CODIS will operate, and the CODIS User Agreement will be made public through publication in the Federal Register. Integrity and confidentiality of the DNA records and the information derived from these records will be maintained through encryption of stored and transmitted data, an access control system, partitioned user authority, backup and restore procedures, agency authentication in transmitted telecommunications (access to the system will be limited to law enforcement crime laboratories), audit logs, and user training. A User Agreement will be developed and enforced through audits and continuous electronic monitoring of controls. This agreement will include the procedures for maintaining CODIS security, analytical testing standards for the acquisition of DNA records, limitations on the information that can be retained, and the procedures for exchanging information between laboratories. Standards will be developed and enforced that ensure DNA records derived from DNA profiling analysis are reliable and comparable.

CODIS potential matches will be confirmed by DNA experts through an exchange of DNA testing data before announcing the match to investigators. In the case of a DNA match that leads to the identification of the perpetrator from the convicted offender index, the match will be confirmed through analysis of a blood sample from the suspect. The DNA analysis of a suspect's blood sample is conducted by the laboratory that processed the case evidence.

The removal of a DNA record in CODIS will be accomplished by electronically overwriting the DNA record, not by marking it as deleted. Furthermore, the confirmation of removal of the DNA record will be forwarded to the laboratory only after the DNA record has been removed from the on-line indexes. Procedures that ensure deleted DNA records are removed from any other medium that may also contain the deleted DNA record, including backup electronic medium, will be followed. The laboratory is therefore assured that even an on-line failure of the system resulting in its restoration by employing backup tapes, will not result in the inadvertent inclusion of the DNA record in the CODIS indexes.

Notes

1. The CODIS pilot laboratories are: Arizona Department of Public Safety, Phoenix, AZ; Broward County Sheriff's Office, Fort Lauderdale, FL; California Department of Justice, Berkeley, CA; Florida Department of Law Enforcement, Tallahassee, FL; Illinois State Police, Springfield, IL; Kansas Bureau of Investigation, Topeka, KS; Metro-Dade County Crime Laboratory, Miami, FL; Minnesota Bureau of Criminal Apprehension, St. Paul, MN; Orange County Sheriff's Office, Santa Ana, CA; Oregon State Police, Portland, OR; Virginia Division of Forensic Sciences, Richmond, VA; Washington State Patrol, Seattle, WA; Washoe County Sheriff's Office, Reno, NV; and the FBI DNA Analysis Unit, Washington, DC.
2. States with enacted legislation establishing files of convicted offender genetic records for law enforcement purposes: Arizona, California, Colorado, Florida, Georgia, Hawaii, Illinois, Iowa, Kansas, Kentucky, Michigan, Minnesota, Missouri, Nevada, North Carolina, Oklahoma, Oregon, South Dakota, Tennessee, Virginia, Washington, and Wisconsin. Additional states are considering enactment of similar legislation.