CODIS

COMBINED DNA INDEX SYSTEM

The Federal Bureau of Investigation (FBI) Laboratory's Combined DNA Index System (CODIS) blends forensic science and computer technology into an effective tool for solving crime.

CODIS began as a pilot software project in 1990 serving 14 state and local laboratories. The DNA Identification Act of 1994 formalized the FBI's authority to establish a National DNA Index System (NDIS) for law enforcement purposes. Today, more than 170 public law enforcement laboratories participate in NDIS across the United States. Internationally, over 40 law enforcement laboratories in more than 25 countries use the CODIS software for their own database initiatives. The FBI Laboratory is committed to the support of the CODIS program.

Crime

CODIS generates investigative leads in cases where biological evidence is recovered from the crime scene. Matches made among profiles in the Forensic Index can link crime scenes together, possibly identifying serial offenders. This allows police from multiple jurisdictions to coordinate their respective investigations and share the leads they developed independently. Matches made between the Forensic and Offender Indexes provide investigators with the identity of a suspected perpetrator. Since names and other personally identifiable information are not stored at NDIS, qualified DeoxyriboNucleic Acid (DNA) analysts in the laboratories that share matching profiles contact one another to confirm the candidates match.

Missing Persons

In 2000, the FBI Laboratory began developing the National Missing Persons DNA Database (NMPDD) program for the identification of missing and unidentified persons. Both Mitochondrial DNA (mtDNA) and short tandem repeat (STR) profiles can be entered into the missing persons indexes of CODIS. Efforts to enhance kinship analysis for missing persons data is a top priority for CODIS. Once fully implemented, the enhancements will provide investigators with a powerful tool in the identification of missing and unidentified persons on a national level. For questions concerning missing persons cases, please contact the DNA Analysis Unit I (Nuclear DNA) at (703) 632-8446 or the DNA Analysis Unit II (mtDNA) at (703) 632-7572.

NMPDD uses three indexes in NDIS to enter DNA profiles that can be searched against one another:
– Unidentified human remains
– Missing persons
– Biological relatives of missing persons.

DNA

Nuclear DNA – Nuclear DNA is found in the nucleus of the cell. It is inherited from both the mother and the father. Nuclear DNA analysis targets an area of the nuclear DNA called STRs for entry into CODIS. Nuclear DNA can be found in samples from blood, semen, bones, cigarette butts, shirt collars, hats, weapons, bottles, envelopes, etc. CODIS allows for the entry of 13 core STR loci into indexes based on specimen categories.

Mitochondrial DNA – Mitochondrial DNA is found in the mitochondria of the cell and is inherited from the mother. It is extracted from biological items of evidence such as hair, bones, and teeth. Typically, these samples contain low concentrations of degraded DNA, often making them unsuitable for nuclear DNA examinations. CODIS allows for the entry of mtDNA only in missing persons-related indexes because multiple individuals can have the same mtDNA type, so unique identifications are not possible using just mtDNA.

The Future

Through the combination of increased federal funding and expanded database laws, such as the DNA Fingerprint Act of 2005, the number of profiles in NDIS has increased and will continue to increase dramatically, resulting in a need to re-architect the CODIS software. A considerable focus during this time will be to enhance kinship analysis software for use in the identification of missing persons. The next generation of CODIS will utilize STR and mtMDA information as well as metadata (such as sex, date of last sighting, age, etc.) to help in the identification of missing persons. The re-architecture will also enable CODIS to include additional DNA technologies such as a Y short tandem repeat (Y-STR) and miniature short tandem repeat (miniSTR).

The FBI Laboratory is committed to the support of the CODIS program. With the continued cooperation and collaboration of legislative bodies and all components of the criminal justice community — law enforcement, crime laboratories, victims, prosecutors, and the judiciary — the future of DNA, CODIS, and NDIS holds even greater promise to solve crimes and identify missing persons.

Several Indexes Categorize the Profiles Entered into CODIS

Convicted Offender
Contains profiles of individuals convicted of crimes.

Arrestee
Contains profiles of arrested persons (if state law permits the collection of arrestee samples).

Unidentified Human Remains
Contains DNA profiles developed from unidentified human remains.

Forensic
Contains DNA profiles developed from crime scene evidence, such as semen stains or blood.

Missing Persons
Contains DNA reference profiles from missing persons.

Biological Relatives of Missing Persons
Contains DNA profiles voluntarily contributed from relatives of missing persons.

Contacts

CODIS
(703) 632-8315

Nuclear DNA
DNA Analysis Unit I
(703) 632-8446

mtDNA
DNA Analysis Unit II
(703) 632-7572

Offender/Forensics Profiles & Total Offender Hits									
	2000	**2001**	**2002**	**2003**	**2004**	**2005**	**2006**	**2007**	**2008**
Offender Profiles	460,000	751,000	1,247,000	1,494,000	2,039,000	2,827,000	3,977,000	5,300,000	6,500,000
Forensics Profiles	22,000	28,000	46,000	71,000	94,000	126,000	161,000	200,000	250,000
Investigations Aided	1,500	3,600	6,700	11,000	21,000	30,500	43,000	62,000	81,000
Forsensics Hit	500	1,000	1,900	3,000	5,000	7,000	9,500	12,000	14,000
National Offender Hits	30	170	600	1,200	1,900	2,900	4,300	6,500	8,500
State Offender Hits	700	2,200	4,400	7,100	12,000	18,600	28,000	43,000	58,500
Total Offender Hits	**730**	**2,370**	**5,000**	**8,300**	**13,900**	**21,500**	**32,300**	**49,500**	**67,000**

Note: Figures are rounded