Advancing Justice Through DNA Technology

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DNA/CSI Quiz

True or false:

• DNA results take 8 minutes.
• DNA results can tell investigators what a suspect looks like.
• All CSIs are good looking and solve crimes wearing Armani.
• All CSIs drive Hummers, especially in Florida.
The Real Story

- BJS survey demonstrates that there are substantial delays in DNA analyses across the US.
- State labs have faced a dramatic increase in demand without increased capacity.
  - Lack up-to-date technology and automation
  - Need faster and more cost effective analysis methods
  - Need training to ensure the optimal use of DNA
- Turnaround time in US: 30 days at best, > 1 year in many states.
- Turnaround time in UK: 23 days (goal: 14 days).
Challenges to the Crime Solving Potential of DNA

- Crime labs are overwhelmed by backlogs.

Estimates:
- Convicted offender samples collected, untested
  - 200,000 - 300,000
- Convicted offender samples under review
  - >200,000
- Convicted offender samples “owed”
  - 500,000 - 1,000,000
- Forensic casework samples
  - >500,000 cases (including 52,000 homicide cases, 169,000 sexual assault cases, and 264,000 property crime cases)
- Most forensic samples needing testing are still in the hands of law enforcement agencies.
DNA Evidence in Warehouses
The President’s DNA Initiative:  
Advancing Justice Through DNA Technology

- Comprehensive national strategy to use DNA technology to solve crime and protect the innocent.
President’s DNA Initiative

• Commitment of $1 Billion over 5 Years to enhance the use of DNA Technology.

• Provides funding to states and localities to increase their capabilities and capacities.

• To maximize the application of DNA technology in solving crime, protecting the innocent and identifying missing persons.
Goals of the DNA Initiative

• Eliminate DNA sample backlogs within five years.
• Strengthen crime laboratory capacity at the Federal, State, and local levels.
• Train the criminal justice community.
• Provide access to post-conviction DNA testing to protect the innocent.
• Stimulate further research and development.
• Use DNA to identify missing persons.
The DNA Vision

- Build our Nation’s capacity to use DNA as a routine law enforcement investigative tool
  - allow police to focus resources on the guilty early on in the investigation
  - exonerate the innocent before charges are filed
- Eliminate backlogs and provide State grants for post-conviction testing.
- Identify the missing and provide closure.
- Ensure a Federal “exit strategy.”
- Continue to encourage future developments.
Realizing the Full Potential of DNA

- Large DNA databases solve more crimes (Virginia would miss 80% of its “hits” if its database only included violent offenders).
- Great Britain routinely uses DNA to solve burglaries and car thefts.
- A recent $111,000 DNA grant for investigator and forensic analyst overtime solved nine rapes and 22 homicides in Kansas City.
- Quality assurance, professional standards, training and education, public awareness are critical factors.
How is DNA used to solve crimes?

**Identified suspect:**
Suspect’s DNA is compared to DNA from crime scene sample.

**No identified suspect:**
Crime scene DNA is compared to offender profiles in DNA databases.
DNA can Eliminate and Match
How is DNA used to Identify the Missing?

**Unidentified remains:**
Can be compared to known family members through nuclear DNA (unique) or mitochondrial DNA (passed through maternal lines).

**Family reference samples:** Can be compared to DNA profiles from unidentified remains included in Missing Persons DNA database.
National DNA Database System
CODIS (Combined DNA Index System)

DNA Indexes:
- Forensic casework
- Convicted offender
- Missing persons
  - Unidentified Remains
  - Missing Person
  - Relatives of Missing Person

\[ \leftarrow \text{NDIS} \text{ (National DNA Index System)} \]
\[ \leftarrow \text{SDIS} \text{ (State DNA Index System)} \]
\[ \leftarrow \text{LDIS} \text{ (Local DNA Index System)} \]
Case Study: DNA Databases

Matching crimes to prior offenders

• In 1990, in Goldsboro, North Carolina, the “Night Stalker” breaks into homes, rapes three elderly women, murdering two of them and one husband. No suspect. DNA entered into database.

• More than 10 years later, the database makes a “cold hit” to offender profile (entered into the database for a conviction on shooting into an occupied dwelling).
Case Study: DNA Databases

Matching evidence from **other crimes**

- In Philadelphia, DNA samples linked numerous center city rapes and the rape/strangulation of a Wharton graduate student.
- The cases received substantial public attention, an artist’s sketch was publicized, and the attacks in Philadelphia stopped.
- More than a year later, the National DNA database linked the Philadelphia cases to a series of rapes in Fort Collins, Colorado.
- Armed with this investigative information, police were able to focus on a suspect. DNA evidence confirmed his identity. He plead guilty to all crimes.
Solving Cold Cases with DNA

• Search, evaluate, select and conduct DNA analysis on violent crime “cold cases” (i.e., old, unsolved cases) that have the potential to be solved through DNA testing.

• Take advantage of scientific advances that improve the ability to use DNA from biological evidence that is old, of poor quality, or limited in quantity.

• Maximize the crime solving potential of expanded and searchable convicted offender databases (now over 2.8M profiles)
Case Study: Protecting the Innocent

- Post-conviction DNA testing has exonerated a number of individuals convicted of crimes using evidence and technology not previously available at the time of the trial.
  - In 2002, a Maryland man was released from prison after serving 20 years of a 30-year sentence for the home invasion rape of a schoolteacher.
  - Maryland authorities entered the DNA profile from the crime scene into the National DNA Database and it was linked to the DNA profile of a convicted felon.
  - The DNA match led authorities to arrest the identified individual for the 1982 crime.
Case Study: Identifying the Missing

- DNA testing enables the identification of the remains of missing persons when other defining characteristics have been destroyed.

- The FBI’s Missing Persons DNA Database has the potential to identify recovered remains by matching DNA samples from the family of missing persons to those from unidentified bodies.

- Improved nuclear and mitochondrial DNA analysis methods were developed with Office of Justice Programs funding to identify World Trade Center victims.

- Use of mitochondrial DNA analysis to identify Romanovs
DNA Testing of Unidentified Remains

• University of North Texas Health Science Center (UNTHSC)

• The objectives of this project are to identify and collect unidentified human remains and reference samples from families with missing loved ones.

• Develop STR and mtDNA profiles from a minimum of 850 samples for entry into CODIS

• The profiles will be generated from DNA obtained from 150 unidentified remains and 700 family reference samples.
Legislation to Increase the Use of DNA Analysis

• The President’s DNA Initiative endorses legislative action that maximizes the use of DNA technology:
  – Encourages States to pass legislation expanding DNA collections to include all convicted offenders.
  – Encourages States to make offender collection statutes fully retroactive to offenders who are in custody or under parole supervision.
  – Supports Federal legislation to allow States to enter “all lawfully collected” DNA profiles into the national database, including collected juvenile and arrestee profiles.
DNA’s Scientific Future

Current Research and Development

• “DNA Chip Technology”
• Technologies that enable the analysis of degraded, old, or compromised items of biological evidence
• Physical characteristic identification
• The use of animal, plant, and microbial DNA
• Technologies that facilitate the separation of male DNA from victim’s DNA in sexual assault cases
Presidential DNA Initiative

Advancing Justice Through DNA Technology

The President's DNA Initiative provides funding, training, and assistance to ensure that forensic DNA reaches its full potential to solve crimes, protect the innocent, and identify missing persons.

Highlights

- DNA Initiative Awards made by NIJ in Fiscal Year 2005
- Visit our new section on the History of Forensic DNA!
- DNA identifies slaying suspect

MONTGOMERY, AL - A man was found guilty of murder in Montgomery's first capital murder trial to go to trial in 2005.

Case Studies

- Case Studies of Preventable Crimes
- DNA Captures "Night Stalker"
- Convicted by Juris, Exonerated by Science

Services for Laboratories

- DNA Laboratory Audits
- Grant Program Assessments
- Sample Analysis
- Accreditation Assistance
- Quality Documents

About Forensic DNA

- Basic Biology of DNA
- History of Forensic DNA
- Evidence Collection and Analysis
- About the Backlog
- Glossary

News Briefs

DNA Identifies Slaying Suspect

Montgomery Advertiser
January 26, 2005

Frank: Cold Case Murders Still Solvable

Wahoo Newspaper (Papillon, NE)
January 5, 2006

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Questions?