

# Forensic DNA: Genetics & Justice

Lecture 13



## Quick Review

### Basic Technology

- DNA Profile
  - 1985 accidental discovery
  - STRs and multiple loci
- Two Types of Information
  - Identity
  - Kinship

### Applications

- Paternity
- ID for mass casualty
- Reuniting families
- Animals, Wines, Collectables...
- Criminal Justice

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## Genetics & Justice

- Proportionality
- CSI Effect
- CODIS
- DNA Dragnets

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## Surreptitious Sampling

- Investigators collect DNA information about a suspect without a warrant by retrieving abandoned items that may have DNA from the suspect; e.g., cigarette butts, coffee cup, envelope, tissues, napkins, etc.
- How do you feel about this collection of DNA evidence? Why?

*NYTimes*, April 3, 2008: Lawyers Fight DNA Samples Gained on Sly

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## Fourth Amendment

Guards against unreasonable search and seizures especially when there is a reasonable expectation of privacy; requires search and arrest warrants be judicially sanctioned, supported by probable cause and be limited in scope according to specific information supplied by a person (law enforcement officer) who has sworn by it and is therefore accountable to the issuing court:

***“The right of the people to be secure in their persons, houses, papers, and effects, against unreasonable searches and seizures, shall not be violated, and no Warrants shall issue, but upon probable cause, supported by Oath or affirmation, and particularly describing the place to be searched, and the persons or things to be seized.”***

## Proportionality

The state has a duty to protect privacy and other human rights, and it has a duty to protect citizens from criminal harm.

### Principle of Proportionality (Justice):

- Any interference with legally enforceable rights (esp. 4<sup>th</sup> amendment rights) must be justified as being *proportionate* to the need to detect and prosecute offenders effectively;
- In other words, a balance of risks/benefits of state duties with the presumption that citizens' rights have priority unless evidence that interference is needed and will be effective.

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## Genetics & Justice

- Proportionality
- CSI Effect
- CODIS
- DNA Dragnets

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## DNA in Courtroom

- The use of DNA profiling was used within a month of its discovery (1985) to influence legal decisions (UK immigration case)
- Within a year DNA profiling was accepted in court cases and establishing legal rulings in UK and USA. By 1990, FBI established *CODIS*.
- DNA evidence used for investigations, prosecutions, exonerations

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## The “CSI Effect”

- Influence of shows like CSI on popular expectations for forensic science
  - “Unrealistic” expectations for forensic DNA in court
  - Also, increased enrollment in forensic science programs
- Raised awareness of forensic use of DNA



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## Three Myths of “CSI Effect”

### Unrealistic expectations and overvaluation of DNA evidence?

1. **DNA evidence is always available:** False
  - only 10%-20% of cases
  - problem of lost, degraded, or destroyed DNA evidence.
2. **DNA is always right:** False (and True)
  - accurate yes, but some caveats...
  - limited inference to guilt: what does DNA evidence tell us?
3. **DNA is fast and easy:** False
  - time to process is long
  - Forensic labs underfunded, overloaded, backlogged
  - *NYTimes*, Feb. 19, 2009: NAS Study Calls for Oversight of Forensic Crime Labs.

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## Influence of “CSI Effect”

- Notions of guilt and innocence may be influenced:
  - “DNA doesn’t lie”
- Types of prosecutions and other legal action possible given the expectation of DNA evidence.
  - Prosecutions will favor only cases with DNA evidence
  - Less than 20%\* of cases have or require DNA evidence
- Criminals become aware of Forensic practice.
  - More difficult to detect and prosecute
- DNA evidence always is viewed as good
  - Challenge of proportionality
  - Challenges of DNA database and dragnets

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## Genetics & Justice

- Proportionality
- CSI Effect
- DNA Databases (*CODIS*)
- DNA Dragnets

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- FBI Laboratory's **C**ombined **D**NA **I**ndex **S**ystem
  - Piloted in 1990, DNA Identification Act of 1994 established National DNA Index System (NDIS)
- Number of Profiles
  - By 2002 contained over 1 million DNA profiles. By 2007 (Oct.) contains over 5.2 million DNA profiles
- Contains several indexes:
  - Integrates National, State, and Local Indexes
  - Convicted Offender, Forensic, Arrestees (if state law permits), Missing Persons, Unidentified Human Remains

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- **DNA Evidence Backlog**
    - Homicide/Rape: >221,000
    - Property: >264,000
    - Unanalyzed DNA cases: >264,000
    - Cases still at local: >542,700
- } **>1.29 Million**
- **1997-2000 DNA labs 73% increase in casework and 135% increase in case backlogs.**
  - *NYTimes*, Feb. 19, 2009: NAS Study Calls for Oversight of Forensic Crime Labs.

<http://www.dna.gov/>

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- **What information?**
  - Collects profiles consisting of 13 STR loci (12 plus sex)
  - Profiles do not contain information about physical features, ancestry, health, etc.; meant as a unique identifier (and kinship).
  - Electronic record for most indexes
  - Some retain biologics: Forensic, missing person, etc.
- **Who is in CODIS?**
  - Originally only convicted felons of violent crimes and sex offenders\*
  - Expansions:
    - Conviction for non-violent crimes (property, embezzlement), misdemeanors, etc.
    - Arrestees for a variety of violations
    - Detainees for a variety of violations, including immigration violations

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## Expansions

- **1990s** - reserved for people convicted of serious and violent felonies, and sex offenses.
- **2004** - "Justice for All Act" expand to include "federally qualifying offenses" which included violent and property crimes.
- **Since 2003** - 18 states amended statutes to include all or part: "all felons, all criminals, misdemeanants, prostitutes, terrorists, those serving community service, immigration violators and arrestees." (42 U.S.C. sec. 14135(a) (2006))
  - Arrestees: TX, LA, VA, CA, NM, KS (also... IL, NC, NJ, NY, PA)
- **2006** - "Violence Against Woman Act" amended to require Feds to collect DNA samples from persons arrested or non-US persons detained under federal authority
  - Fed arrest/year: ~250,000
  - Detained for immigration violations: ~1.3 Million

Jenny Rushlow, Rapid DNA Expansion and Disparate Minority Impact. Gene-Watch.org, 2007

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## Are these expansions a good idea?

- **Who?**
  - Should only convicted criminals or those detained or arrested have their DNA profiled?
  - Should non-violent, non-felony crimes be included?
  - Should visitors and immigrants be profiled?

Discussion

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## Are these expansions a good idea?

- **Risks?**
  - **Stigmatizing:** Inclusion in CODIS is stigmatizing, and will expose individuals to unnecessary investigations because of CODIS search
  - **Genetic Exceptionalism:** genetic information contains more than personal identity (not merely a fingerprint), but also sensitive information.
  - **Function Creep:** original purposes for database may change, posing other risks or abuses

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## Are these expansions a good idea?

- **Justice?**
  - **Unfair system:** Assumes a fair justice system... but it is not fair; e.g., unequal racial representation in database.
  - **Proportionality:** the balance of the need for servicing criminal justice and protecting individual rights (e.g., privacy, 14<sup>th</sup> amendment, etc.)
- Should we just have a national or universal DNA database? (equal distribution of risk)

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## Genetics & Justice

- Proportionality
- CSI Effect
- DNA Databases (CODIS)
- DNA Dragnets

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## What should be included?

- Indicators for physical traits?
  - Eye color, hair color, skin color, etc.
- Indicators for ancestry (race)?
  - African, European, Asian, etc.
- What uses: DNA Dragnets?

Discussion

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## DNA Dragnet 1986 Pitchfork Case (UK)

- Two schoolgirls raped and murdered near Narborough, England. (1983 and 1986)
- Prime suspect confessed to 1986 murder
  - But his DNA profile did not match semen recovered from either victim.
- DNA profile launched the worlds 1st DNA-based manhunt
  - Police requested DNA sample from all males in the local community .
- Resulted in successful arrest of Colin Pitchfork (now serving life for both murders)
  - Pitchfork tried to pass another's blood sample as his own.

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## DNA Dragnet, 2002-03

Melba Newsome, The Inconvenient Science of Racial DNA Profiling, *Wired* October 5, 2007.

- **July 2002:** body of Pam Kinamore found in Louisiana on banks of Mississippi river. First of several deaths from a serial killer.
  - FBI profile and eye witness pointed to a "young white man who drove a white pick-up truck."
- **December 2002:** After fourth death, Louisiana State Police set up a DNA dragnet, collecting DNA samples from 1200 white men associated with FBI profile...
- **March 2003:** contacted Tony Frudakis (*DNAPrint*) who looked at 176 loci and told police: "Your guy has substantial African ancestry. He could be Afro-Caribbean or African American but there is no chance that this is a Caucasian. No chance at all."
  - 85% Sub-Saharan African and 15% native American
- **May 2003:** Lead to capture of Derrick Todd Lee, a 34 year-old black man with criminal record. DNA connected him to seven murder/rapes in Louisiana, possibly more.

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## Proportionality in Louisiana Case

Melba Newsome, The Inconvenient Science of Racial DNA Profiling, *Wired* October 5, 2007.

- DNA success story?
- 4th amendment violations?
  - DNA dragnet: some resistance to collecting DNA samples... 4th amendment violations?
- Racial DNA profiling?
  - CODIS profiles don't include "racial" markers, but Frudakis included 176 loci meant to capture ancestry and other physical characteristics.

Discussion

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## Some Resources

- CSI Effect
  - Wiki article: [http://en.wikipedia.org/wiki/CSI\\_Effect](http://en.wikipedia.org/wiki/CSI_Effect) (with many links to news articles)
  - "CSI Effect" Is Mixed Blessing for Real Crime Labs. By Stefan Lovgren. National Geographic News. September 23, 2004. [http://news.nationalgeographic.com/news/2004/09/0923\\_040923\\_csi.html](http://news.nationalgeographic.com/news/2004/09/0923_040923_csi.html)
  - CSI shows give 'unrealistic view'. By Paul Rincon. BBC News. 21 February, 2005. <http://news.bbc.co.uk/1/hi/sci/tech/4284335.stm>
- Thomas Jefferson and Sally Hemings: A Brief Account. From Montecello.org. [http://www.monticello.org/plantation/hemingscontro/hemings-jefferson\\_contro.html](http://www.monticello.org/plantation/hemingscontro/hemings-jefferson_contro.html)