The Role of DNA in a Sexual Assault Investigation

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Learning Objectives

- Establish a shared understanding of the role of DNA evidence in a sexual assault investigation, including what can and cannot be accomplished at each stage.
- Dispel common misunderstandings about the nature of DNA evidence, the process of crime lab analysis, and comparisons (or “hits”) within the federal DNA database (CODIS).
- Properly assess all aspects of evidence that might be found in a sexual assault.
- Improve communication with criminalists by determining which evidence should be evaluated and in what order, based on the information obtained from the victim and the investigation.

EVAWI Resources on DNA

- Training Bulletins (5-part series)
  - Unpacking Common Assumptions
  - Case Example: Connecting a Series
  - A Little Bit of History
  - Alternative Sources and Potential Purposes
  - Policy Responses, Assessment, and Recommendations (Part I and II)

  www.evawintl.org/ArchivedBulletins

EVAWI Resources on DNA

- Training Bulletin
  - Should we “Test Anonymous Kits?”
  - www.evawintl.org/ArchivedBulletins

- OnLine Training Institute Module
  - Laboratory Analysis of Biological Evidence and the Role of DNA in Sexual Assault Investigations
  - Coming soon!

Underlying Assumptions

1. The sole purpose of a Sexual Assault Medical Forensic Exam (SAFE) is to collect DNA evidence.
2. The process of investigating a sexual assault proceeds directly from the SAFE exam to the identification of a DNA profile, to the courtroom trial (i.e., “from kit to court”).
3. DNA evidence answers “yes or no” to the question of whether a suspect committed a sexual assault against a particular victim.
4. There is no need for Investigators to communicate directly with the Crime Laboratory. Just send the kit and test everything.

Carrie’s Experience

- Carrie was sexually assaulted in high school, by a family friend of her father’s
  - She immediately reported the rape to police
  - He had been arrested before for similar crimes
  - “Not enough evidence” to prosecute
  - “Maybe if we get this guy coming in again for rape, we can move forward…”
  - The evidence in her case was never tested
  - Yet the failure was far bigger than this
Carrie’s Experience

“The police had not interviewed the suspect, not interviewed other potential witnesses, nor considered the hospital examiner’s report, which indicated ‘vaginal swelling and tearing consistent with forced penetration.’ As far as Carrie knows, her rape kit continues to sit in police storage, untested” (Human Rights Watch, 2010, p. 5).

Not Just DNA Evidence

- DNA not the only evidence collected in a SAFE
- Often not the most important evidence, for advancing a SA case through criminal justice system
- Increased focus on all forensic evidence collected from both victim and suspect
- We avoid term “rape kit”
  - First, it’s not just rape (e.g., penile vaginal contact)
  - Second, it’s not just a kit (also other evidence)

Other Types of Evidence

Stranger vs. Non-Stranger

Unknown Suspect (Stranger)

- Begins as identification case
- DNA (and other forensic evidence) is critical
  - To identify suspect
  - To establish sexual acts
- Will likely switch to consent defense at some point during investigation or prosecution

Non-Stranger (Known Suspect)

- Suspect does not typically deny sexual acts, but will argue that victim consented
- Evidence needed to overcome consent defense
  - Corroborate element of force, threat, or fear
  - Or establish that victim was unable to consent
  - Cannot typically accomplish these purposes with DNA evidence

Overcoming Consent Defense
Not from “Kit to Court”

Not a “Yes or No” Answer

- DNA cannot answer: “Did this suspect sexually assault this victim?”
- Requests for laboratory work should typically only be determined after a thorough investigation
- Improved communication between the investigator and the criminalist is critical

Julie’s Experience

- Julie was sexually assaulted by friend of friend
  - Going through the exam was difficult for her
  - Evidence from the exam was not analyzed
  - Case was not prosecuted
  - She recognizes it may not have gone to court, even if the evidence from the exam was analyzed
  - But believes it would have provided answers

Julie’s Experience

“I feel like even though my case may not have gone to court regardless if my kit were tested or not, I feel like I would have had somewhat of a closure, I feel like I would have had answers, maybe not answers that I liked, but I would have answers. If the rape kit was tested, I feel like I, in some part, would have internal justice. It would have, I wouldn’t be wondering why. It’s hard and it’s difficult to think that you could potentially be setting someone free to do it to someone else, and the reason not testing a kit” (Human Rights Watch, 2010, p. 4).

Two Sources of DNA Evidence in CODIS

1. Forensic Evidence

DNA profile can be developed from forensic evidence collected from:
- Body/clothing of victim
- Body/clothing of suspect
- Multiple Crime Scenes
1. Forensic Evidence

- May be sent to crime lab for analysis, depending on case facts and investigative strategy
- May develop DNA profile for suspect
- May submit DNA profile to CODIS
  - In section of CODIS called Forensic Database
  - Known as Forensic DNA Profile or Forensic Unknown, because developed from evidence
  - Does not necessarily mean suspect is unknown

2. Reference Standards

- Sample can be collected directly from suspect
  - By drawing blood
  - Or using a buccal swab
- May be used to develop a DNA profile of suspect
- This type of profile called a reference standard
  - May be submitted to CODIS during investigation
  - Until recently, only with certain convictions
  - Convicted Offender Database within CODIS

Many states have passed laws authorizing submission of DNA reference standards at the point of arrest (for certain offenses)
- Into the Arrestee Database within CODIS

Information on CODIS is available from the website for the FBI, at http://www.fbi.gov/bq/lab/html/codisbrochure_text.htm

CODIS Database

National DNA Database
NDIS: The National DNA Index System is a system of DNA profile records input by criminal justice agencies (including state and local law enforcement agencies). CODIS: The Combined DNA Index System is the automated DNA information processing and telecommunication system that supports NDIS. In other words, "a software platform that blends forensic science and computer technology" (NIJ Report, 2010, p. 2)

Sources:
DNA Initiative (http://www.dna.gov/dna-databases/levels)

CODIS Database

Types of Profiles in a DNA Database

<table>
<thead>
<tr>
<th>REFERENCE STANDARDS</th>
<th>FORENSIC EVIDENCE</th>
<th>DNA: REFERENCE STANDARDS AND FORENSIC EVIDENCE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Convicted Offenders</td>
<td>May be submitted to CODIS.</td>
<td>Reference standards from people convicted of certain crimes.</td>
</tr>
<tr>
<td>Arrestees</td>
<td>May be submitted to CODIS.</td>
<td>Reference standards from people arrested for crimes.</td>
</tr>
<tr>
<td>Suspects</td>
<td>May be submitted to CODIS.</td>
<td>Reference standards from suspects in criminal cases.</td>
</tr>
<tr>
<td>Unknowns</td>
<td>May be submitted to CODIS.</td>
<td>Reference standards from unidentified human remains.</td>
</tr>
</tbody>
</table>

Source: DNA Initiative (http://www.dna.gov/dna-databases/levels)
1. Establish Sexual Act / Contact
   - Biological evidence can confirm that a sexual act took place, establishing element of offense
     - E.g., suspect's semen found in victim's vagina
     - Or victim's epithelial cells underneath suspect's fingernails
   - Crucial when suspect denies sexual act
   - Also corroborates sexual activity

2. Identify the Suspect
   - Identify person who committed a sexual act
     - Particularly important when suspect is unknown
   - Collect forensic evidence from victim / suspect / scene
     - Send to crime lab, develop DNA profile
     - Submit unknown profile to CODIS for match
     - This is a Forensic DNA Profile or Forensic Unknown (not a Reference Standard)
Obtaining Buccal Swabs

2. Identify the Suspect

- Identify the Suspect
  - CODIS search for matches with any DNA profiles developed from reference standards (taken from known individuals)
    - Convicted Offender Database
    - Arrestee Database
  - If no match, forensic DNA profile remains in CODIS waiting for a potential future match
    - If later identified, investigator will be notified

- If match is found, suspect’s identity established
  - Often referred to as a “hit”
  - Investigation can proceed
  - Can potentially yield prosecution (if there is sufficient evidence, victim is participating, etc).

- CODIS match could identify source of DNA as someone not currently viewed as a suspect
  - Can identify one suspect, and exonerate another

3. Identify Prior Offenses

- If “hit” within Convicted Offender Database, identifies suspect convicted for prior crime(s)
  - Or identifies prior arrest(s) in states submitting DNA profiles to Arrestee Database

- Used in prosecution for prior bad acts
  - Usually only if sexual assault or other similar crime
4. Linking Cases

- Identify matches with forensic DNA profile in past or future cases, to link cases together

**Linking Cases: Strangers**

**Unknown Suspect (Stranger)**

- Suspect identity may remain unknown, with cases simply linked together with a forensic DNA profile
- Or the link may help identify the suspect, and assist in the investigation and prosecution of the case(s)

**Linking Cases: Non-Strangers**

**Known Suspect**

- Suspect identity in a prior case may have been known, but case was not prosecuted for other reasons
- May introduce evidence or victim testimony from a prior case when prosecuting the current one
- Could be prosecuted jointly, depending on facts, laws

**Need for Forensic DNA Profiles**

Just as important to submit forensic DNA profile for known suspects as unknown ones

- Identify unknown suspects
- Link cases together, using forensic DNA profiles
- Prosecute current case, linked with any prior cases using federal evidence law 404 (b)
- Solve past cases, with unknown identity
- Solve or prosecute any future crimes

**Excluding Consensual Partners**

- Highlights importance of thorough investigation and medical forensic exam
- Consensual partners should be excluded before submitting forensic DNA profiles into CODIS
  - Could upload the consensual partner’s DNA profile, rather than the person who committed the SA
  - Could mislead into thinking suspect not in CODIS
  - Could result in a “hit” from prior offense, which is not what victim expects and compounds trauma
Best Practice Implications

- Investigators routinely submit evidence from victims / crime scenes in every SA case
  - To identify forensic DNA profiles for CODIS
  - Even when they know who the suspect is
- Many agencies do not have resources (yet)
  - Often submit only with unknown suspect
  - This is changing as DNA testing becomes less expensive and faster, and more resources available

Best Practice Implications

- Would reveal more cases linked together
  - Challenge perception of who serial offenders really are
  - Non-stranger suspects re-offend, cross boundaries
- Help investigation and prosecution, increase our understanding of sexual offending

Improving Communication

- Law enforcement investigators and prosecutors across the country begged to have evidence analyzed for decades
- Backlog Headlines – “How do we keep this from happening again”
  - “National Disgrace”
  - Shame and blame

Improving Communication

- DNA backlog is not law enforcement’s dirty little secret
- DNA revolution has allowed law enforcement, legislators and advocates to push for DNA funding and testing
- Property room supervisors and investigators knew that mountains of evidence had been stored but didn’t have access to crime laboratories

Just because we’ve been to the moon, it doesn’t mean that you or I will ever get to go.

This is how it felt for many, if not most investigators, when it came to DNA.
Improving Communication
- DNA used to be reserved for trial
- Homicide had crime lab and prosecution priority
- **Now Everyone wants DNA**
  - Burglary
  - Hit and Run
  - Robbery
  - CSI Effect
    - Even if DNA isn't needed, juries expect it

Why aren’t we celebrating our successes?
- Many of us have waited our entire careers to be where we are today. We couldn't have arrived any other way.

Improving Communication
- National discussion has only been on forensic evidence kits
- Based on the history of the sexual assault, the kit is often the last place we should be looking
  - Kits are less expensive and easier to test
  - The bench work needed for crime scene evidence is time consuming and therefore, expensive

Improving Communication
- Very few jurisdictions conduct suspect exams
- Suspect examinations should be conducted by trained forensic examiners
- Standard evidence collection kits should be used
- Suspects are often the better source of probative evidence depending on the assault history
  - Digital penetration
  - Oral copulation

What about all the other crime scene evidence?

Crime Scene Evidence
Crime Scene Evidence

Background on DNA Testing
- DNA contained in cells
- Body fluids rich in cells (e.g. semen, blood, saliva, vaginal secretions, sweat, etc.)
- DNA testing is so sensitive now that DNA profiles can be obtained from surfaces with minimal contact
  - e.g. DNA from demand note at bank robbery

Sensitivity of DNA Analysis
- Small quantities of DNA routinely analyzed
  - Single hairs, cigarette butts, and as few as fifty to one hundred sperm
- PCR is 50 to 100 times more sensitive than RFLP testing
- Works well with degraded DNA
  - Buried human remains, fire victims and crash victims
- Touch DNA

Comparison of DNA Typing Success Rates from Touch DNA Evidence

<table>
<thead>
<tr>
<th>Evidence</th>
<th>Number of samples</th>
<th>% Mixtures</th>
<th># Interpretable</th>
<th>% Success</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gear Shifter</td>
<td>13</td>
<td>76.9%</td>
<td>4</td>
<td>30.7%</td>
</tr>
<tr>
<td>Steering Wheel</td>
<td>29</td>
<td>73.5%</td>
<td>7</td>
<td>24.1%</td>
</tr>
<tr>
<td>Car - Other</td>
<td>26</td>
<td>88.8%</td>
<td>5</td>
<td>19.2%</td>
</tr>
<tr>
<td>Rocks</td>
<td>55</td>
<td>88.8%</td>
<td>14</td>
<td>25.4%</td>
</tr>
<tr>
<td>Tool - Crowbar</td>
<td>9</td>
<td>88.8%</td>
<td>5</td>
<td>55.5%</td>
</tr>
<tr>
<td>Tool - Screwdriver</td>
<td>21</td>
<td>76.2%</td>
<td>13</td>
<td>47.6%</td>
</tr>
<tr>
<td>Tool - Wrench</td>
<td>4</td>
<td>100%</td>
<td>1</td>
<td>25.0%</td>
</tr>
<tr>
<td>Tool - Other</td>
<td>36</td>
<td>55.5%</td>
<td>10</td>
<td>27.5%</td>
</tr>
</tbody>
</table>

Analyzing Sexual Assault Evidence
- Laboratory will extract DNA from each sample and separate sperm cells from non-sperm cells
  - Sperm fraction:
    - Contains mostly sperm cells
  - Non-sperm fraction:
    - Contains all other cells
- Develop DNA profiles when possible

Analyzing Sexual Assault Evidence
- Most common, PCR DNA test in use is called the 13 CODIS core loci
- This testing includes sex discrimination
- Accepted in Scientific and legal communities
Examples

- Victim DNA on penile/scrotal swabs
  - From victim saliva during forced oral copulation of suspect by victim
  - From victim vaginal secretions during penile-vaginal penetration with no ejaculation, azospermic / vasectomized males
  - From victim blood during rape with injury

Examples

- Victim DNA on suspect fingers swabs, fingernail swabs/scrapings
  - Digital penetration of victim
  - Victim injures suspect during assault
    - Bite marks
    - Scratches

Examples – Multiple Suspect Assaults

- V held down by S1 while S2 raped V w/o condom
- After S2 finished, S1 forcibly orally copulated V, then raped her
- S1 apprehended, kit collected
- V DNA detected on non-sperm fraction of S1 penile swab
- S2 DNA detected on sperm fraction of S1 oral swab
- Mixture of S1 & S2 DNA detected on sperm fraction of S1 penile swab

What Evidence Should Be Submitted??

- Scenario: V raped by acquaintance, reports 3 days post-assault after showering multiple times
- Available evidence:
  - Evidence kit collected from V
  - Reference sample from V
  - Unwashed clothing worn by V post-assault
  - Evidence kit collected from S
  - Reference sample from S

What Evidence Should Be Submitted??

- Suspect (S) breaks into a residence through the front window. Victim (V) wakes up to the noise and S sees V. S pulls out a gun. V attempts to take the gun by grabbing the slide of the gun, but S pushes her off. S demands that V takes off her clothes. S rapes V (penile-vaginal) and forces V to orally copulate S. V states that S wore a condom and ejaculated in the condom. S then flees the apartment and V calls police. A witness reported seeing the suspect breaking in with a flashlight in his mouth.
- Evidence collected:
  - Evidence kit from V
  - Condom from trash can with creamy white liquid on exterior
  - Flashlight found inside apartment by broken front window
  - Handgun and black beanie found in the dumpster outside of V’s apartment complex

Considerations

- V SART kit available? S on kit is probative
- S SART kit available? V on kit is probative
- Do not discount the value of “handler DNA” and “touch DNA”
  - Slide of the handgun for V DNA
  - Grip of the handgun & grip of the flashlight for S DNA
  - Middle of flashlight for potential S DNA
  - Headband area of beanie for S DNA
TYPES OF ACTIVITIES BY SUSPECT
- Vaginal, anal, oral penetration
- Ejaculation, salvia, body fluids
- Physical violence
- Alleged acts
- Time frame and *what was said*

Improving Communication
- Transparency – When police departments “clean up” their backlogs with a “shotgun” approach, are victims being told that the lab was unable to find any evidence or simply that the evidence kit was negative?

Improving Communication
- DNA funding has typically only addressed crime lab capacity
- The “kit to court” mentality leads people to think that no further investigation is needed

Improving Communication
- # suspects & scenario (including any transfer of biological fluids)?
- Where was the evidence collected from?
- Who else may have had contact with the evidence?
- What environmental conditions was the evidence exposed to (e.g. sitting in sun for months)?
- Has the evidence been washed/cleaned since the alleged incident?
- Were there any references collected?

Improving Communication
- When was the V’s last consensual contact?
- Consensual partner reference collected?
- How much time elapsed between the alleged incident and the SART exam?
- Did the V shower?
- (If female) - Was the V menstruating?
- Was any clothing collected? Has it been washed since the alleged incident?
Future Directions

- Continued DNA Funding
- Evidence Based Research guiding practices, procedures and protocols
- Improved Equipment/Automation/Robotics
- Improved Police Evidence Tracking Systems
- Post Conviction DNA Testing
- Cold Case Units
- Studies Looking at Victim Centered Notifications
- Increased or Eliminated Statutes of Limitations
- Suspect examinations performed by SAFE’s should be standard

Future Directions

- Forensic Scientists and investigators must communicate
- Screening and DNA analysis should not begin without
  - evaluating the impact DNA evidence would have on the case, i.e., consent or identification issues
  - reviewing all reports
  - a detailed history of the assault
  - appropriate reference samples from victim, suspect and consensual partners

Future Directions

- We all want to live in a safer world
  - Today, 32 countries (30% of world’s population) have passed laws creating DNA databases
  - Including an estimated 25 million offender samples
  - By 2015, estimated that countries representing 60% of world’s population will pass such laws
  - Potentially including 100 million DNA samples

Future Directions

- In the U.S., hit rates estimated to increase from 10% to 70%, with samples from all arrestees
  - U.K. currently has a 60% hit rate
  - With 5,000 stranger rapes with no evidence except DNA, 3,000 cases can be solved
  - Benefit of mature DNA offender databases
  - CODIS has already produced over 127,100 hits, assisting in more than 123,900 investigations

Future Directions

- Benefits beyond solving crimes
  - Prevent future crimes, identifying offenders early
  - Solve crimes while spending less money
  - Exonerate those who are innocent yet charged

Future Directions

- Evaluate all evidence not just the kit
- Submit appropriate evidence to crime laboratories
- Timely DNA analysis

Future Directions
Conclusion

• Victims and their loved ones strive for validation and closure as well as a sense of understanding and justice
• Many investigators and criminalists have dedicated their lives to achieving this goal as well as holding offenders accountable for their crimes.

San Diego Police Department Sex Crimes Unit