Sexual Assault Evidence Collection and Processing

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Overview

- Evidence collection from sexual assaults
- Suspect exams
- Evidence processing at BCA laboratories
- DNA results from sexual assault evidence

Sexual Assault Evidence Collection

Toxicology Blood and Urine Kits

COLLECT THESE SAMPLES BEFORE THE SEX ASSAULT EXAM

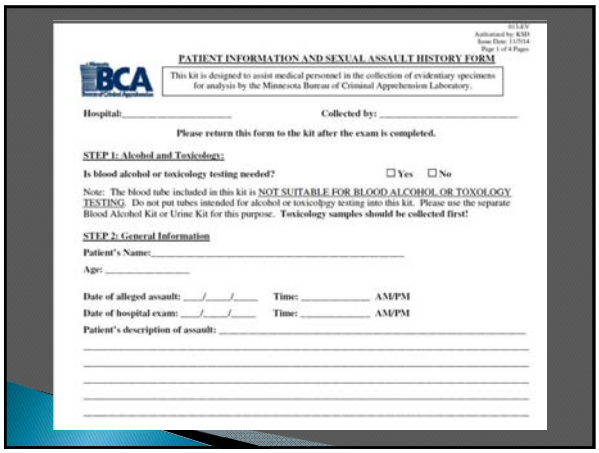
- Obtain urine and blood in **each** case with the respective kits
  - Patient should not wipe after urination!
- First urine post assault is best
  - Blood and urine samples need to be refrigerated

Sexual Assault Evidence Collection Kit

- Typically most probative item of evidence (shows intimate contact).
- Detailed instructions are provided in kit.
- Contains swabs, envelopes, blood tube, evidence tape, info sheet

BCA Sexual Assault Information Sheet

- Designed by forensic scientists to optimize and standardize collection techniques across the state
- Often the only information about the assault we have
  - Details reported by the patient and recorded in the narrative can help solve a case
  - Probative nature of items of evidence
  - Can include copy of exam paperwork with narrative, instead of re-writing narrative on BCA form; **however**, please fill out the rest of BCA form.
- What is recorded on the information sheet determines which tests will be performed on the samples.



BCA

PATIENT INFORMATION AND SEXUAL ASSAULT HISTORY FORM

This kit is designed to assist medical personnel in the collection of evidentiary specimens for analysis by the Minnesota Bureau of Criminal Apprehension Laboratory.

Hospital:_____ Collected by: _____

Please return this form to the kit after the exam is completed.

STEP 1: Alcohol and Toxicology:

Is blood alcohol or toxicology testing needed? ☐ Yes ☐ No

Note: The blood tube included in this kit is NOT SUITABLE FOR BLOOD ALCOHOL OR TOXOLOGY TESTING. Do not put tubes intended for alcohol or toxicology testing into this kit. Please use the separate Blood Alcohol Kit or Urine Kit for this purpose. **Toxicology samples should be collected first!**

STEP 2: General Information

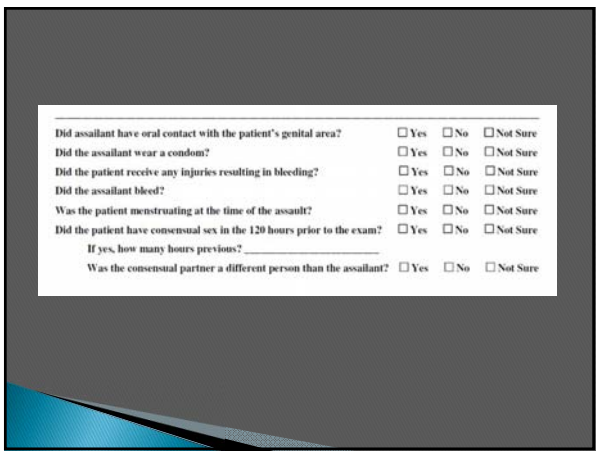
Patient's Name:_____

Age: _____

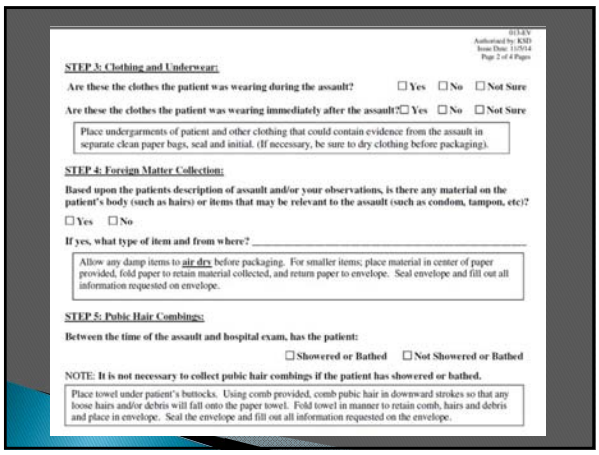
Date of alleged assault: ____/____/____ **Time:** _____ **AM/PM**

Date of hospital exam: ____/____/____ **Time:** _____ **AM/PM**

Patient's description of assault: _____



Did assailant have oral contact with the patient's genital area?	☐ Yes	☐ No	☐ Not Sure
Did the assailant wear a condom?	☐ Yes	☐ No	☐ Not Sure
Did the patient receive any injuries resulting in bleeding?	☐ Yes	☐ No	☐ Not Sure
Did the assailant bleed?	☐ Yes	☐ No	☐ Not Sure
Was the patient menstruating at the time of the assault?	☐ Yes	☐ No	☐ Not Sure
Did the patient have consensual sex in the 120 hours prior to the exam?	☐ Yes	☐ No	☐ Not Sure
If yes, how many hours previous? _____			
Was the consensual partner a different person than the assailant?	☐ Yes	☐ No	☐ Not Sure



STEP 3: Clothing and Underwear:

Are these the clothes the patient was wearing during the assault? ☐ Yes ☐ No ☐ Not Sure

Are these the clothes the patient was wearing immediately after the assault? ☐ Yes ☐ No ☐ Not Sure

Place undergarments of patient and other clothing that could contain evidence from the assault in separate clean paper bags, seal and initial. (If necessary, be sure to dry clothing before packaging).

STEP 4: Foreign Matter Collection:

Based upon the patients description of assault and/or your observations, is there any material on the patient's body (such as hairs) or items that may be relevant to the assault (such as condom, tampon, etc)?

☐ Yes ☐ No

If yes, what type of item and from where? _____

Allow any damp items to **air dry** before packaging. For smaller items; place material in center of paper provided, fold paper to retain material collected, and return paper to envelope. Seal envelope and fill out all information requested on envelope.

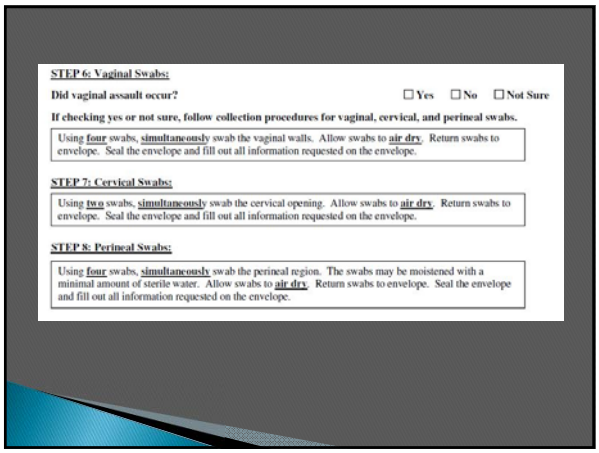
STEP 5: Pubic Hair Combings:

Between the time of the assault and hospital exam, has the patient:

☐ **Showered or Bathed** ☐ **Not Showered or Bathed**

NOTE: **It is not necessary to collect pubic hair combings if the patient has showered or bathed.**

Place towel under patient's buttocks. Using comb provided, comb pubic hair in downward strokes so that any loose hairs and/or debris will fall onto the paper towel. Fold towel in manner to retain comb, hairs and debris and place in envelope. Seal the envelope and fill out all information requested on the envelope.



STEP 6: Vaginal Swabs:

Did vaginal assault occur? ☐ Yes ☐ No ☐ Not Sure

If checking yes or not sure, follow collection procedures for vaginal, cervical, and perineal swabs.

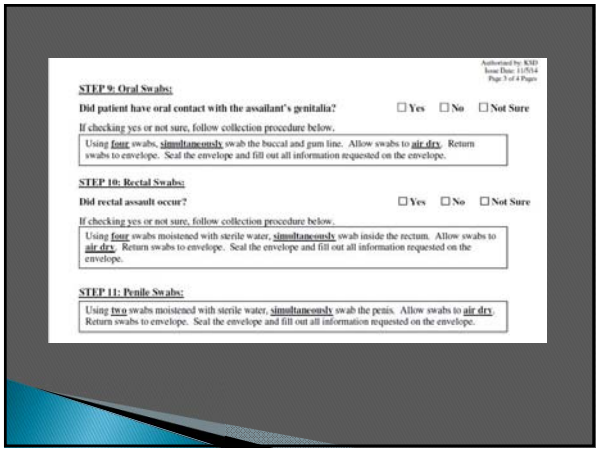
Using **four** swabs, **simultaneously** swab the vaginal walls. Allow swabs to **air dry**. Return swabs to envelope. Seal the envelope and fill out all information requested on the envelope.

STEP 7: Cervical Swabs:

Using **two** swabs, **simultaneously** swab the cervical opening. Allow swabs to **air dry**. Return swabs to envelope. Seal the envelope and fill out all information requested on the envelope.

STEP 8: Perineal Swabs:

Using **four** swabs, **simultaneously** swab the perineal region. The swabs may be moistened with a minimal amount of sterile water. Allow swabs to **air dry**. Return swabs to envelope. Seal the envelope and fill out all information requested on the envelope.



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Page 3 of 4 Pages

STEP 9: Oral Swabs:

Did patient have oral contact with the assailant's genitalia? ☐ Yes ☐ No ☐ Not Sure

If checking yes or not sure, follow collection procedure below.

Using **four** swabs, **simultaneously** swab the buccal and gum line. Allow swabs to **air dry**. Return swabs to envelope. Seal the envelope and fill out all information requested on the envelope.

STEP 10: Rectal Swabs:

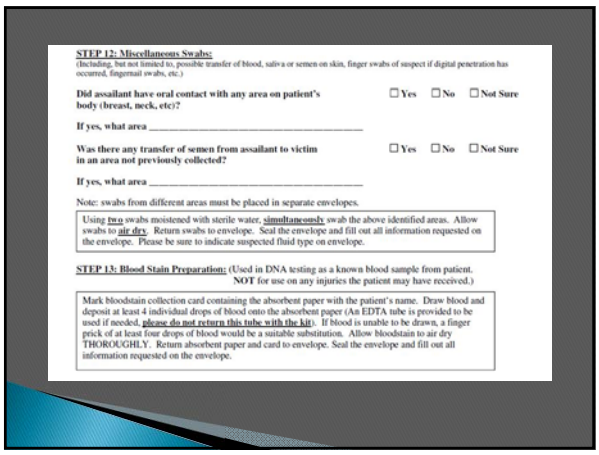
Did rectal assault occur? ☐ Yes ☐ No ☐ Not Sure

If checking yes or not sure, follow collection procedure below.

Using **four** swabs moistened with sterile water, **simultaneously** swab inside the rectum. Allow swabs to **air dry**. Return swabs to envelope. Seal the envelope and fill out all information requested on the envelope.

STEP 11: Penile Swabs:

Using **two** swabs moistened with sterile water, **simultaneously** swab the penis. Allow swabs to **air dry**. Return swabs to envelope. Seal the envelope and fill out all information requested on the envelope.



STEP 12: Miscellaneous Swabs:
(Including, but not limited to, possible transfer of blood, saliva or semen on skin, finger swabs of suspect if digital penetration has occurred, fingernail swabs, etc.)

Did assailant have oral contact with any area on patient's body (breast, neck, etc)? ☐ Yes ☐ No ☐ Not Sure

If yes, what area _____

Was there any transfer of semen from assailant to victim in an area not previously collected? ☐ Yes ☐ No ☐ Not Sure

If yes, what area _____

Note: swabs from different areas must be placed in separate envelopes.

Using **two** swabs moistened with sterile water, **simultaneously** swab the above identified areas. Allow swabs to **air dry**. Return swabs to envelope. Seal the envelope and fill out all information requested on the envelope. Please be sure to indicate suspected fluid type on envelope.

STEP 13: Blood Stain Preparation: (Used in DNA testing as a known blood sample from patient. **NOT** for use on any injuries the patient may have received.)

Mark bloodstain collection card containing the absorbent paper with the patient's name. Draw blood and deposit at least 4 individual drops of blood onto the absorbent paper (An EDTA tube is provided to be used if needed, **please do not return this tube with the kit**). If blood is unable to be drawn, a finger prick of at least four drops of blood would be a suitable substitution. Allow bloodstain to air dry THOROUGHLY. Return absorbent paper and card to envelope. Seal the envelope and fill out all information requested on the envelope.

FINAL INSTRUCTIONS

1) Fill out all information requested on all sample envelopes and bags COMPLETELY.
2) Return this form to the kit prior to sealing.
3) Affix and initial red police evidence seals where indicated on box top.
4) Fill out all information requested on kit top under "For Hospital Personnel"
5) Give sealed kit and sealed bags to investigating officer.

Note: If officer is not present at this time, place sealed kit and sealed bags in secure and refrigerated area, and hold for pickup by the investigating officer.

Documentation

- The BCA Information Sheet is kept by the laboratory and is sent to defense as part of discovery. Make sure information is accurate.
- If you have additional information you think the scientist should know, feel free to write on BCA form or alter a question so that it fits the situation.
- If patient has had consensual sex recently, note on BCA form and tell investigators so they can get a known sample from that individual.

- If sterile water is not available you can use saline to moisten the swabs (no tap water)
- If you run out of kits, use regular white envelopes and sterile swabs – just don't forget to label everything!
- Envelopes not used can be saved and used later in a kit that may need extra envelopes.
- If you are checking "yes" or "not sure" on the form – SWAB THAT AREA

Contamination Issues

- DNA contamination can occur during evidence collection
- Gloves should be worn during the entire collection procedure and changed frequently
- Be careful of sneezing, spitting while talking, adjusting glasses, etc.

Miscellaneous Swabs

- Areas of fluorescence with Woods Lamp
  - Semen, saliva, sweat, other fluids (ex: milk, yogurt) may all fluoresce
- For semen or saliva on skin surfaces, lightly wet the swab with sterile water or saline and **gently** rub, not scrub!
  - Trying to swab off any body fluids on the skin surface while collecting minimum of patient's skin cells (**use two swabs for skin swabbings**)

Miscellaneous Swabs cont.

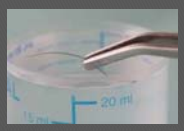
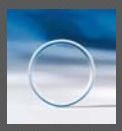
- Do not swab and package multiple areas together
  - Ex: Breasts should be swabbed and packaged separate from swabs from abdomen swabs –
- Think outside the box
  - Patient refuses to give up underwear – swab the crotch
  - Patient has dried blood stain on lower leg and she did not bleed during the assault and has no injury – collect!

He grabbed her arm or slapped her, should I swab that area??

- When kits are examined we look for body fluids. Body fluids have a greater concentration of cells and adhere to the body longer.
- Victim's DNA overwhelms suspect's DNA – usually cannot get a good profile

Common Foreign Matter

- Foreign Matter Collection
  - Tampons and pads
  - Hairs (not from pubic area)
  - Condoms found in vaginal cavity
  - NuvaRings


Drying swabs

- Swabs should be dried in a safe, low traffic area
  - Drying swabs prevents:
    - ✓Contamination (leak though) from sample to sample within the sex assault kit
    - ✓Loss of sample - wet samples stick to envelopes when they dry
- Don't use a fan, can blow dirt/skin cells/etc. around and attach to sample.


Drying Tampons

- Let tampons **air dry** as much as possible.
  - If still not dry enough, use a plastic urine collection cup (as long as there are no preservatives or chemicals in it). Holes **must** be punched into the lid to allow for air circulation. Package cup into a paper bag and label – **refrigerate**.

Hair Evidence

- Use comb provided to dislodge any loose hairs from patient's pubic area
  - Note if patient shaves or is prepubescent
- Package with comb and paper towel in envelope.
- **If patient has showered, it is not necessary to collect this sample.**

Common Collection Errors

- More or less than the 4 swabs provided are used for oral, vaginal, rectal or perineal swabbing.
- Wet swabs – bleed through
- If patient showered, pubic hair combings and skin swabs do not need to be taken
- Misc. Envelopes not labeled as to what fluid is suspected.
- Victim's known blood sample not collected

Importance of Blood Knowns

- Patient's known sample **always** needs to be collected
- Blood is preferred over buccal swabs in SA cases
  - Semen may be present in mouth
- Blood should be placed on inner filter paper
- Tube of blood does not need to be sent back to us
- If a blood draw is not possible, a finger prick and collection of 5-7 spots of blood is sufficient
- If blood cannot be collected at all, inform investigator so they can collect buccal swabs at a later date.

Questions to think about

- How many people involved (more people typically = more samples)?
- Did more than one person bleed / ejaculate?
- Are you trying to reconstruct a story?

REMEMBER:

There is only ONE chance to collect – when in doubt, collect more!

Packaging Evidence

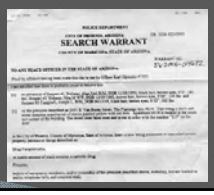
- Wet evidence must be thoroughly air dried prior to packaging.
- Biological evidence must be packaged in containers that allow air circulation – USE PAPER or CARDBOARD
- Never package biological evidence in plastic bags, sealed tubes, or jars unless liquid or tissue samples (and then refrigerate or freeze as needed).
- Package items separately
- Correctly label and TAPE SEAL package with initials

Suspect Exams

- What samples could be useful?
  - Finger swabs
  - Penile swabs
  - Suspect's clothes
  - Suspect's underwear
  - Body fluids found on suspect

- Potential Benefits
  - Evidence that may only be found on the suspect
  - No sex assault exam for victim if suspect samples submitted (child cases)
  - May show contact between victim and suspect
  - Confirm victim/suspect's story

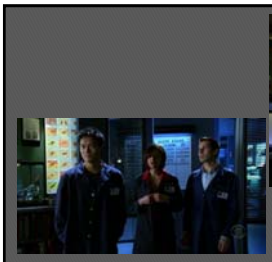
- Potential drawbacks
  - No access to suspect
  - Suspect refuses
  - Suspect unknown/suspect can't be found
  - Time sensitive if evidence may be on suspect
  - May need warrant to obtain evidence
  - Money and time

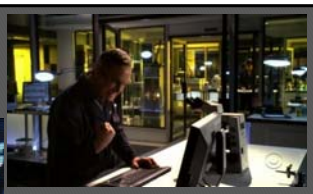

SEARCH WARRANT

Sexual Assault Evidence Processing

Your lab is just like CSI…right?

CSI: vs BCA



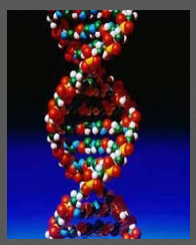


The main difference is we turn on the lights in the lab…

Casework Flow Overview

1. Evidence submitted to the BCA Lab
2. Serological exams performed (ID of body fluids)
   - Blood, semen, saliva, urine, hairs, wearer DNA
3. DNA analysis
4. DNA profiles developed and compared to principals in case
   - Principals can include victim, suspect, elimination subjects (ex. victim's boyfriend)
5. DNA profiles from questioned samples are entered into database

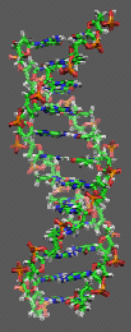
Types of Cases Utilizing DNA Analysis



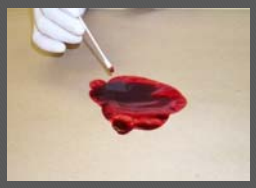
- Homicides
- Death Investigations
- Criminal Sexual Assaults
- Assaults
- Robbery/Theft
- Vandalism
- Terroristic Threats
- Arson
- Burglary
- Weapons

Nuclear DNA

- *Nuclear DNA found in the nucleus of cells.
- Everyone has a unique DNA profile with the exception of identical twins.
- DNA can be found in many biological materials left at the scene of a crime.

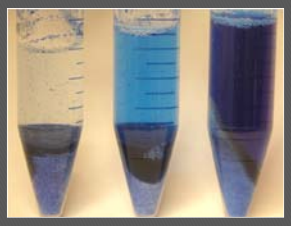


Blood



Phenolphthalein

Saliva



A method for the detection of amylase, which is an enzyme found in high levels in saliva. Color change test called Phadebas is used.

Alternative Light Source (ALS)

Identification of Semen

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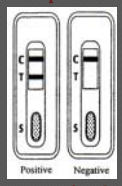
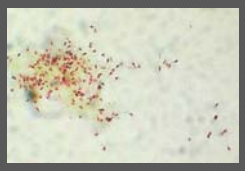


- Human protein found in very high levels in seminal fluid.
- Useful for men who are aspermatic or have had a vasectomy

Microscopic Examination

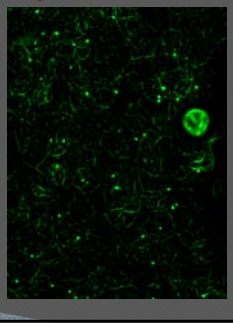


"Christmas tree stain"
Stains nuclear material red (including sperm heads) and other cellular material green.

Sperm Identification

Epithelial & sperm cells

Sperm HY-LITER



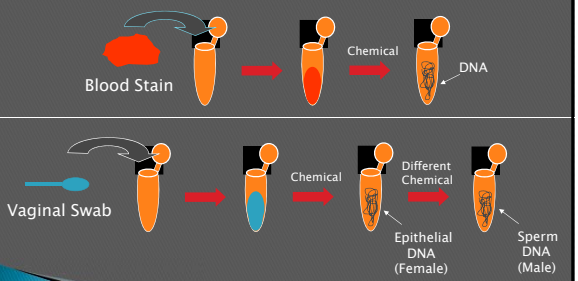
DNA Analysis

DNA > > > > > > > DNA Profile

DNA Analysis

1. Extraction
   - DNA is purified from the sample
2. Quantitation
   - Determination of how much DNA is in the sample
3. Amplification
   - Many copies of the DNA are made (PCR)
4. Typing
   - DNA profile is obtained

Extraction



Quantitation

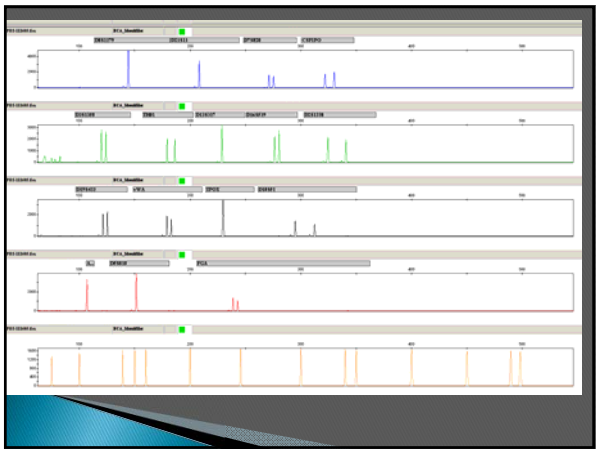
Determines how much DNA is present in a sample.

- *If you have too little DNA you will not get a full profile
- *If you have too much DNA you can overwhelm the system and not obtain good results

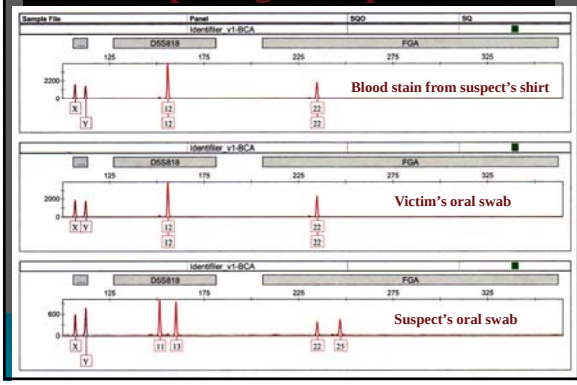
Amplification

- Multiple copies of a targeted region of DNA are made.
- Process of replication is Polymerase Chain Reaction (PCR)

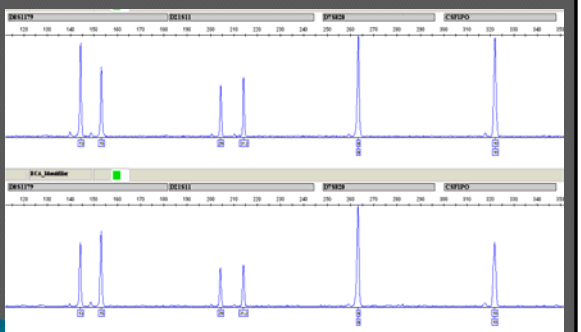
Capillary Electrophoresis



Comparing DNA profiles



How is it interpreted?

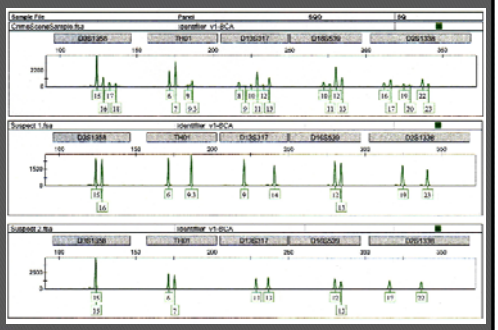


Mixture Comparisons

Brick Swab

Suspect 1

Suspect 2



Forensic DNA Databases

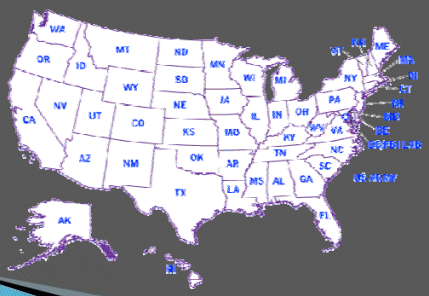
- Combined DNA Index System (CODIS)
  - Local (LDIS)
  - State (SDIS)
  - National (NDIS)
- Over 12 million profiles now in NDIS
- Effective due to repeat offenses
- Minnesota BCA made the first National Database hit (with Illinois)

CODIS Combined DNA Index System

CODIS

Minnesota (Nov 2017)
154,968 convicted offenders
15,824 forensic samples

National (Nov 2017)
13,122,773 convicted offenders
817,097 forensic samples



Questions?

Contact information:
Jess Weber
651-793-2918
Jessica.weber@state.mn.us

Have an evidence question?
BCA has a biology scientist assigned daily to answer questions. 651-793-2900

Cold case: Dale Heinold

- Killed (stabbed) in May 1989
- Fingerprint recovered from scene, no hits
- Case reopened for DNA analysis in 2006
- Unidentified male DNA profile obtained from bloodstains in Heinold's apartment
- Hit to Ohio convicted offender sample of Larry Brigman (auto theft)
- Brigman pled guilty in July 2009

Cold case: Wally Lundin

- Killed (strangled) in August 1996
- Case reopened for DNA analysis in 2007
- DNA mixture obtained from condom
- Database search indicated convicted offender Rommal Bennett
- Condom profile mixture of Lundin & Bennett
- Bennett pled guilty in October 2009 (already serving a life sentence in New York)

Cold case: Laura Demeules

- Found in a ditch in 2005, strangled, naked
- Rain in area before body/evidence recovered
- Male DNA profile obtained from under Demeules's fingernails, uploaded to database
- January 2008: hit to convicted offender Antonio Medina (drunk driving conviction)
- Medina pled guilty in May 2008

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