

*Current Research Findings in Sexual Assault Cases in Utah & Implications on Practice

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February 2014

- * National Institute of Justice (NIJ) Sexual Assault Nurse Examiner (SANE) Toolkit on Criminal Case Outcomes in Sexual Assault Cases
- * NIJ federally funded research
- * Nationwide campaign
- * Released in February 2013
- * Research question - What are the criminal case outcome percentages in sexual assault cases within communities with established SANE programs?

* First Completed Study

Julie Valentine MS, RN, CNE, SANE-A

* Sexual Assault Criminal Case Outcomes assigned to the following categories:

- Not charged
- Charged but later dropped
- Pled or plea bargain reached
- Trial with Acquittal
- Trial with Conviction

* **NIJ SANE Toolkit**

*Step 1 - Develop eligible pool of cases

*18 years or older?

*Interview with law enforcement?

*Completed forensic medical examination with evidence collected?

*2241 cases between 2003 - 2011

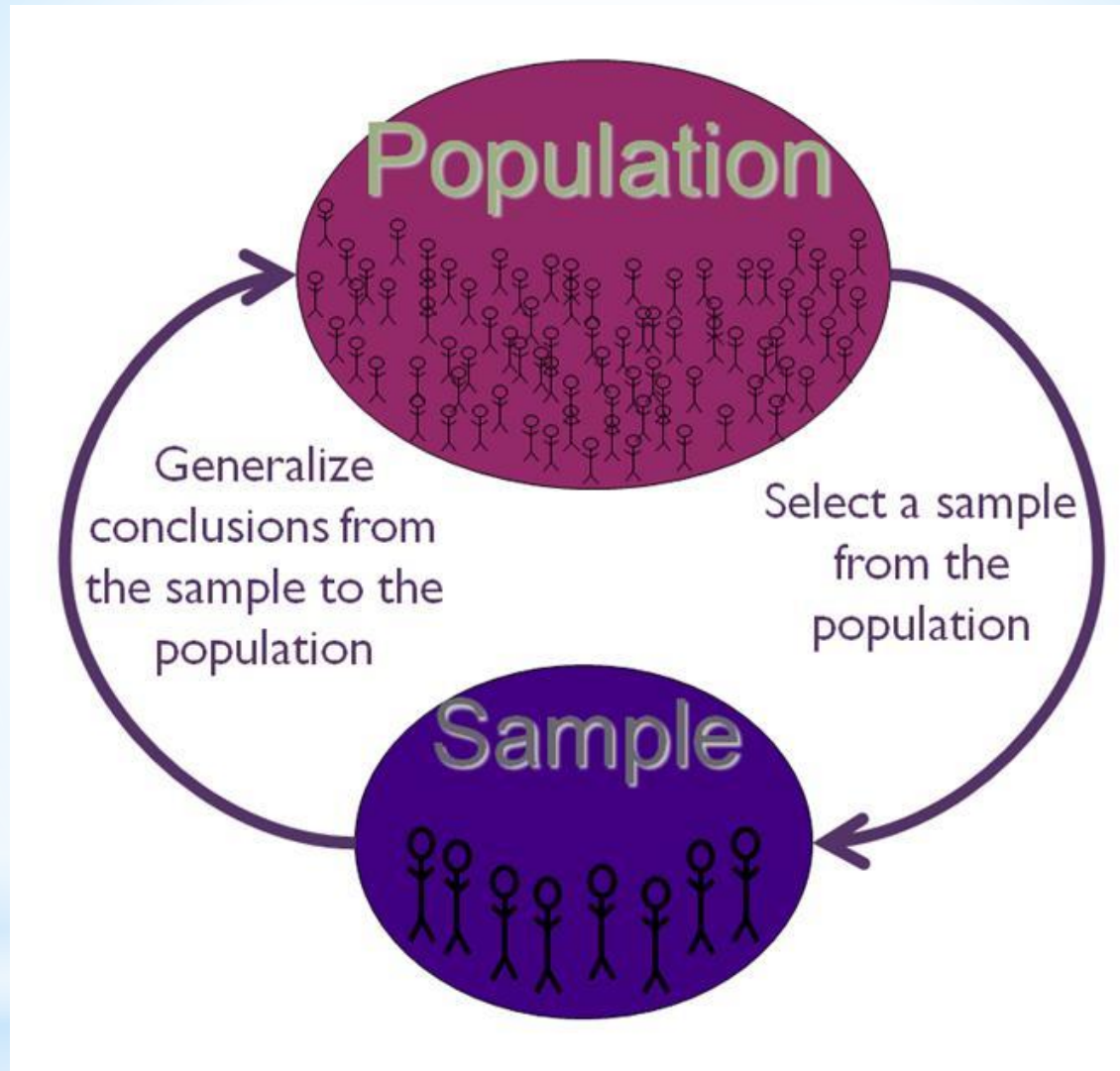
*1657 eligible for study

*NIJ SANE Toolkit

*Step 2 -Step 2 - From eligible pool of cases, randomly select 30 cases per year through randomization program developed by the NIJ SANE toolkit study.

*30 cases x 9 years (2003 to 2011) =
270 randomly selected cases

*NIJ SANE Toolkit



*NIJ SANE Toolkit

***Step 3 - Divide 270 randomly selected cases into respective law enforcement agency**

| LE AGENCY | 03 | 04 | 05 | 06 | 07 | 08 | 09 | 10 | 11 | Total |
|-----------------------|----|----|----|----|----|----|----|----|----|-------|
| Cottonwood Heights PD | | | | | | | 1 | | 1 | 2 |
| Draper PD | | | | 2 | 1 | | 2 | | 2 | 7 |
| Midvale PD | | | 3 | | 2 | 3 | 1 | 2 | | 11 |
| Murray PD | | 1 | 1 | 2 | 2 | 2 | 1 | 2 | 2 | 13 |
| SLC PD | 29 | 24 | 13 | 13 | 11 | 7 | 6 | 7 | 10 | 120 |
| SL Co Sheriff | 1 | 2 | 4 | 2 | 1 | 6 | 9 | | | 25 |
| Sandy PD | | 1 | 1 | 1 | 4 | 2 | 3 | 4 | | 16 |
| South Jordan PD | | | 1 | 1 | | | | 1 | | 3 |
| South SL PD | | 1 | 3 | 4 | | | 1 | 3 | 3 | 15 |
| Taylorsville PD | | | | 2 | 1 | 3 | 1 | 3 | 2 | 12 |
| U of U PD | | 1 | | 1 | 1 | | | | | 3 |
| Unified PD | | | | | | | | 4 | 3 | 7 |
| West Jordan PD | | | 1 | | 1 | 2 | 1 | 3 | | 8 |
| West Valley City PD | | | 3 | 2 | 6 | 5 | 7 | 2 | 3 | 28 |

*Step 3 - LE packets hand delivered to obtain suspects' names

| SLSANE # | LE Case # | Date of Assault | Suspect's name if screened with DA | Screened with DA's office |
|----------|-----------|-----------------|------------------------------------|--|
| | | | | Yes _____ No _____ Unknown _____ |
| | | | | Yes _____ No _____ Unknown _____ |
| | | | | Yes _____ No _____ Unknown _____ |

*NIJ SANE Toolkit

***Percentage of Screened Cases in Salt Lake County from 2003 - 2011**

| | |
|---|-------------|
| Percentage of sexual assault cases SCREENED by LE with DA's Office | 34% |
| Percentage of sexual assault cases NOT SCREENED by LE with DA's Office | 66% |
| Total | 100% |

***NIJ SANE Toolkit**

- *Step 4 - Chart B - Determine final criminal case outcomes of 270 randomly selected cases with prosecution

Study Population Year_____

| Year-# of case | Suspect/Defendant's Name | LE Agency & Case # | Date of Assault | Case Outcome |
|----------------|--------------------------|--------------------|-----------------|---|
| | | | | <input type="checkbox"/> Not Charged <input type="checkbox"/> Charged, later dropped <input type="checkbox"/> Pled/Plea Bargain <input type="checkbox"/> Trial/Acquittal <input type="checkbox"/> Trial/Convict |

*NIJ SANE Toolkit

*Step 4 - Determine Final Criminal Case Outcome via Court Docketing System

https://courtapps.utcourts.gov/XchangeWEB/login

Welcome: Brigham Young University College of Nursing (Balance Owning: \$0.00)

Home Make Payment Manage Account Help Logout

Utah Court Case Search

Jurisdiction District ☐ Show Date Range Panel [Search Tips](#)

Search Type Case Search **Search Scope** State Wide

Case Number **Case Type** **Citation Number**

Last Name / Company Smith **First Name** John* **Birth Date**

[Search](#) [Clear Search Fields](#)

| County | Court Location | Case Type | Case Number | Filing Date | First Name | Last Name | Birth Date | Party Code | Case History / Documents |
|--------|----------------|-----------|-------------|-------------|------------|-----------|------------|------------|--------------------------|
|--------|----------------|-----------|-------------|-------------|------------|-----------|------------|------------|--------------------------|



NIJ SANE Toolkit

*Results - Percentage of Cases Declined by DA

| Year | % Declined |
|---------------------|----------------------|
| 2003 | 100% |
| 2004 | 83.33% |
| 2005 | 83.33% |
| 2006 | 70.00% |
| 2007 | 83.33% |
| 2008 | 100% |
| 2009 | 45.45% |
| 2010 | 53.33% |
| 2011 | 75.00% |
| <i>TOTAL</i> | <i>75.53%</i> |

NIJ SANE Toolkit Data.XLSM

Search in Sheet

Home Layout Tables Charts SmartArt Formulas Data Review

Edit Font Alignment Number Format Cells Themes

Fill Calibri (Body) 11 Wrap Text General Normal Insert Delete Format Themes

A5

Make note of the month and year (Calendar Year) that correspond with each Program Year for the years your SANE program has been operating:

For example: Year 2 = May 2003 - Apr 2004
Year 3 = May 2004 - Apr 2005
etc.

| Program Year | Calendar Year | Program Year | Calendar Year |
|--------------|---------------|--------------|---------------|
| Year 1 | | Year 9 = | 2010 |
| Year 2 = | 2003 | Year 10 = | 2011 |
| Year 3 = | 2004 | Year 11 = | |
| Year 4 = | 2005 | Year 12 = | |
| Year 5 = | 2006 | Year 13 = | |
| Year 6 = | 2007 | Year 14 = | |
| Year 7 = | 2008 | Year 15 = | |
| Year 8 = | 2009 | | |

| Case # or ID | Exam Date | Program Year | Outcome |
|--------------|-----------|--------------|--------------------------|
| 2003-1 | 17-Jan-03 | 2 | Not referred/Not charged |
| 2003-2 | 2-Feb-03 | 2 | Not referred/Not charged |
| 2003-3 | 14-Feb-03 | 2 | Not referred/Not charged |
| 2003-4 | 26-Feb-03 | 2 | Not referred/Not charged |
| 2003-5 | 8-Apr-03 | 2 | Not referred/Not charged |
| 2003-6 | 26-Apr-03 | 2 | Not referred/Not charged |
| 2003-7 | 31-May-03 | 2 | Not referred/Not charged |
| 2003-8 | 1-Jun-03 | 2 | Not referred/Not charged |
| 2003-9 | 9-Jun-03 | 2 | Not referred/Not charged |
| 2003-10 | 11-Jun-03 | 2 | Not referred/Not charged |
| 2003-11 | 28-Jun-03 | 2 | Not referred/Not charged |
| 2003-12 | 1-Jul-03 | 2 | Not referred/Not charged |
| 2003-13 | 20-Jul-03 | 2 | Not referred/Not charged |
| 2003-14 | 29-Jul-03 | 2 | Not referred/Not charged |
| 2003-15 | 4-Aug-03 | 2 | Not referred/Not charged |
| 2003-16 | 18-Aug-03 | 2 | Not referred/Not charged |
| 2003-17 | 24-Aug-03 | 2 | Not referred/Not charged |
| 2003-18 | 5-Sep-03 | 2 | Not referred/Not charged |
| 2003-19 | 14-Sep-03 | 2 | Not referred/Not charged |
| 2003-20 | 20-Sep-03 | 2 | Not referred/Not charged |
| 2003-21 | 6-Oct-03 | 2 | Not referred/Not charged |

AFTER you have entered all your data, CLICK HERE to generate results

Data Entry Results

Normal View Ready Sum=0

* NIJ SANE Toolkit Statistical Program

***Percentages of Criminal Case Outcomes By Outcomes 2003 - 2011**

| | Salt Lake County | Other Urban Sites |
|------------------------------|------------------|-------------------|
| By Outcome | | |
| Not Charged | 91% | 82-84% |
| Charged but later dropped | 3% | 4-7% |
| Pled or plea bargain reached | 5% | 7-13% |
| Trial with Acquittal | 0% | 1% |
| Trial with Conviction | 1% | 1% |
| TOTAL: | 100% | |

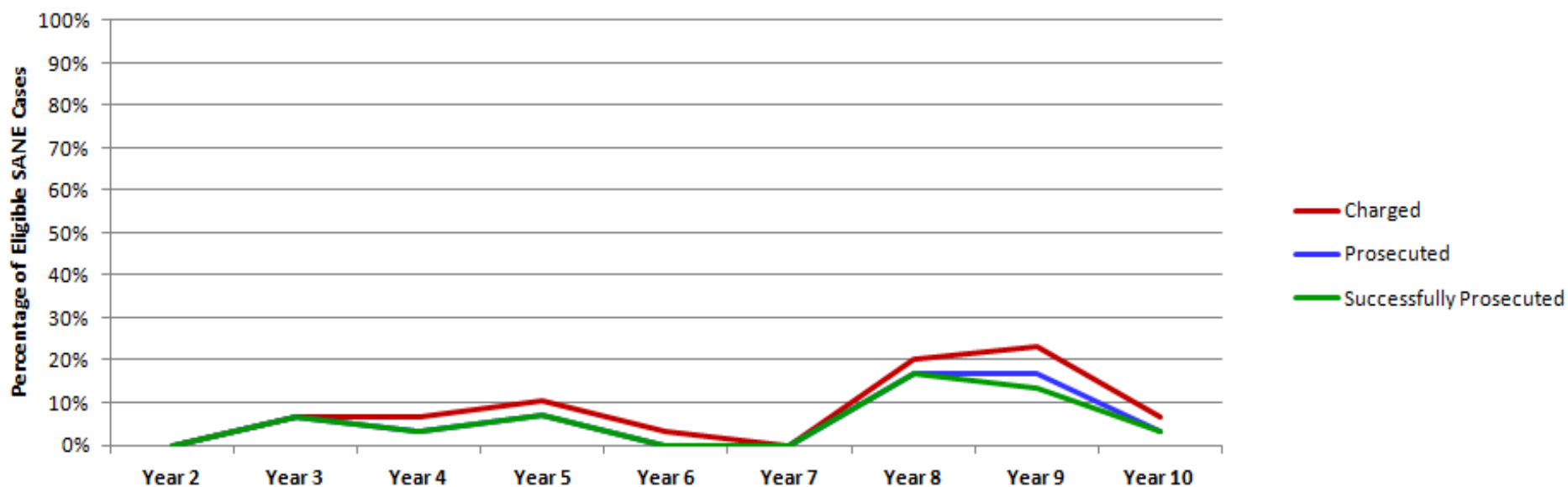
***NIJ SANE Toolkit Results**

*Percentages of criminal case outcomes by Categories 2003-2011

| By Category | Salt Lake County | Other Urban Sites |
|-----------------------------|------------------|-------------------|
| Not Charged | 91% | 82-84% |
| Charged | 9% | 16-18% |
| TOTAL | 100% | |
| Not Prosecuted | 94% | 85-91% |
| Prosecuted | 6% | 9-15% |
| TOTAL | 100% | |
| Not Successfully Prosecuted | 94% | 87-92% |
| Successfully Prosecuted | 6% | 8-13% |
| TOTAL | 100% | |

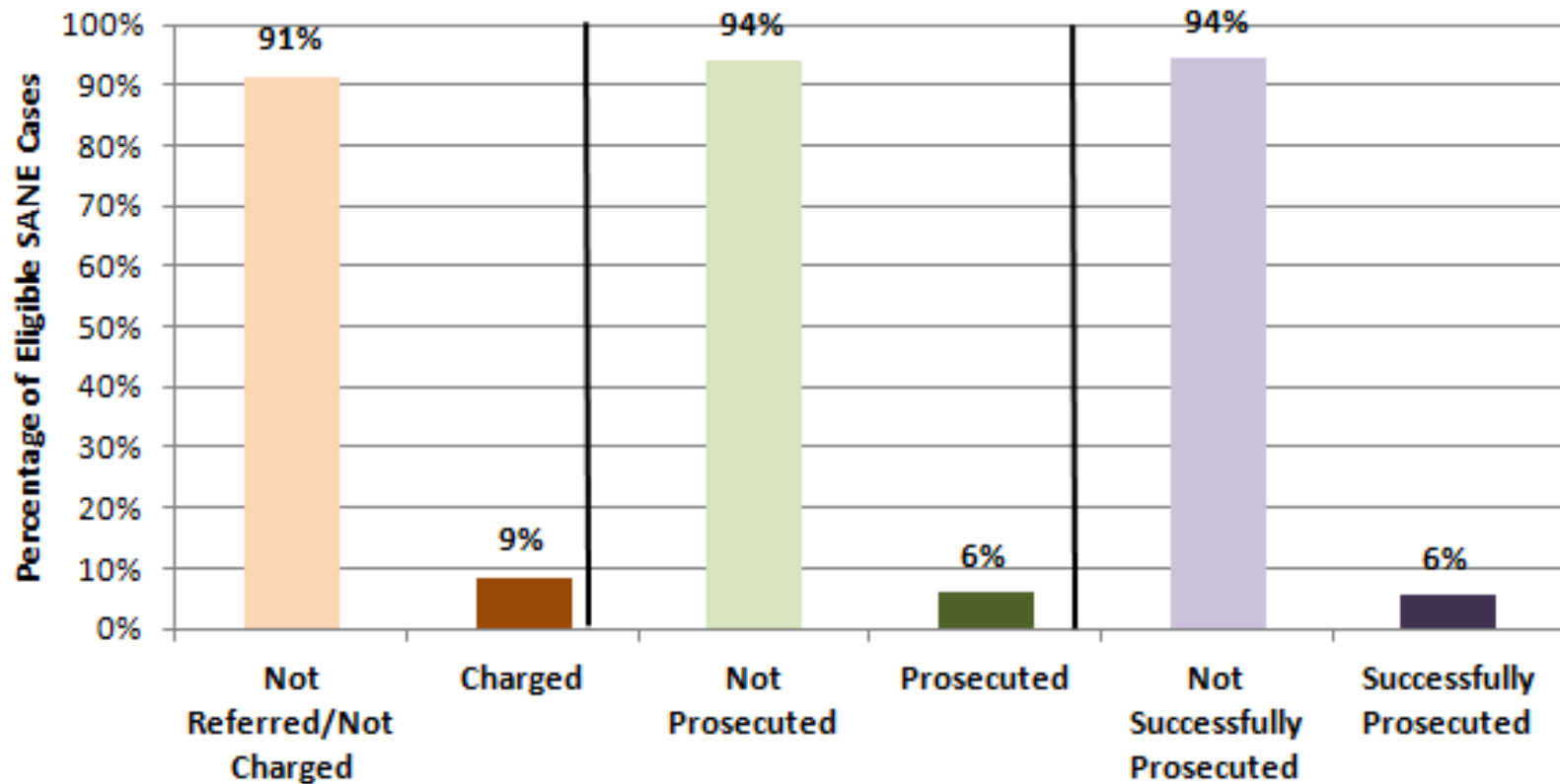
*NIJ SANE Toolkit Results

Percentage of Case Outcomes By Category Over Time



*NIJ SANE Toolkit Results

Percentage of Case Outcomes By Category



* NIJ SANE Toolkit Results

| Written Reason for Not Screening Case | TOTAL |
|--|-------|
| Victim did not want to pursue | 25 |
| Unable to contact victim | 24 |
| Unknown Suspect* | 21 |
| Uncooperative victim | 15 |
| Insufficient Evidence | 13 |
| Case cancelled by victim | 5 |
| <i>Possible False Report</i> | 4 |
| Inconsistent statements by victim | 4 |
| Crime lab did not find seminal fluid | 3 |
| Victim has no memory of the incident | 2 |
| Victim had mental illness | 2 |
| <i>Victim admitted to making a false report</i> | 2 |
| Reason unknown | 2 |
| Investigative leads exhausted | 1 |
| DNA collected in Code R kit ruled out suspect | 1 |
| Victim did not know if sexual assault happened | 1 |
| Low functioning victim, did not articulate force | 1 |
| <i>Victim claimed consensual sex, no crime</i> | 1 |
| <i>No sexual assault occurred</i> | 1 |
| <i>Victim arrested for making a false report</i> | 1 |
| <i>Victim stated that she was not sexually assaulted</i> | 1 |

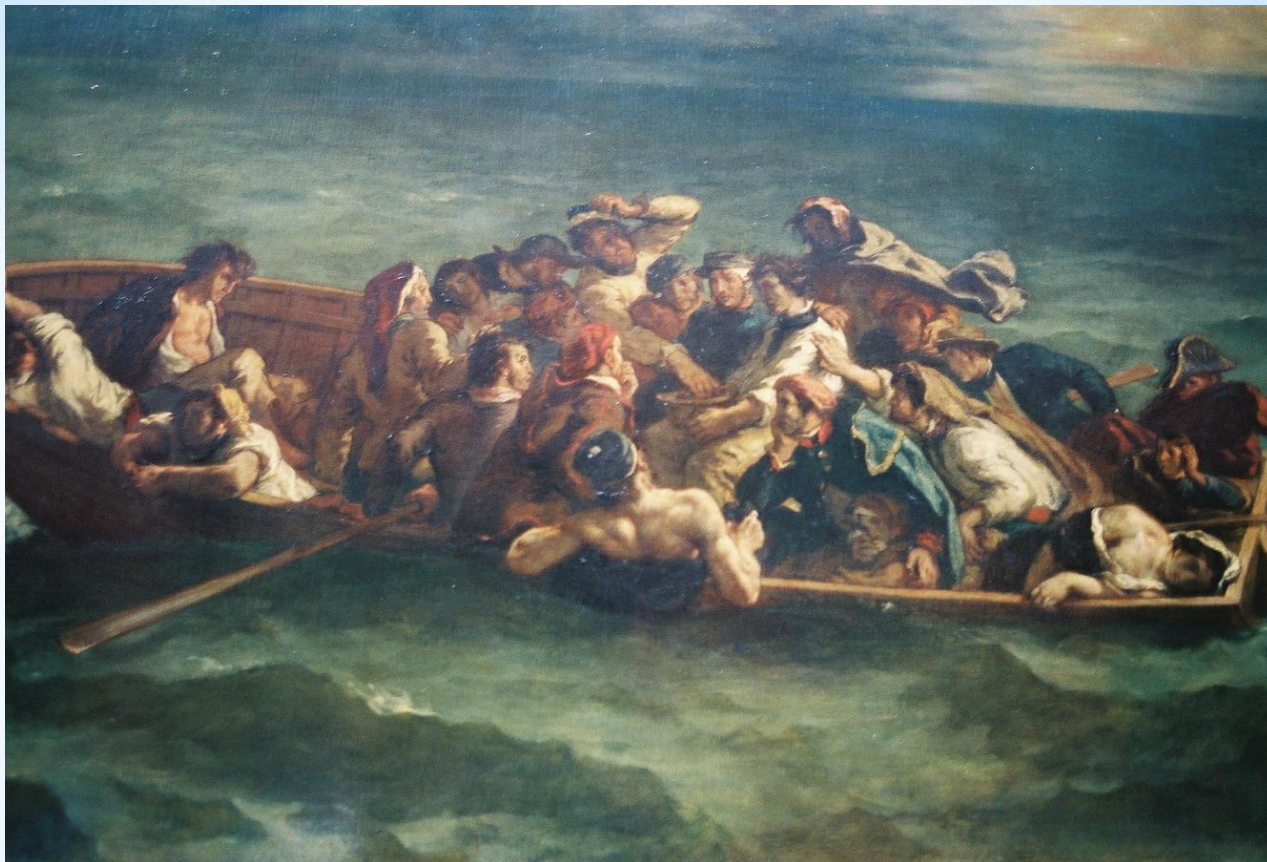


* Multiple evidence-based studies indicate that between 2 - 8% of sexual assault cases are false. (Lonsway, Archambault, & Lisak, 2009 ; Lisak, Gardinier, Nicksa, & Cote, 2010)

* Out of the 132 cases in which the reason for not screening with prosecution was written, 10 cases were false reports.

* This is 8% of the cases.

*** NIJ SANE Toolkit Results**



* So What?

* Now What?

* NIJ SANE Toolkit Results

* Next Research Study -

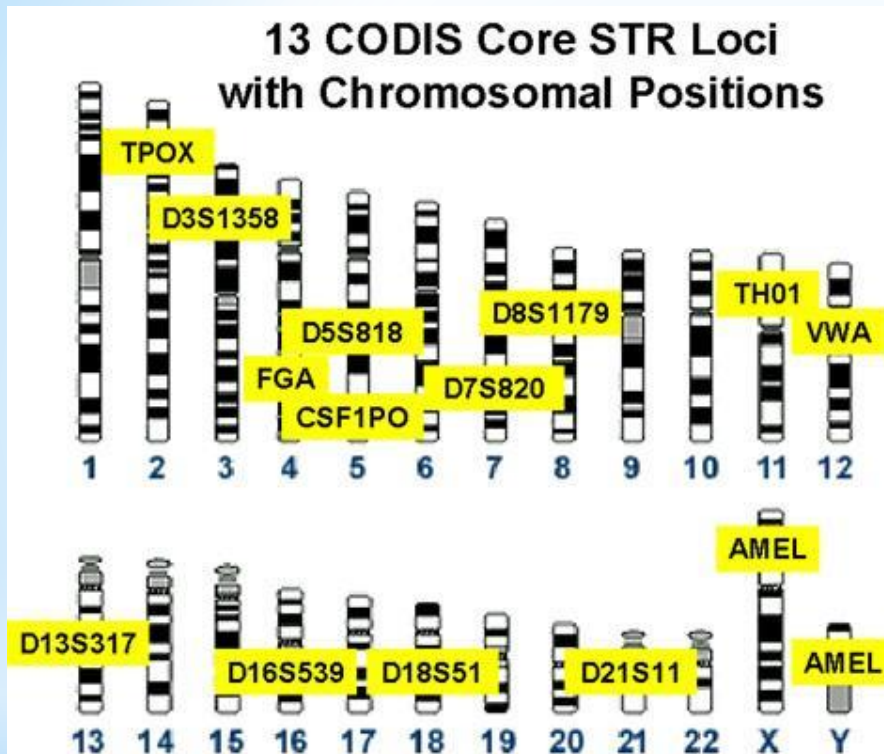
Whatcha got there?
Collaborative findings
between forensic nursing and
crime lab data

Julie Valentine MS, RN, CNE, SANE-A

Suzanne Miles, Forensic Scientist, UBFS

January 2014

* Impetus for research



What do we know about our patients and suspects?

* Background

*Demographic information

- *What can we learn about our patients and suspects?

- *Why is learning about our patients valuable?

- *New DNA analysis methods

- *Implications on practice

- *Additional research areas

*Background

- * 344 Charts
- * 30 Declined Cases (8.7%)
- * Out of 314 cases, 94 kits (29.2%) were brought by LE to Crime Lab



* 2010

*317 patients coded for SEX

*304 Female = 95.9%

*13 males = 4.1%

*Demographic Glimpse

* Age Breakdown

Age of Patients

| | |
|---|------------|
| ■ | 14-16=4.7 |
| ■ | 17=5.1 |
| ■ | 18-20=19.6 |
| ■ | 21-23=13.9 |
| ■ | 24-26=11.1 |
| ■ | 27-29=9.8 |
| ■ | 30-32=6.9 |
| ■ | 33-35=6.0 |
| ■ | 36-38=5.0 |
| ■ | 39-41=3.1 |
| ■ | 42-44=4.0 |
| ■ | 45-47=4.4 |
| ■ | 49-51=2.8 |
| ■ | 52-54=1.2 |
| ■ | 56-60=1.2 |
| ■ | 73-86=0.6 |



Mean = 28.23 Years

Standard deviation = 11.067 years

Range = 72 years

* Demographic Glimpse

| | Victim % | Suspect % | Salt Lake County % (US Census 2012) |
|---------------------------|----------|-----------|--|
| White | 78.4% | 51.8% | 73.4% White alone |
| Black | 3.2% | 10.9% | 1.9% |
| Hispanic | 14.0% | 22.0% | 17.5% |
| Asian/Pacific Islander | 1.9% | 1.6% | 5.2% |
| American Indian | 2.5% | 1.0% | 1.3% |
| Other | | 1.0% | |
| Unknown | | 11.8% | |

 **Demographic Glimpse**

Patient Relationship to Suspect

| | Frequency |
|----------------|-----------|
| Stranger | 21.1% |
| Acquaintance | 61.0% |
| Spouse/Partner | 7.0% |
| Other | 2.2% |
| Unknown | 3.5% |
| Ex-Boyfriend | 5.1% |

 **Demographic Glimpse**

*Location of Assault

| Location | Percent |
|-----------------|---------|
| House/Apartment | 64.9% |
| Automobile | 6.7% |
| Outside | 10.2% |
| Other | 13.7% |
| Unknown | 4.5% |

*Demographic Glimpse

*Suspects' Actions

| Suspects' Actions | Percentage |
|---------------------------|------------|
| Use of a weapon | 6.7% |
| Grabbed/held patient | 60.7% |
| Physical blows to patient | 18.5% |
| Strangled patient | 10.5% |
| Use of restraints | 5.1% |
| Burned patient | 3.8% |

*Demographic Glimpse

| | Patient Alcohol | Patient Drug Use | Suspect Alcohol | Suspect Drug Use |
|---------|-----------------|------------------|-----------------|------------------|
| Yes | 53.2% | 14.0% | 39.5% | 14.3% |
| No | 45.5% | 84.7% | 16.9% | 39.2% |
| Unknown | 1.3% | 1.3% | 43.5% | 46.5% |

Patient or suspect used drugs or alcohol

67.2% Yes

9.6% No

23.2% Unknown

 **Demographic Glimpse**

*Suspected Drug-Facilitated Assault

*Yes = 16.2%

*No = 78.3%

*Unknown = 5.4%

*Demographic Glimpse

*Prevalence of Physical Injury
81.5%

*Prevalence of Genital Injury
66.5%

*Demographic Glimpse

*Physical Injuries Location

| Location of Physical Injury | Percent |
|-----------------------------|---------|
| Head | 19.6% |
| Neck | 21.2% |
| Breasts | 13.8% |
| Chest/Back | 31.7% |
| Abdomen | 13.8% |
| Extremities | 73.1% |

*Demographic Glimpse

| Type of Physical Injury | Percent |
|-------------------------|---------|
| Bruise | 66.0% |
| Abrasion | 43.9% |
| Redness | 27.9% |
| Petechiae | 15.1% |
| Swelling | 11.5% |
| Discolored mark | 9.9% |
| Laceration | 6.1% |
| Ecchymosis | 1.3% |
| Puncture wound | 1.3% |
| Incision | 1.0% |
| Bite Mark | 0.6% |
| Conjunctival hemorrhage | 0.6% |
| Burn | 0.3% |
| Missing or broken teeth | 0.3% |
| Bone Fracture | 0.3% |

*Female Genital Injuries Location

| Female Genital Area w/Injury | Percent |
|------------------------------|---------|
| Inner thighs | 6.7% |
| Clitoral Hood/Clitoris | 0% |
| Labia Majora | 12.2% |
| Labia Minora | 13.8% |
| Periurethral Tissue/Urethra | 1.0% |
| Perihymenal tissue | 6.7% |
| Hymen | 1.9% |
| Vagina | 5.5% |
| Cervix | 7.1% |
| Fossa Navicularis | 37.5% |
| Posterior Fourchette | 12.2% |
| Perineum | 10.3% |
| Anal/Rectal | 13.1% |

*Male Genital Injuries Location

| Male Genital Area with Injury | Percent |
|--|---------|
| Glans Penis/Penile Shaft/Urethral Meatus | 0% |
| Scrotum/Testes/Perianal | 0% |
| Anus | 1.9% |
| Rectum | 0.3% |

*Type of GENITAL INJURY

| Type of Genital Injury | Percent |
|------------------------|---------|
| Abrasion | 41.7% |
| Laceration | 31.7% |
| Redness | 22.4% |
| Bruise | 5.8% |
| Swelling | 2.9% |
| Petechiae | 2.2% |
| Discolored Mark | 1.0% |
| Avulsion | 0.6% |
| Puncture Wound | 0.6% |

Toludine Dye Uptake = 58.3% positive dye uptake

* Loss of consciousness/awareness or
change in consciousness/awareness

* Prevalence of mental illness/use of
psychotropic medications

* **Additional Studies based on
demographic information**

Page 2

Patient lost consciousness/awareness:

If yes, describe

- * Was There Contact with Patient's Vagina by:
- * Was There Contact with Patient's anus by:
- * Was There Contact with Patient's Penis by
- * Was There Contact with Patient's Mouth by:
- * Did Suspect's mouth contact Patient's:

Yes No **Unknown**

*Patient lost
consciousness/awareness

| | |
|-----|-------|
| Yes | 33.1% |
|-----|-------|

| | |
|----|-------|
| No | 66.6% |
|----|-------|

| | |
|---------|-----|
| Unknown | .3% |
|---------|-----|

*Demographic Glimpse

*Patient reports change in consciousness:

| | |
|-----|-------|
| Yes | 23.1% |
| No | 76.0% |

OVERALL, LOSS OR CHANGE IN
CONSCIOUSNESS

56.2% OF 314 PATIENTS

*Demographic Glimpse

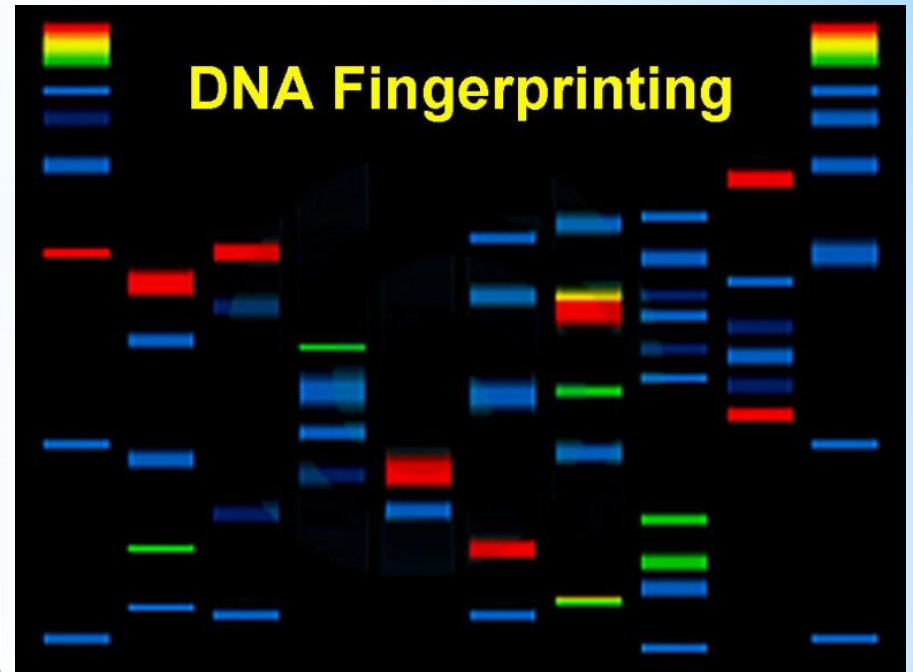
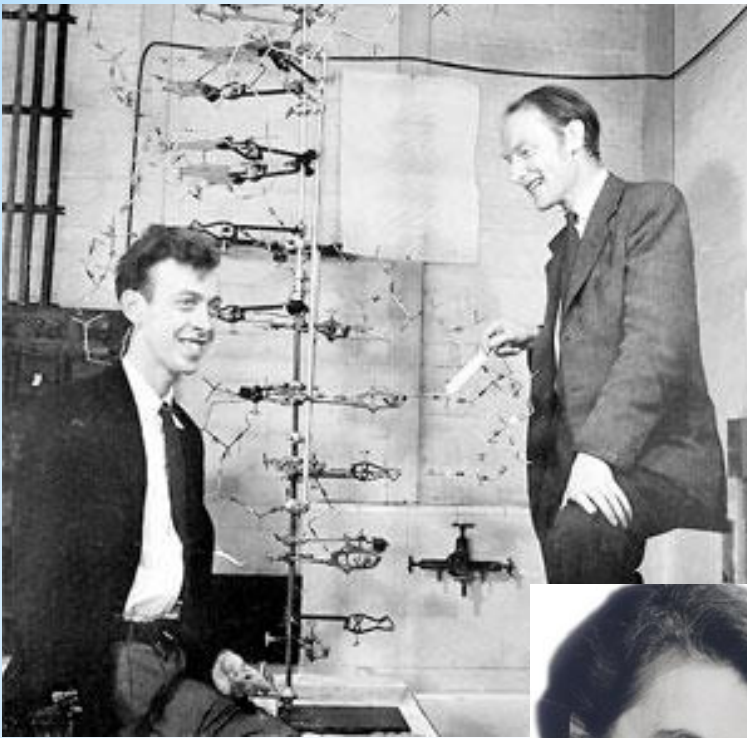
| | STUDY N=314 | Medco | CDC 2010 | NIMH 2005 | NHNES 2010 | SAMHSA 2012 |
|----------------------------|----------------|-------|-------------|--------------|---------------|----------------|
| Psychotropic | 39.6% | 25% F | | | | |
| | | 15% M | | | | |
| Stimulants | 3.5% | | | 4.1% | | |
| Atypical antipsychotics | 8.2% | | | 1.1% | | |
| Typical antipsychotics | 0.9% | | | 1.1% | | |
| Antianxiety | 16.1% | | 5.7% | 18.1% | | |
| Antidepressant | 26.3% | | 11.9% | 6.7% | 8% | 6.9% |
| | | | | | 10% F | 8.4% F |
| Anti-seizure/ bipolar | 10.1% | | 4.6% | 2.6% | | |
| Addiction | 4.4% | | | | | |
| Sleep aid | 8.5% | | 5.7% | | 4.1% | |



Psychotropic Medication Use

| | STUDY N=314 | SAMHSA 2009 | SAMHSA 2009 Utah | SAMHSA 2012 | NIMH 2005 | NSDUH 2010 |
|--|----------------|----------------|------------------------|----------------|--------------|---------------|
| Self disclose mental illness or use of psychotropic medication | 42.4% | 19.67% | 24.09% | | | |
| 12 Month Prevalence | | | | 18.12% | 26.2% | |
| Receive Treatment | | | | | | 13.7% |

*** Prevalence of Mental Illness or
Psychotropic Medication Use**



*DNA Historical Background

- * Probative evidence found during serological screening is taken to DNA testing.



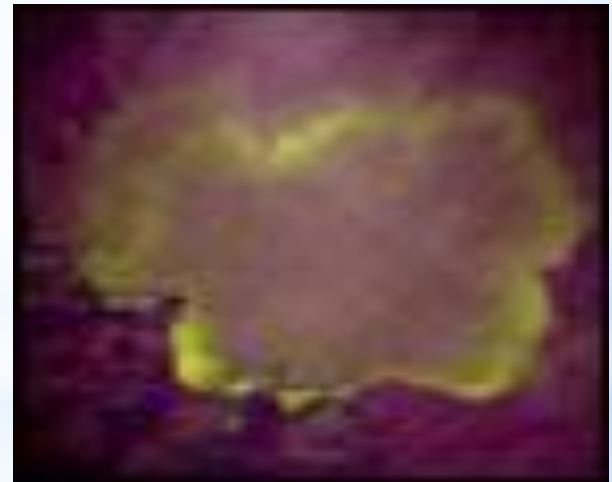
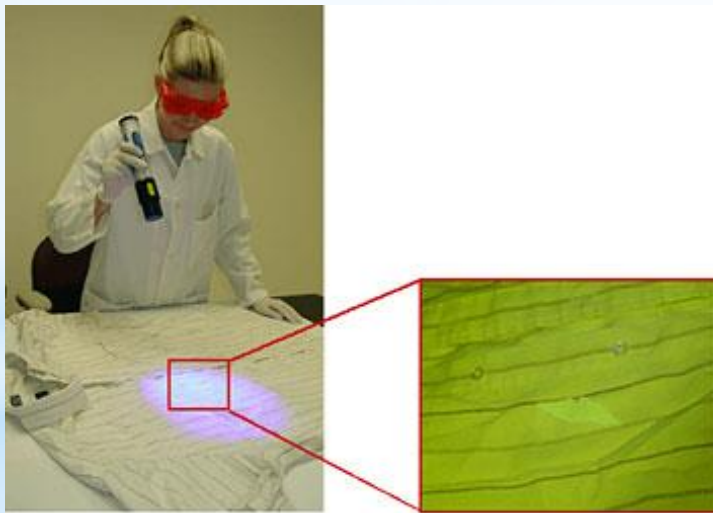
- * Determining Types of Analyses

- * Test for **seminal fluid** - performed on all intimate swabs.
- * Should the information on the medical report indicate oral contact then tests for **salivary amylase** will be performed.
- * **Blood** may be noted in the examination (as reddish brown stains), but not fully tested unless the request indicates the need.

*Types of Analyses

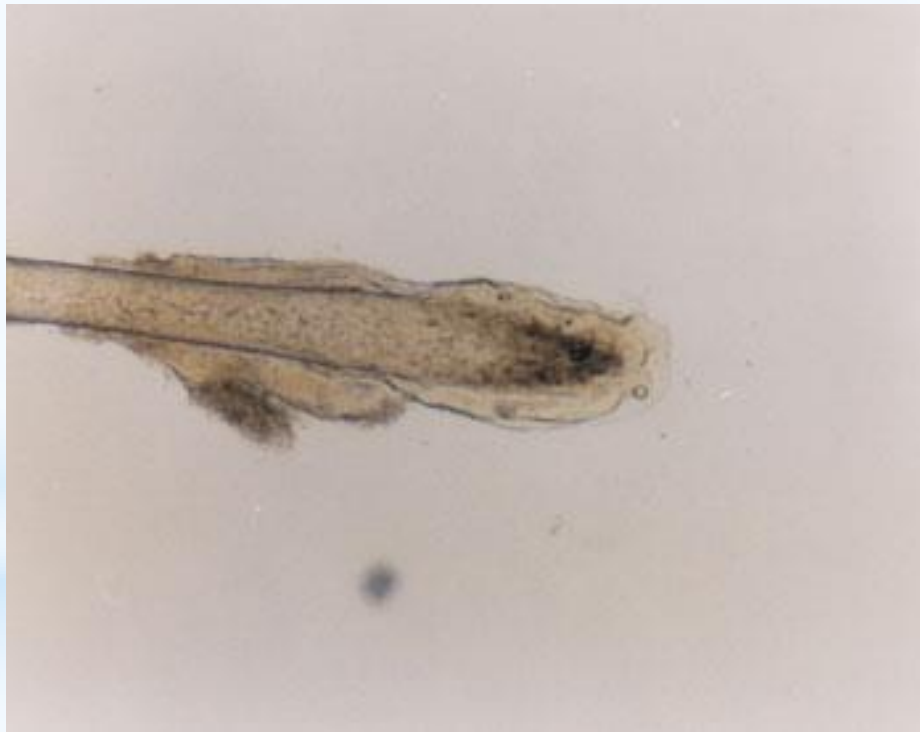
* Bedding, clothing, objects:

- ★ A **seminal fluid** stain on clothing or bedding is essentially invisible at times to the naked eyes
- ★ ALS-alternative light source
- ★ Seminal fluid will fluoresce in a unique manner
- ★ This is used as a screening aid to help locate a potential stain
- ★ Several other stains will also fluoresce including milk and urine



* Screening Additional Evidence

- * Hair and fiber lift may be done on evidence that is submitted to serology
- * Check hair microscopically for presence of root/skin tag
- * Must have root/skin tag for STR testing



* Screening Additional Evidence

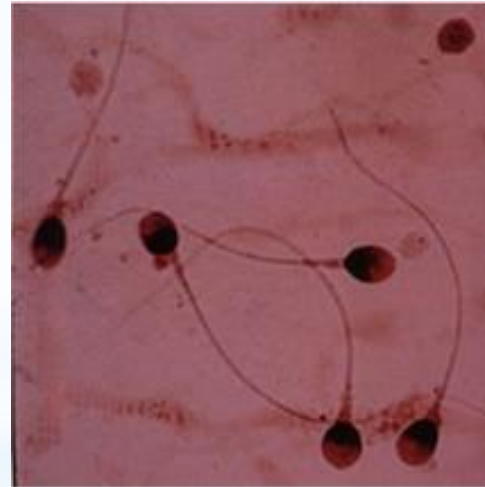
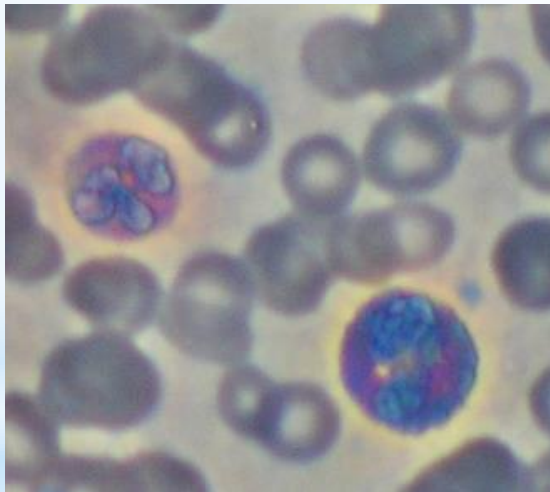
- * Most are rape cases (>2 out of 3)
- * Looking for match between evidence and suspect
- * Must compare victim's DNA profile

Challenges:

- Mixtures must be resolved
- DNA is often degraded
- Inhibitors to PCR are often present

* DNA Use in Forensic Cases

- * DNA is found in the nucleated cells of our bodies:
 - * Saliva, sweat, urine, fecal material (epithelial cells)
 - * Blood stains (White Blood Cells)
 - * Seminal fluid (Spermatozoa)



* Cell Types

Step 1: Extraction

Extraction is the process by which we break open the cells in order to get the DNA into solution for subsequent analysis.



Step 2: Quantitation

- Is the process by which we find the amount of DNA in the sample.
- Male to female DNA ratios in our sample can be calculated from this data

If the ratio of human to male DNA detected is > 10:1, traditional STR DNA analysis will only develop the female's profile. YSTR analysis will be needed to analyze the male contributor.

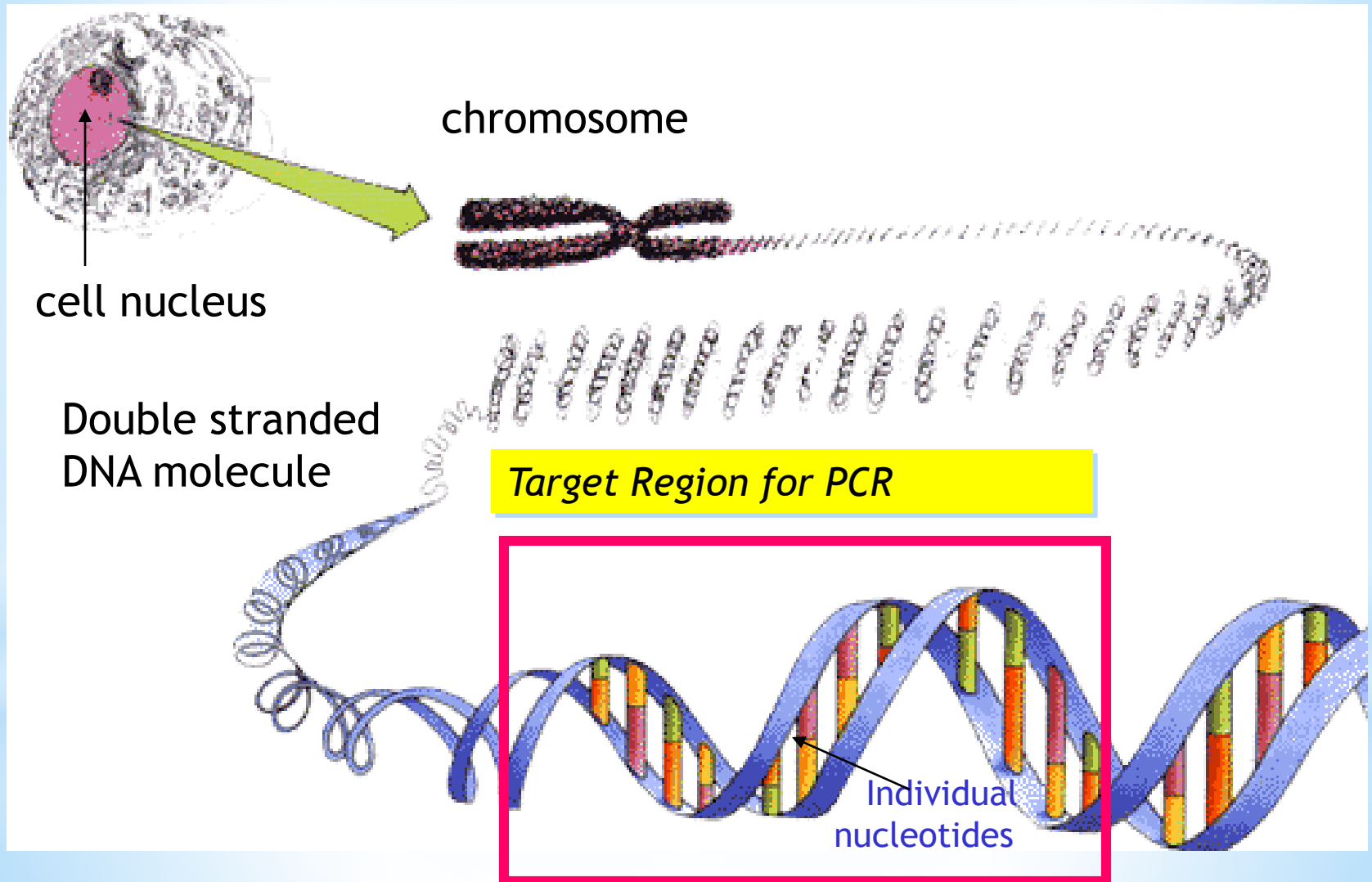
- this information is used to help us determine which DNA typing method to proceed with STRs and/ or YSTRs

Step 3: Amplification

Amplification is the process by which we make millions of identical copies of specific areas of the DNA where we know there are differences between individuals.

PCR – Polymerase Chain Reaction
the “Molecular Xerox” machine

Step 3: Amplification

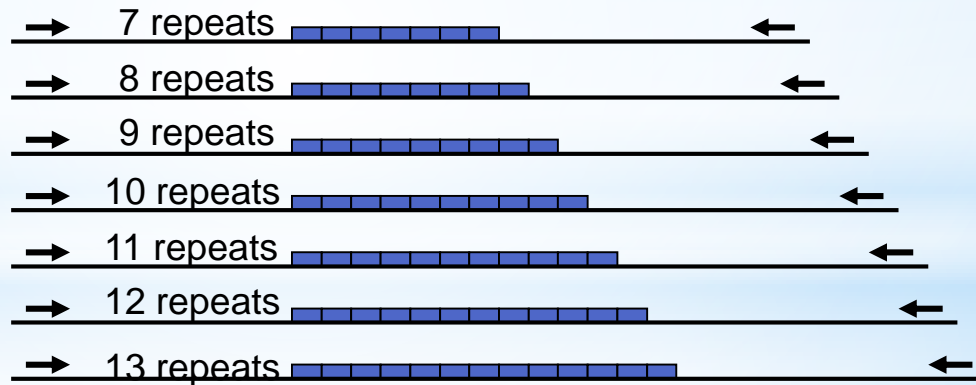


What are STRs?

STRs = Short Tandem Repeats

TCCCAAGCTCTTCCTCCTTCCCTAGATCAATACAGACAGAAGAC
AGGTG**GATAGATAGATAGATAGATAGATAGATAGATAGATA**
GATAGATATCATTGAAAGACAAAACAGAGATGGATGATAGA
TACATGCTTACAGATGCACAC

= 12 GATA repeats (“12” is all that is reported)



Target region
(short tandem repeat)

SNP

short tandem repeat (STR)



Man 1 GTACT**T**AGACTACTACTACTACTACTCTGGTG...
5 repeats

Man 2 GTAC**A**AGACTACTACTACTACTACTACTACTCTGGTG...
6 repeats

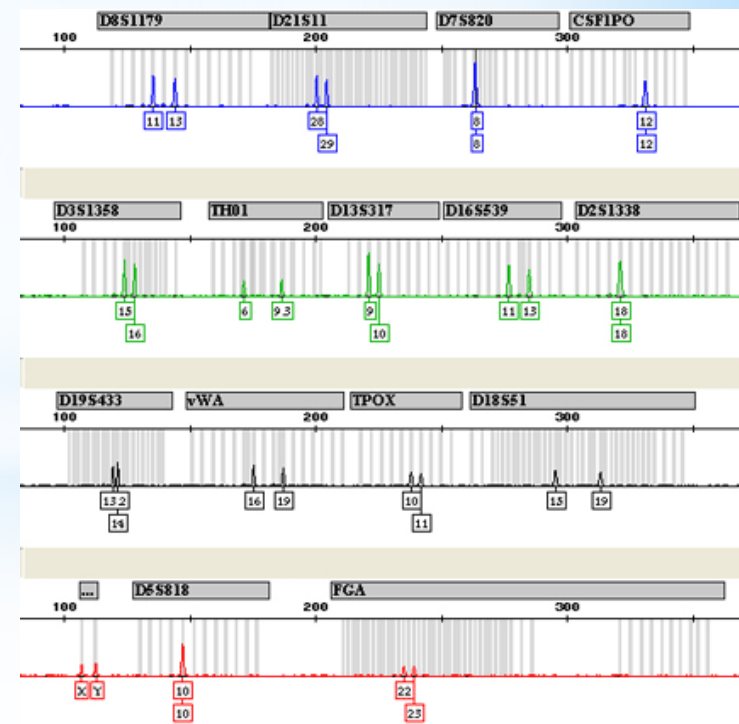
Man 3 GTAC**A**AGACTACTACTACTACTACTACTACTACTCTGGTG...
7 repeats

*STR Background

Step 4: Data Analysis

The copied pieces of DNA from the amplification process are separated by size via capillary electrophoresis.

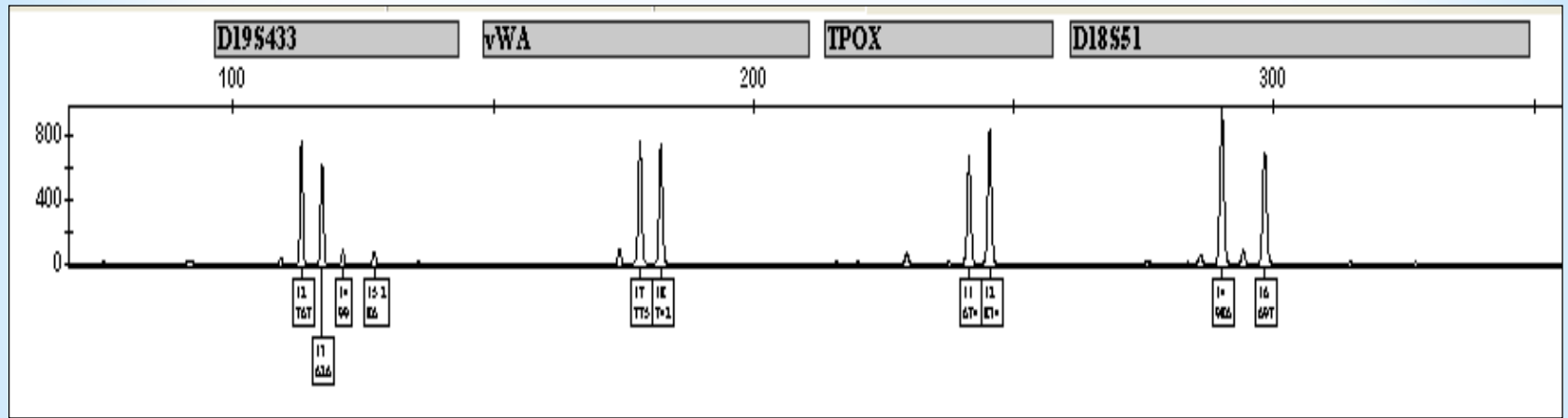
- The electronic data can be visualized.
The result is what we call a
DNA Profile
- Comparing the resulting alleles at every locus allows us to *include* or *exclude* potential contributors to the evidentiary stain.



- * Conventional DNA typing in the forensic community
- * Identifies both male and female DNA
- * Ability to upload into CODIS
- * Best statistical significance with frequencies in the quintillions
- * If there is sufficient DNA, useful in cases with the following cases: Male:Female, Male:Male, Female:Female

***STR Advantages**

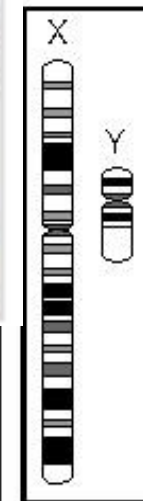
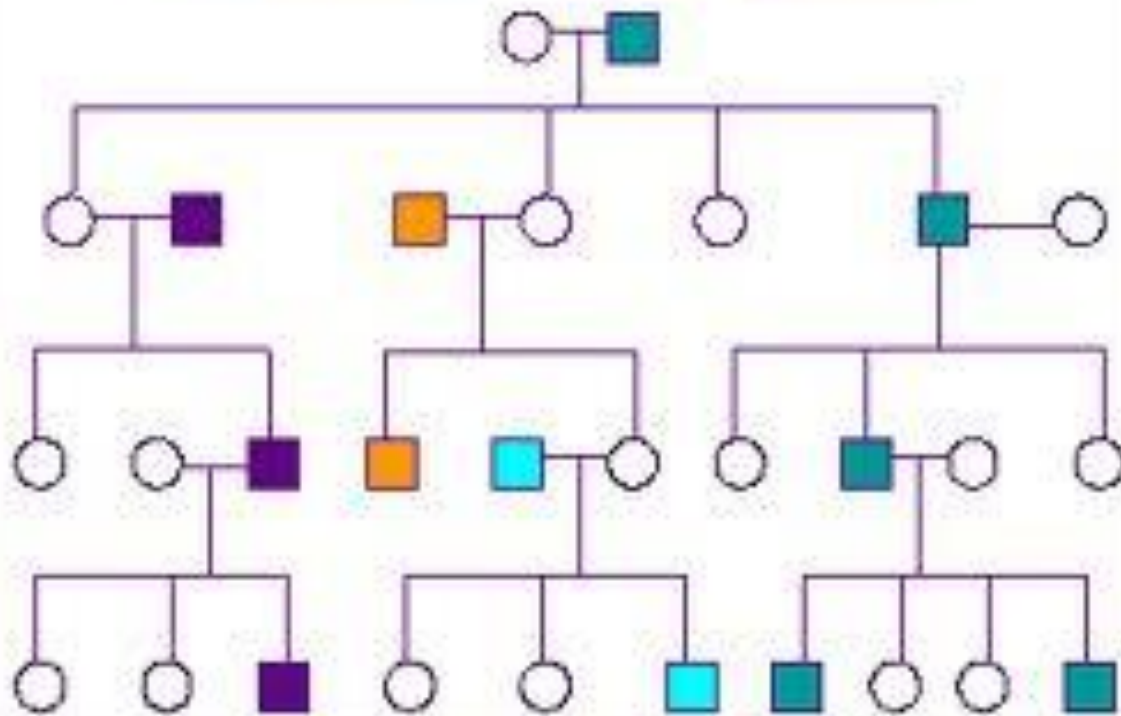
* Only detectable in minor profile in mixtures down to a 1:10 ratio



* Need a larger amount of DNA to identify a profile than the amount needed for Y-STR

* STR Limitations

Y Chromosome DNA is paternally inherited

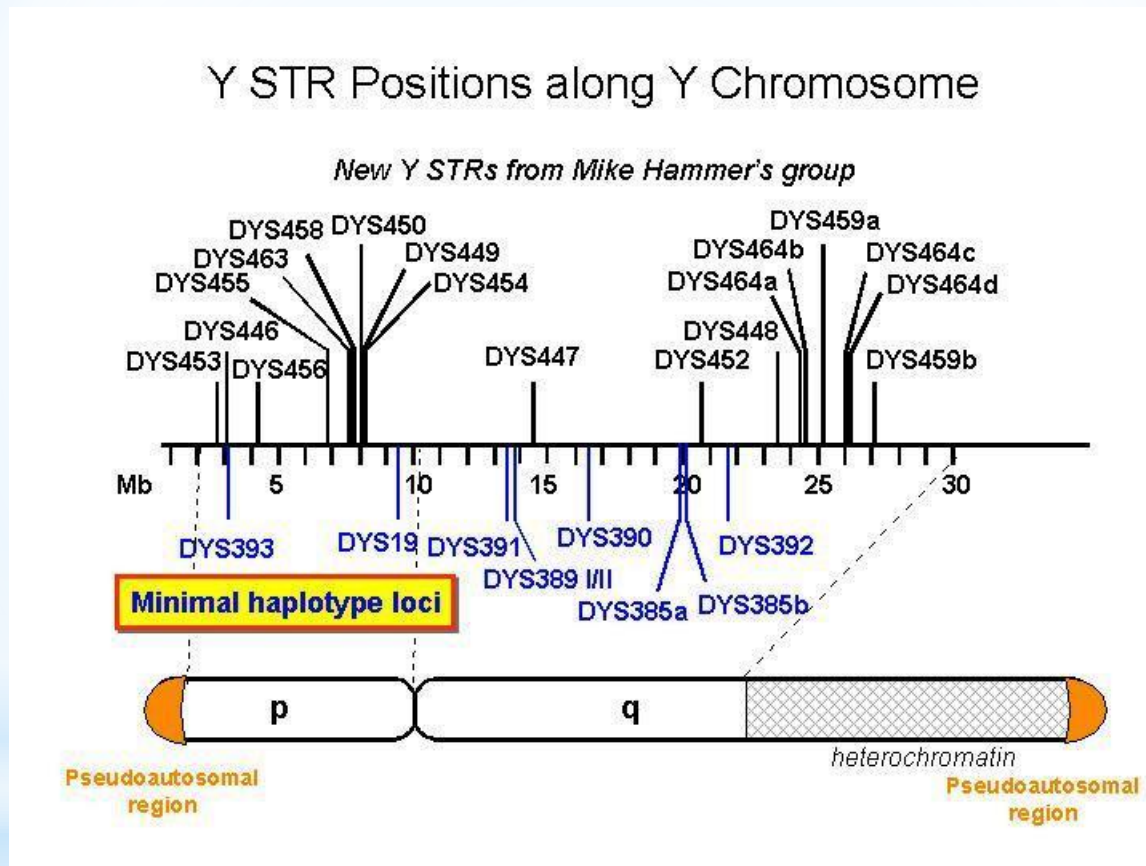


X chromosome

Y chromosome

*Y-STR Background

* All locations (loci) tested are on the Y Chromosome



* Y-STR Background

- **Highly sensitive method**

- * Useful for touched DNA cases
- * More sensitive than traditional DNA analysis (approximately 14 cells)
- * **Able to detect male profiles in male to female mixtures of 1:2000**

- **Useful for extreme mixture cases**

- * Examples: low sperm count or a-spermatic assailants or molestation cases



* **Y-STR Advantages**

- Courts have already widely accepted Y-STR typing
 - * same technology, instrumentation and analysis software as used with STRs
- Simplified statistics
 - * the counting method is used
- YSTR profile can be searched at the State Level

*Y-STR Advantages

● Paternal Inheritance

- * all male relatives share the same Y-STR profile
- * alleles do not undergo independent assortment

*** Lower power of discrimination = lower statistical significance**

*** Y-STR Limitations**

- Database of 18,547 individuals
 - new profiles still being added
- A searchable listing of 11- to 23-loci Y-STR haplotypes
- 5 main populations:
 - * African Americans
 - * Asians
 - * Caucasians
 - * Hispanics
 - * Native American
- * Funded by NIJ and managed by the National Center for Forensic Science (NCFS) and the University of Central Florida
- * <http://www.usystrdatabase.org/>

* **National Y-STR Database**

- *Future National Y-STR Database
- *Utah State Y-STR Database
- *Improved discrimination

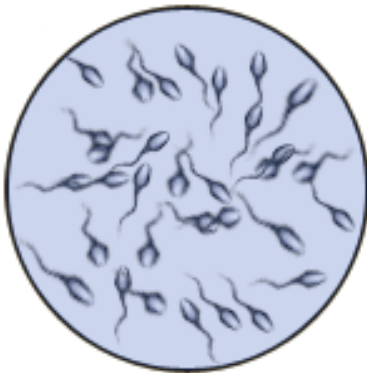
***Future of Y-STR DNA**

- * Out of kits brought to crime lab for analysis, 41 kits (43.6%) underwent DNA analysis
- * STR DNA analysis yielded positive autosomal DNA profile in 87% (27 kits) of kits tested with this method.
- * Y-STR DNA analysis yielded a positive Y-STR profile in 79% (19 kits) of kits tested with this method.

* DNA Analysis



Normal sperm count



Low sperm count



* Implication
for Practice

- * 70 hours from time of assault to evidence collection
- * Patient had bathed/showered
- * Positive Amylase on neck swab
- * Negative seminal fluid and amylase on all other swabs
- * Y-STR found on neck swab matched suspect



* 2010 Case
Study

- *58 hours from time of assault to evidence collection
- *Patient had bathed/showered, and removed/inserted a tampon
- *Suspect had ejaculated in vagina, unknown condom use
- *Vaginal and cervical swabs positive for seminal fluid
- *Y-STR and STR found on vaginal swabs matched suspect

*Case Study 2010

*“Collect oral swabs as victim bit suspect’s finger.”



*2011 Case Study

Evidence obtained by SANE

SWABS:

- * Oral
- * Lips, around mouth and chin
- * Jacket button
- * Lower abdomen
- * Outside of underwear

CLOTHING:

Jacket, tights, underwear, skirt

* 2011 Case Study

| Swab locations | DNA Profile | Traditional STRs | Suspect part of mixture |
|-------------------------------|----------------------|------------------|-------------------------|
| Pant UBFS | Not attempted | | |
| Jacket Shoulders | YES | More than 2 | No |
| Tights UBFS | YES | More than 1 | No |
| Underwear UBFS | No male DNA | | |
| | | | |
| <i>Lower Abdomen SANE</i> | <i>Not attempted</i> | | |
| <i>Underwear SANE</i> | YES | YES | YES |
| <i>Jacket Button SANE</i> | <i>No male DNA</i> | | |
| <i>Around pt's mouth SANE</i> | <i>Not attempted</i> | | |

*** DNA Yield of Traditional STR Testing**

| Swabs | DNA Profile | Y-STRs | Suspect part of mixture |
|---------------------------|--------------------|-----------------------|------------------------------------|
| Pants UBFS | No male DNA | | |
| Jacket Shoulders UBFS | YES | >3 males | YES - matches major portion |
| Tights UBFS | YES | > 1 male | YES - matches major portion |
| Underwear UBFS | No male DNA | | |
| | | | |
| <i>Lower abd. SANE</i> | <i>YES</i> | <i>YES</i> | <i>YES - matches major portion</i> |
| <i>Underwear SANE</i> | <i>YES</i> | <i>YES</i> | <i>YES - matches major portion</i> |
| <i>Jacket button SANE</i> | <i>No male DNA</i> | | |
| <i>Around mouth SANE</i> | <i>YES</i> | <i>YES, low level</i> | <i>YES - matches major portion</i> |

 **DNA Yield of Y-STR Testing**

- * 2 Swabs - Cervix and Posterior Fornix at Day 0, 10 days after consensual sex
- * Standard Y-STR testing - 12.3% detected DNA
- * Enhanced Y-STR testing - 60% detected DNA



* Post-Coital DNA Recovery Study Results

- * Additional years (2011 and 2012)
- * Additional areas of Utah
- * Expanded study looking at prevalence of self-disclosed mental illness/use of psychotropic medication and relationship to other demographic characteristics and kit being brought to UBFS
- * Expanded study examining “loss of consciousness or awareness” -Loss of consciousness? Tonic immobility? Dissociative symptoms?
- * Increase number of cases to complete logistic regression analysis

* **Future Research**

- * Sexual Assault Kit back log reduction
 - * Collaborate with local district attorneys and law enforcement
- * Triage of kits that have already been collected:
 - * An Agency Triage Program where the agency will review the case specifics and identify where the case belongs on the Laboratory Triage Scale. This will assist the laboratory in prioritizing cases (from immediate attention to cold case).
- * UQuiK:
 - * An in house trial study showed more efficient evidence processing by taking select swabs straight to DNA testing (no serology performed).
 - * During the trial, there was a dramatic decrease in turnaround time, ~25% of cases resulted in CODIS upload-able profiles.
 - * 33% of those resulted in CODIS hits.

* Future Crime lab Processing Goals

- * Globalfiler - will analyze 24 locations in a DNA sample vs. 16 we look at now
- * Yfiler Plus - will analyze more Y-STR locations
 - * More discriminating YSTR testing - individualize fathers and sons
- * Maxwell 16 - will improve our extraction efficiency
- * 3500xL - will run 24 samples at a time vs. the 4 we can run now

* Future and Upcoming Technologies



*Questions? Comments? Suggestions?