Case Connectivity Using DNA:
How Testing Sexual Assault Kits Can Link Criminal Cases

Case Connectivity Overview

Case connectivity refers to linking, or connecting, crimes committed by the same perpetrator. In the context of sexual assault, case connectivity means establishing that the person who committed a sexual assault can be linked to additional crimes. These additional crimes may be other sexual assaults—ranging from lower-level offenses (e.g., exhibitionism or voyeurism) to higher-level offenses (such as rape)—or they may be nonsexual crimes (e.g., robbery, drug offenses, burglary, or homicide). Establishing linkages between crimes can support investigation and prosecution by

- identifying or providing leads to previously unidentified perpetrators and
- establishing a pattern of serial offending.

Evidence from sexual assault kits (SAKs), including forensic evidence that could help establish case connectivity through DNA analysis, has been historically underutilized. However, more and more jurisdictions across the country are utilizing victim-centered, trauma-informed investigation practices that encourage submission of SAKs for DNA testing. This creates an increased likelihood that DNA profiles from SAKs can be used to establish case connectivity.

The goals of this brief are as follows:

- Explain case connectivity and establish its potential utility to law enforcement personnel and prosecutors.
- Define terms frequently used to discuss case connectivity.
- Review how DNA profiles obtained from evidence in a SAK can be used to establish case connectivity.
- Provide step-by-step directions about how DNA testing information can establish case connectivity.

Case Connectivity: An Example

To begin, let's consider a case study example. While reviewing the example, familiarize yourself with the content listed in the Important Terms section on page 3.

> In March 2006, a 27-year-old African American woman was sexually assaulted by someone she knew. After the assault, she went to a nearby hospital where an emergency department physician performed a medical forensic exam. She was screened and treated for injuries, STIs, and the risk of pregnancy from the assault. She also consented to the physician collecting a **sexual assault kit (SAK)**. After the medical forensic exam and evidence collection kit (more commonly known as a SAK) were completed, the victim signed the paperwork to have the SAK released to law enforcement with the purpose of having law enforcement submit the SAK for forensic DNA testing. She also gave a detailed report of the assault to law enforcement. However, law enforcement personnel did not investigate this case and the SAK was not submitted for **forensic DNA testing**.

> Two months later, in May 2006, a 29-year-old African American woman was sexually assaulted by someone she knew; she reported the incident to law enforcement and went to a hospital to have a SAK collected. Law enforcement did not investigate this case and the SAK was not submitted for forensic DNA testing.

> In July 2008, another woman was sexually assaulted by someone she knew. She did not have a SAK collected; however, she did report the assault to law enforcement. Law enforcement investigated this assault, and the assailant was arrested and prosecuted in February 2009. Per state law, the assailant's DNA profile was uploaded into the **Combined DNA Index System (CODIS)** when he was convicted. At the time, this offender's DNA profile was not in CODIS for any other crimes.

In June 2013, the previously submitted SAKs associated with the March 2006 and May 2006 sexual assaults were sent for DNA testing as part of a city-wide effort to resolve previously unsubmitted SAKs. This testing led to multiple **CODIS hits**. The first was a **case-to-case association** between the two previously unsubmitted SAKs; the DNA profiles obtained from both previously unsubmitted SAKs matched, indicating that the same assailant had assaulted both women. The second CODIS hit was an **offender hit**, in which the DNA profile obtained from the 2006 assaults **hit to** the DNA profile that had been uploaded into CODIS after the 2009 conviction. Both the case-to-case association and the offender hit established **case connectivity** to other crimes. Specifically, the CODIS hits revealed a pattern of **serial sexual offending**, in which the assailant sexually assaulted multiple victims. Once the cases were connected via the offender's DNA profile, the assailant's pattern of offending became evident.

Important Terms

Sexual assault kit (SAK)—A victim may choose to have evidence for a SAK collected if they seek medical care after a sexual assault. SAK evidence collection involves gathering biological evidence from victims' bodies; swabbing the vagina or penis, anus, mouth, and/or breasts to collect any semen, blood, or saliva. In some instances, SAK evidence collection may also involve obtaining fingernail scrapings and plucking hairs from the head and pubic area. Other pieces of evidence may not fit inside the kit (e.g., victim's clothing, feminine hygiene products) but may be collected and submitted together with the SAK for DNA testing and analysis.

Forensic DNA testing—The samples in the SAK may be screened for biological evidence that can be further analyzed for DNA or the samples may be processed directly for DNA without screening. For samples that contain semen, forensic scientists use a process that attempts to separate the victim's cells from those of the possible perpetrator. DNA profiles from the separated cell types are then generated. In other sample types, such as blood and saliva, no processes currently exist to effectively separate cells. However, the forensic scientist will still attempt to obtain the offender's DNA profile by another means (for example, the victim's body may have dried saliva from the assailant). If a DNA profile of sufficient quality is obtained (i.e., a DNA profile with the requisite core loci for that specimen type) and there is reasonable belief that the sample is from the likely perpetrator, the DNA profile can then be uploaded into CODIS.

Combined DNA Index System (CODIS)—An FBI database that houses DNA profiles collected from known criminal offenders and from crime scenes. The *offender index* houses DNA profiles obtained from samples collected from known offenders, such as samples taken upon conviction and incarceration (and, where the law applies, upon arrest). The *forensic database* houses DNA profiles collected from crime scenes or evidence collected from a SAK.

CODIS-qualifying offense—The offense that qualified a known offender's DNA profile for entry into the offender database of CODIS.

Crime scene offense type—The offense that qualified an unknown offender's DNA profile for entry into the forensic database of CODIS.

CODIS hit—CODIS hits can be described as an offender hit, a forensic hit, or a case-to-case association (see definition below). A hit of any type occurs when a newly uploaded DNA profile matches with, or "hits to," a DNA profile already in CODIS.

Offender hit—A type of CODIS hit in which the newly uploaded DNA profile matches a DNA profile in the offender index; this index houses DNA profiles of known offenders. When an offender hit occurs, this means that the DNA profile obtained in the SAK matches the DNA profile of an individual who was arrested for and/ or convicted of at least one other crime.

Forensic hit—A type of CODIS hit in which the newly uploaded DNA profile matches to a DNA profile in the forensic index; this index houses DNA profiles from unidentified offenders. When a forensic CODIS hit occurs, this means that the DNA profile obtained in the SAK matches the DNA profile found at a crime scene, but the offender's identity is not (yet) known in CODIS (although the offender's identity may be listed in the case file).

Case-to-case association—A type of CODIS hit in which two or more newly uploaded DNA profiles match to each other.

Case connectivity—Multiple crimes committed by the same offender. Offender hits, forensic hits, and case-to-case associations establish case connectivity by revealing other crimes the offender has committed (i.e., the CODIS-qualifying offense and the crime scene offense type).

Serial sexual offending—Multiple sexual assaults committed by the same offender. An individual becomes a serial offender when they commit two or more sexual assaults against two or more victims. A CODIS hit establishes serial sexual offending when a hit is linked to (a) an offender whose CODIS-qualifying offense is a sexual assault or (b) a forensic sample that was collected from a sexual assault. A case-to-case association between two or more SAKs also establishes serial sexual offending because the cases are sexual assaults.
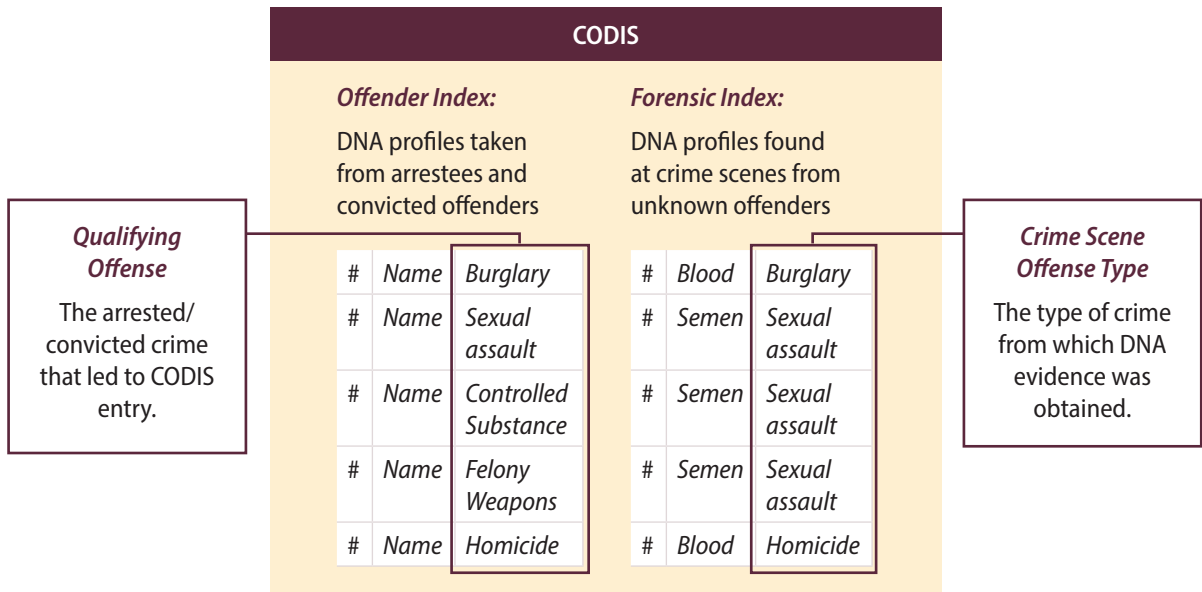
Establishing Case Connectivity Through CODIS

Forensic DNA testing of SAKs can establish case connectivity. A wealth of information exists in CODIS, and DNA profiles from SAKs that are matched to DNA profiles in CODIS can establish case connectivity. Let's begin by understanding the structure of CODIS and the information CODIS stores.
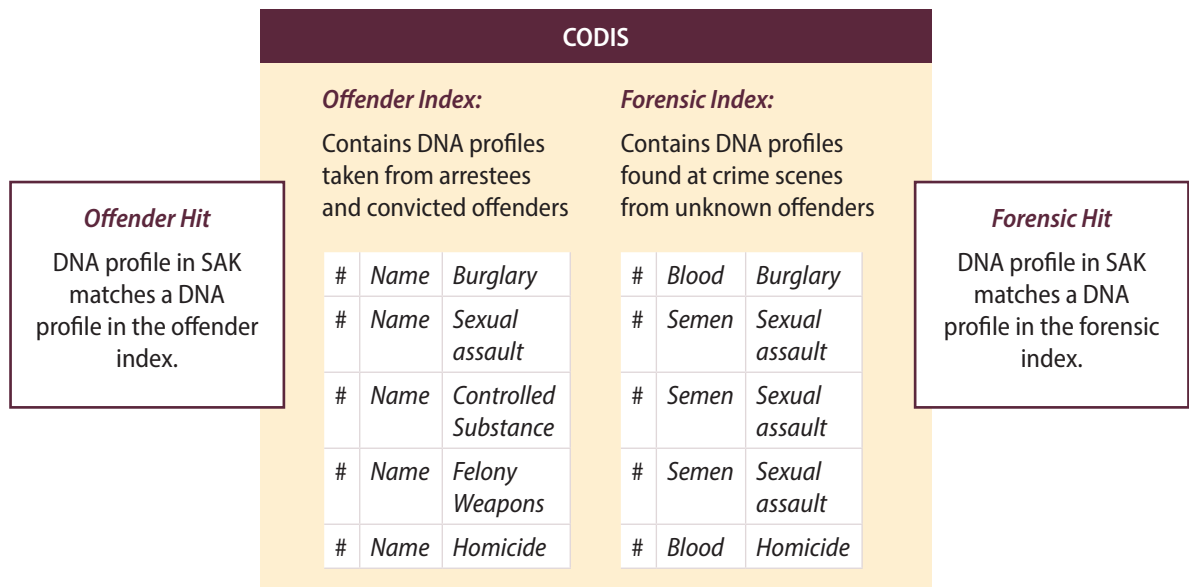
CODIS	
Offender Index:	**Forensic Index:**
Contains DNA profiles taken from arrestees and/or convicted offenders	Contains DNA profiles found at crime scenes from unknown offenders

CODIS consists of two indexing systems: The *offender index* and the *forensic index*. When the offender's identity is known, a DNA profile obtained from a convicted or an arrested offender sample is uploaded in the offender index (where applicable by law). When the DNA profile is obtained from a sample collected at a crime scene, the DNA profile is uploaded in the forensic index.

For an offender's DNA profile to be uploaded into CODIS, the crime committed (known as the *qualifying offense* in the offender index and the *crime scene offense type* in the forensic index) must be one that meets the federal requirements for CODIS entry. The crime is recorded with the DNA profile in either the offender or forensic index, making it possible to determine the type of crime that led to a DNA profile's entry into CODIS.

CODIS					
Offender Index: DNA profiles taken from arrestees and convicted offenders			**Forensic Index:** DNA profiles found at crime scenes from unknown offenders		
#	Name	Burglary	#	Blood	Burglary
#	Name	Sexual assault	#	Semen	Sexual assault
#	Name	Controlled Substance	#	Semen	Sexual assault
#	Name	Felony Weapons	#	Semen	Sexual assault
#	Name	Homicide	#	Blood	Homicide

Qualifying Offense

The arrested/ convicted crime that led to CODIS entry.

Crime Scene Offense Type

The type of crime from which DNA evidence was obtained.

Newly uploaded DNA profiles can hit to either the offender index or forensic index; those hits can provide important information about crimes committed by offenders.

CODIS

Offender Hit

DNA profile in SAK matches a DNA profile in the offender index.

Offender Index:

Contains DNA profiles taken from arrestees and convicted offenders

#	Name	Burglary
#	Name	Sexual assault
#	Name	Controlled Substance
#	Name	Felony Weapons
#	Name	Homicide

Forensic Index:

Contains DNA profiles found at crime scenes from unknown offenders

#	Blood	Burglary
#	Semen	Sexual assault
#	Semen	Sexual assault
#	Semen	Sexual assault
#	Blood	Homicide

Forensic Hit

DNA profile in SAK matches a DNA profile in the forensic index.

In cases in which the offender is unknown, an offender hit occurs when a newly uploaded DNA profile obtained from SAK evidence matches to an arrested and/or a convicted offender profile already in CODIS. If the newly uploaded DNA profile belongs to an unidentified offender, this hit can reveal the offender's identity. If the DNA profile from the SAK (or a newly uploaded DNA profile) hits to a DNA profile in which the CODIS-qualifying offense was a sexual assault, this hit can also establish a pattern of serial sexual offending.

Alternatively, if a newly uploaded DNA profile obtained from SAK evidence matches a DNA profile in the forensic index, a forensic hit has occurred. If the newly uploaded DNA profile hits to a forensic sample from a sexual assault, this would also establish a pattern of serial sexual offending.

One specific type of CODIS hit that can occur is a "case-to-case association," which indicates that two newly uploaded SAKs have DNA profiles that match to each other. If the offender was known to both victims, then the case-to-case association establishes the offender as a serial sexual perpetrator. If the offender's identity was known in one SAK but not the other, this case-to-case association has established the unknown perpetrator's identity in the second SAK. If the offenders are unknown in both cases, a pattern of serial sexual perpetration has still been established, and a future CODIS hit may identify the offender.

Case Studies

The following case studies illustrate how testing SAKs and uploading DNA profiles into CODIS can establish case connectivity.

Case Study 1: CODIS hit reveals serial sexual offending.

A community tests its previously unsubmitted SAKs, and an offender's DNA profile is obtained from SAK evidence. An offender hit occurs when the DNA profile is uploaded into CODIS. The qualifying offense was a sexual assault for which the perpetrator was arrested years ago.

What we've learned: Testing the previously unsubmitted SAK and uploading the DNA profile into CODIS enabled us to identify a previously unidentified pattern of serial sexual perpetration.

Case Study 2: CODIS hit reveals case connectivity to other crimes and identifies an unknown perpetrator.

An offender's DNA profile is obtained from a previously unsubmitted SAK. The offender was known to the victim. When the profile is uploaded into CODIS, the offender's DNA profile hits to the forensic index; that same DNA profile was collected from a series of unsolved robberies.

What we've learned: The DNA profile did not hit to any other sexual assaults, so there is no indication of serial sexual offending. However, the CODIS hit did reveal a pattern of serial *criminal* offending, in which the offender committed a string of robberies, as well as the sexual assault indicated by the SAK. Additionally, the offender's identity was known from the SAK but not from the robberies; therefore, testing the SAK and uploading the DNA profile into CODIS revealed the identity of a previously unidentified serial robber.

Case Study 3: Case-to-case association identifies an unknown perpetrator and establishes serial sexual offending, and a forensic hit identifies an unknown perpetrator.

An offender's DNA profile is found in two previously unsubmitted SAKs. One SAK was collected from an assault in which the offender was a stranger to the victim, and the other was collected from an assault in which the offender was known to the victim. When these SAKs are tested and the DNA profiles are uploaded into CODIS, the offender's DNA profile hits to the forensic index, in which the qualifying offense was a homicide.

What we've learned: The case-to-case association from the two previously unsubmitted SAKs identified a pattern of serial sexual offending. Because the offender's identity was known in one SAK and not the other, the case-to-case association also revealed the identity of a previously unidentified perpetrator. Finally, the forensic hit to the homicide not only established case connectivity, but also provided detectives with a good lead as to the previously unknown perpetrator's identity.

Using CODIS Data To Establish Case Connectivity: Step-By-Step Directions For Researchers And Analysts

Up to this point, we've talked conceptually about using CODIS to establish case connectivity. This section will walk through the logistical steps needed to develop this connectivity. We anticipate that this "how to" section will be particularly applicable for the researchers or crime analysts who manage and analyze SAK and CODIS data.

These steps presume the following:

- You have already submitted SAKs for forensic testing and the obtained DNA profiles have been submitted to CODIS.

- You are now ready to use those forensic testing results to establish case connectivity to understand serial perpetration in your community.

1. **Establish important relationships.** Identify your local CODIS Administrator and develop a partnership. CODIS Administrators are heavily tasked with technical and analytical responsibilities, so they may have limited availability and capacity. Building a positive working relationship with your CODIS Administrator is integral to the following steps. Discuss your project goals and how the CODIS Administrator can assist you with the process. Consider discussing the following:

   a. What types of data is the CODIS Administrator able to share with you? (Step 2 outlines some suggestions for what you might like to request.)

   b. Will the CODIS Administrator provide you with the data only, or is this person available to help with interpretation as well?

   c. What is the best way for you to communicate with the CODIS Administrator if you run into any problems or have questions?

   We recommend that you form a written agreement, such as a Memorandum of Understanding, that outlines your agreements regarding what data will be shared.

2. **Understand what types of information you'll need to request from your CODIS Administrator.** Your CODIS Administrator will likely use technical language to discuss this project. It is helpful for researchers, criminal justice professionals, and forensic personnel to develop a common language around forensic testing when involved in these projects. Consider becoming familiar with the following concepts and terms:

   a. Every tested SAK will have an assigned identification (ID) number for tracking purposes; these IDs are frequently referred to as the *kit numbers*, kit IDs, or SAK IDs. You can use this ID number to track SAKs in your own study. In our examples, we will refer to this as the *kit number*.

   b. When SAKs are tested, a forensic scientist may be able to obtain a DNA profile from the samples in each SAK. The DNA profiles are most frequently referred to as *forensic samples* and every forensic sample will have an ID number assigned to it for tracking purposes. These are frequently referred to as *ForSIDs* (i.e., forensic sample IDs) and that is how we will refer to them in our example.

   c. Every forensic sample uploaded to CODIS will be accompanied by an offense code, either a CODIS-qualifying offense code or a crime scene offense type code. These offense codes can help determine the type of crime for which each forensic sample was uploaded. Each state has a different way of organizing this information, so talk with your CODIS Administrator about how this works in your jurisdiction. In our examples, we will refer to these as *QOCode* (i.e., CODIS-Qualifying Offense Code) and *ForClass* (i.e., Crime Scene Offense Type).

3. **Decide on the list of cases for which you'd like to establish case connectivity.** Work with your SAKI team and CODIS Administrator to determine a list of cases for which you'd like to establish case connectivity. For example, you may choose all SAKs tested in the last year or all SAKs tested with a particular set of funding. Communicate with your CODIS Administrator about your list and consider discussing the following questions:

   a. How is your list organized? Is it compiled by *kit number* or another ID?

   b. How many cases should the CODIS Administrator anticipate being on your list?

4. **Obtain data necessary for establishing case connectivity.** Request the following types of information from your CODIS Administrator for each of the cases on your list. Depending on the CODIS Administrator's capacity, consider whether some of this information could be gathered in CODIS hit reports sent to law enforcement agencies:

   a. *The ID numbers for each case in your list.* Using the *kit number* will likely be easiest.

KITNumber
KIT1
KIT1
KIT2
KIT3

   The *kit numbers* that you encounter when working with real data may look more similar to the following:

KITNumber
KIT12-3456
KIT12-3456
KIT34-5678
KIT56-7890

b. *The ID numbers for the forensic samples obtained from evidence in each SAK.* In our example, we refer to this as ForSID1. Note that a single SAK may contain multiple forensic samples. This could happen in a variety of circumstances, including if multiple perpetrators sexually assaulted a single person. Each perpetrator would have a different DNA profile in the SAK; as such, each DNA profile would have its own ForSID. This number typically begins with its associated kit number. In this example, you can see how two ForSIDs may be associated with a single SAK (both KIT1-A and KIT1-B are from KIT1).

KITNumber	ForSID1
KIT1	KIT1-A
KIT1	KIT1-B
KIT2	KIT2-A
KIT3	KIT3-A

The ForSID1s that you encounter when working with real data may look more similar to the following:

KITNumber	ForSID1
KIT12-3456	KIT12-3456-E01-SF
KIT12-3456	KIT12-3456-E02-ER
KIT34-5678	KIT34-5678-E01
KIT56-7890	KIT56-7890-E01

c. *The crime associated with each ForSID1.* In our example, we refer to this as ForClass1. Given that all of these forensic samples are associated with SAKs, you may expect that all of their crime codes will also represent sexual assaults. In this example, we use *1100* to represent a sexual assault.

KITNumber	ForSID1	ForClass1
KIT1	KIT1-A	1100
KIT1	KIT1-B	1100
KIT2	KIT2-A	1100
KIT3	KIT3-A	1100

d. *The CODIS-qualifying offenses hitting to your research team's cases.* Each CODIS-qualifying offense will be listed with a state-specific code. In our example, we refer to this as the QOCode. (In some states, there may be a state-specific acronym that references state laws or crime codes. In Michigan, it is called an MCL number.) These represent an offender hit. You will need to ask your CODIS Administrator for a list of these crime codes so that you may interpret them. In this example, we use *740.56* to represent a sexual assault. Note that only forensic samples associated with an offender hit will have a QOCode. In this example, you can see how KIT2-A hit to a qualifying offense.

KITNumber	ForSID1	ForClass1	QOCode
KIT1	KIT1-A	1100	
KIT1	KIT1-B	1100	
KIT2	KIT2-A	1100	740.56
KIT3	KIT3-A	1100	

e. *The ID numbers for the forensic samples hitting to your research team's cases.* In our example, we refer to this as ForSID2. These represent instances of a forensic hit. Note that not every ForSID1 will have an associated ForSID2 because not every SAK will hit to an unknown offender's DNA profile in CODIS. In this example, the forensic samples KIT1-B and KIT3-A each have a forensic hit.

KITNumber	ForSID1	ForClass1	QOCode	ForSID2
KIT1	KIT1-A	1100		
KIT1	KIT1-B	1100		KIT4-A
KIT2	KIT2-A	1100	740.56	
KIT3	KIT3-A	1100		KIT5-A

f. *The crime scene offense type associated with each ForSID2.* In our example, we refer to this as ForClass2. This is similar to ForClass1 in that if the forensic sample had been uploaded to CODIS as the result of a burglary, the associated crime code for burglary would be used. Unlike ForClass1, however, you can expect that these will not all be sexual assaults, indicating that they were uploaded into CODIS for a variety of crimes. Ask your CODIS Administrator for a list of these crime codes so that you may interpret them properly. In this example, we use *1100* to represent a sexual assault and *3600* to represent a nonsexual assault (e.g., a burglary).

KITNumber	ForSID1	ForClass1	QOCode	ForSID2	ForClass2
KIT1	KIT1-A	1100			
KIT1	KIT1-B	1100		KIT4-A	1100
KIT2	KIT2-A	1100	740.56		
KIT3	KIT3-A	1100		KIT5-A	3600

g. You may also request information on Match Date (i.e., the date a case matched to a forensic sample or qualifying offense) or Agency ID (i.e., the agency by which a case was processed) if you feel this information would help your understanding of case connectivity.

Ask that your CODIS Administrator export all of the information into an Excel spreadsheet that they pulled. Each spreadsheet row should represent a unique forensic sample. If the CODIS Administrator cannot gather this information into an Excel spreadsheet, you may be able to submit a list of SAKs to the CODIS Administrator to generate an administrative query for CODIS hit reports. This creates more work for the researcher or crime analyst. This individual will have to mine and code reports for the information; however, it is a back-up option if the CODIS Administrator's capacity or engagement is limited.

5. Clean your data. Your dataset will likely contain some data entry errors or duplicate cases. Work with your CODIS Administrator to find the best way to correct these types of errors. Also consider the following:

a. Add a column to the spreadsheet named *Row Number*. This may make sorting data easier when you begin to work more closely with the data.

Row Number	KITNumber	ForSID1
1	KIT1	KIT1-A
2	KIT1	KIT1-B
3	KIT2	KIT2-A
4	KIT3	KIT3-A

b. Add columns to describe the crime codes your CODIS Administrator provided. In this example, we created a variable called CrimeClass2 that describes, in text, the crime codes recorded by ForClass2. This is not necessary but will likely make data interpretation more straightforward.

ForSID2	ForClass2	CrimeClass2
KIT4-A	1100	Sexual assault
KIT5-A	3600	Burglary

c. Add columns to track your case connectivity findings, including the following:

  i. Offender hit: Use a (yes/no) or (1/0) scheme to track whether the specific spreadsheet row is representative of an offender hit.

  ii. Forensic hit: Use a (yes/no) or (1/0) scheme to track whether the specific row in the spreadsheet is representative of a forensic hit.

Row Number	KITNumber	ForSID1	ForClass1	QOCode	ForSID2	ForClass2	CrimeClass2	Offender Hit	Forensic Hit
1	KIT1	KIT1-A	1100					0	0
2	KIT1	KIT1-B	1100		KIT4-A	1100	Sexual assault	0	1
3	KIT2	KIT2-A	1100	740.56				1	0
4	KIT3	KIT3-A	1100		KIT5-A	3600	Burglary	0	1

6. Establish case connectivity. Using Excel's sort and filter features will be important to help identify whether each case in your sample has an offender hit or a forensic hit.

  a. *To identify cases with offender hits,* filter your data such that you can see cases with qualifying offenses (e.g., QOCode) only. For each of these cases, mark a "1" or a "yes" for offender hit. In this example, KIT2 has an associated QOCode, meaning the case matched to a CODIS-qualifying offense and therefore had an offender hit. Given that our example QOCode of 740.56 is intended to represent a sexual assault, this offender hit implies serial sexual offending.

Row Number	KITNumber	ForSID1	ForClass1	QOCode	ForSID2	ForClass2	CrimeClass2	Offender Hit	Forensic Hit
1	KIT1	KIT1-A	1100					0	0
2	KIT1	KIT1-B	1100		KIT4-A	1100	Sexual assault	0	1
3	KIT2	KIT2-A	1100	740.56				1	0
4	KIT3	KIT3-A	1100		KIT5-A	3600	Burglary	0	1

  b. *To identify cases with forensic hits,* filter your data such that you can see cases with ForSID2 only. For each case, mark a "1" or a "yes" for forensic hit. In the following example, both KITs 1 and 3 had associated ForSID2, meaning that both KIT1 and KIT3 have a forensic hit. These forensic hits have associated crime scene offense types (i.e., ForClass2) that indicate the type of crime associated with these forensic samples.

Row Number	KITNumber	ForSID1	ForClass1	QOCode	ForSID2	ForClass2	CrimeClass2	Offender Hit	Forensic Hit
1	KIT1	KIT1-A	1100					0	0
2	KIT1	KIT1-B	1100		KIT4-A	1100	Sexual assault	0	1
3	KIT2	KIT2-A	1100	740.56				1	0
4	KIT3	KIT3-A	1100		KIT5-A	3600	Burglary	0	1

We can see that KIT1 in the table above has two associated forensic samples: KIT1-A and KIT1-B. Kit1-A does not appear to have a forensic hit, but the forensic sample KIT1-B does have a forensic hit to KIT4-A. KIT4-A was uploaded into CODIS for a sexual assault; therefore, this forensic hit between KIT1-B and KIT4-A indicates serial sexual offending. Note that even though KIT1 has one forensic sample that did not have a forensic hit, we would still say that the kit has a forensic hit overall.

Turning now to KIT3, we can see that it has only one forensic sample, KIT3-A. This forensic sample appears to have hit to the forensic sample KIT5-A. The associated crime code for KIT5-A is a burglary, which does not imply serial sexual offending.

c. *To identify cases with both offender and forensic hits,* use your newly created columns of Offender Hit and Forensic Hit to filter your data such that you can see SAKs that have both offender and forensic hits only. The table below shows what this might look like.

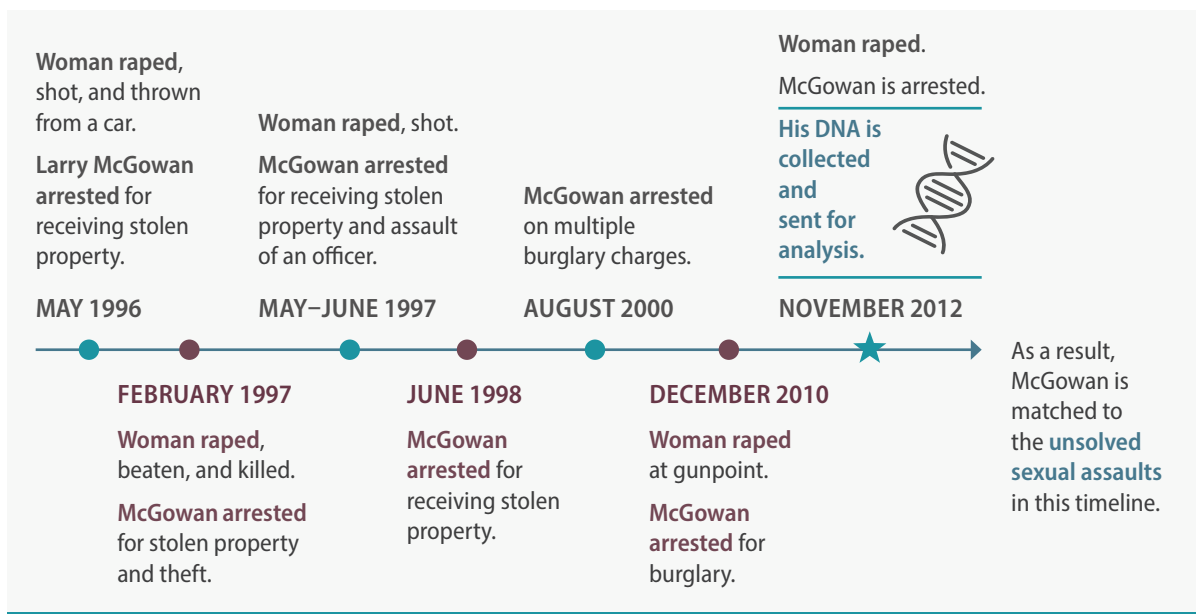| Row Number	KITNumber	ForSID1	ForClass1	QOCode	ForSID2	ForClass2	CrimeClass2	Offender Hit	Forensic Hit
1	KIT7	KIT7-A	1100					0	0
2	KIT7	KIT7-B	1100		KIT8-A	1100	Sexual assault	0	1
3	KIT7	KIT7-B	1100		KIT9-B	3600	Burglary	0	1
4	KIT7	KIT7-B	1100	740.56				1	0

KIT7 has both offender and forensic hits associated with it in the table above. Forensic sample KIT7-A did not make any connections in CODIS, but there were multiple hits for forensic sample KIT7-B. The first is a forensic hit to KIT8-A, a sexual assault. The second is a forensic hit to KIT9-B, a burglary. The third represents an offender hit to another sexual assault. (We know this because 740.56 is the QOCode for sexual assault.) From this, we can interpret that a single offender committed four unique crimes: (1) the sexual assault represented by the SAK in the sample, KIT7; (2) the sexual assault represented by the first forensic hit to KIT8-A; (3) the burglary represented by the second forensic hit to KIT9-B; and (4) the sexual assault represented by the CODIS-qualifying offense.

d. *To identify cases without any forensic hits and/or qualifying offenses (i.e., cases that had no connections),* filter your data such that you can see only cases without offender hits and/or forensic hits. These cases represent those whose only records in CODIS are those represented by the SAKs in the sample. In other words, these are the SAKs that did not have an offender or a forensic hit.

7. **Consider pulling case studies to represent your findings.** Case studies can be a powerful way to illustrate your findings to key stakeholders, policymakers, media, or the public. The graphic on this page draws from a case example in a SAKI jurisdiction. You can create a similar timeline using a free online tool at www.canva.com or similar websites.

Criminal Timeline of a Serial Rapist
Collecting, submitting, and testing sexual assault kits can help communities identify and prosecute serial rapists like **Larry McGowan**.

Woman raped, shot, and thrown from a car.
Larry McGowan arrested for receiving stolen property.
MAY 1996

Woman raped, shot.
McGowan arrested for receiving stolen property and assault of an officer.
MAY–JUNE 1997

McGowan arrested on multiple burglary charges.
AUGUST 2000

Woman raped.
McGowan is arrested.
His DNA is collected and sent for analysis.
NOVEMBER 2012

FEBRUARY 1997
Woman raped, beaten, and killed.
McGowan arrested for stolen property and theft.

JUNE 1998
McGowan arrested for receiving stolen property.

DECEMBER 2010
Woman raped at gunpoint.
McGowan arrested for burglary.

As a result, McGowan is matched to the **unsolved sexual assaults** in this timeline.

Concluding Thoughts

This brief explored the potential utility of SAK forensic analysis in establishing case connectivity. Case connectivity can identify patterns of serial sexual perpetration and serial criminal perpetration, and can also provide valuable investigative leads in identifying previously unknown offenders. Although SAK and CODIS data are incredibly powerful tools toward these ends, the corresponding data are difficult to organize and analyze. The step-by-step directions in this document are meant to help researchers and analysts navigate these data as these individuals use SAK forensic testing results to establish case connectivity.

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