Solving Cold Cases Using Modern DNA Technologies

Michael Holbrook

Abstract

This research paper explores the integration of newer DNA technologies as it relates to solving cold case homicides. The paper discusses the importance of solving these crimes for the families of victims and society as a whole. The research compares some of the scientific advances from early blood-typing to the most current of DNA technologies. It also explores the early crime scene collection techniques in comparison to current forensic protocols. Finally, a survey was distributed to law enforcement agencies throughout Florida inquiring about the obstacles encountered in meshing newer DNA Technologies into investigations of cold case homicides. Florida agencies were also asked what they believe would maximize their efforts in the process of integrating the newer technologies to solve more of their cold homicide cases.

Introduction

In our society, the sanctity of human life has always been the stalwart of what defines a civilized world from primitive cultures. Even in the world today there are governments, religions, and groups that place little or no value on a human life. Criminal actions that result in homicide fracture the sense of well-being in our society. As such, bringing resolution to the intentional taking of a human life is given a high priority. Over the last 100 years, law enforcement has made great strides in crime scene investigations. The advances come not only in basic evidence-collection techniques but in the application of the sciences as an investigative tool. DNA technologies have developed at a pace far beyond what was believed possible when it was introduced into the criminal justice system in the 1980s. As such, using newer DNA technologies to solve homicides previously believed to be unsolvable has become more of a focal point in the law enforcement community. One of the benchmarks a law enforcement agency is assessed on is solving homicides. Leaving homicide cases unsolved can cause a community to live in a state where it not only lives in fear, but also lacks confidence in its police department.

This research project will focus on what are the obstacles in using new DNA technologies to solve cold homicide cases and what support can be provided to assist law enforcement in resolving cold cases, including:

- discussion on the obligation to solve cold homicide cases
- federal and state statistical data on homicides clearance rates
- technological advances in DNA that could help resolve cold cases
- the progression in crime scene methodology to keep pace with science; and unforeseen obstacles that may prohibit successful prosecutions

Literature Review

The Need to Solve Cold Homicides

The senseless killing of a human being disrupts the lives of so many people in the community. Such a violent act affects neighbors, co-workers and the community at large, but it is especially devastating to the family and close friends of the victim. Family survivors, often referred to as secondary victims, are almost always traumatized by the unexpected and senseless loss of a loved one. "Secondary victims reportedly experienced insomnia, feelings of insecurity, remorse about happiness, and a perpetual anxiety about memories of the deceased and homicide being triggered. They also report loss of innocence, of peace of mind, and of trust and faith in other people" (Morrall, 2011, para. 32).

This is the reality that families of murder victims are left with every day. Imagine the devastated family of a murder victim where the case has gone cold and remains unsolved. "Many secondary victims of homicide experience an extraordinary bereavement that contains facets of psychological and physiological distress associated with PTSD" (Morrall, 2011, para. 36). The fact the murder of a beloved family member remains un-resolved can heighten the emotional distress to the secondary victims. According to author Bruce Gross, "survivors may struggle with a loss of faith and feel as if their very core and connection to the world is lost. The magnitude of these feelings can easily develop into a diagnosable depressive disorder" (Gross, 2007, para. 4). The timely apprehension and subsequent conviction of a suspect may bring an end to the judicial process, but few secondary victims will ever experience a sense of closure in the abrupt loss of a loved one who was the victim of a homicide. Relatives of homicide victims have many unanswered questions, which is part of the need to solve cold homicide cases. Helping the victim's families is one reason the federal government allocates so much in financial resources to solving cold cases, and part of the reason local agencies endeavor to solve murders. This is not only a need for the families, but a need for the community in general. Violent acts such as senseless killings fracture the sense of security and well-being in our communities.

DNA Basics

Deoxyribonucleic acid, or more commonly known as DNA, contains the genetic makeup of all living things. DNA is so unique that each person has their own genetic code that tells everything about a human, from their eye color to their skin tone and height. Nothing in the human body has evolved that was not "mapped" out by DNA. DNA is found in almost every cell of every living organism and is unique to each human being, with the exception of identical twins. According to Dale, Greenspan, and Orokos (2006), "in the early 1950s James Watson and Francis Crick first described the structure and a possible role for the double-stranded DNA molecule" (Dale et al., 2006, p. 4). This model for DNA was the basis for further scientific discoveries in DNA. In the mid-1980s in England, Dr. Alec Jeffreys brought DNA into the world of forensics when he introduced DNA as an identification tool in a murder investigation. "Dr. Jeffreys utilized a process called restriction fragment length polymorphism (RFLP) to identify the

homicide suspect" (Dale et al., 2006, p. 4). This was the first time DNA was brought into the criminal justice system and it opened the door for what is now an accepted practice in the judicial system. As later forms of DNA processing were developed RFLP was eventually discontinued. Some of the drawbacks with the RFLP process were that it required a large amount of intact DNA, it was expensive, and it took between six to eight weeks to process a sample. Polymerase chain reaction (PCR) was developed in 1986, which allowed biological samples to be tested through a process that amplified (or replicated) samples through the repetition of a cycle. Ultimately this process provided faster results from a smaller sample provided (Dale et al., 2006, p. 4). PCR, at the time, gave a lower statistical probability than RFLP, but it could be done with a smaller sampling and the process required only three hours to process. Multiplex polymerase chain reaction single tandem repeat (STR/PCR) is the most current type of DNA processing being used today (Dale et al., 2006, p. 4). STR/PCR can use much smaller samples of DNA than RFLP, and can even use partially degraded DNA to create a DNA fingerprint. All of these processes are referred to as nuclear DNA as they obtain the DNA from the nucleus of a cell (Dale et al., 2006, p. 4). Mitochondrial DNA (MtDNA) is another DNA process that has become widely used in the scientific community. "MtDNA is found in the outside of the cell nucleus in the cytoplasm of a cell. MtDNA is present in much higher volumes and is less susceptible to environmental degradation" (Dale et al., 2006, p. 5). Currently mtDNA is costly and comparatively produces fewer statistical probabilities than other types of DNA processes (Dale, Greenspan & Orokos, 2006, p. 5).

DNA technology alone would not be a useful investigative tool without a system of comparing DNA profiles to generate leads and compare DNA taken from other crime scenes across the country. As noted in the 2002 National Institute of Justice report:

> The DNA indexing system starts with the Local DNA Indexing System (LDIS) which is utilized by approved DNA labs from local police departments or sheriff's offices. At the state level is the State DNA Indexing System (SDIS). This state managed system allows DNA profiles to be compared between agencies within a state. The SDIS is also the communications path between the local and national tiers. This level is also the entity responsible for the enactment of that particular State's statute related to the convicted offender and sexual predator/offender database. The National DNA Indexing System (NDIS) is the highest tier of the CODIS network. NDIS receives DNA data from qualified State laboratories. The guideline for submission to the SDIS and NDIS become more stringent as you go higher in the CODIS system. This is to ensure that only DNA profiles meeting stringent criteria are uploaded into CODIS (NIJ, 2002, p. 10).

New, advanced low copy number (LCN) techniques are the dynamic force in what is referenced when discussing newer DNA technologies. STR-DNA analysis has been the standard for many years in the criminal justice system. Techniques developed for low copy number DNA amplification are mtDNA, LCN-PCR, Y-STR; the most recent development introduced into the forensic community is the ""miniSTR"

multiplex STR kits (Cruz, 2009, p. 11-13). The sensitivity of today's DNA technology is "a game changer" when analyzing older, degraded evidence in unsolved homicides.

Homicide Statistics

In the United States, homicide rates, per capita, have been on the decline over the last several years. According to Uniform Crime Reporting (UCR) statistical data released by the Florida Department of Law Enforcement (2012), in 1992, the homicide rates for murder and non-negligent manslaughter was 9.3 per 1000 population. There were 23,760 homicides committed in 1992. In 2011, the rate had dropped to 4.7 homicides per 1000 population according to UCR data. For the year 2011, the data showed a total of 14,612 homicides in the U.S. (FDLE, 2012). In 1972, there were 924 murders in Florida (out of a population totaling 7,259,000). The murder rate at that time was 12.4 percent per 1000 citizens. In 2011, there were 985 murders in Florida (out of a total population of 19,057,542). The homicide rate, per capita, declined to 5.2 percent (FDLE, 2012).

Although this is a marked reduction in the per capita murder rate since 1972, "the solvability rate declined from 93 percent in 1961 to 65 percent in 1993." (Richardson & Kosa, 2001, p. 2). Nationally, the clearance rate has not increased much since 1993. According to the FBI statistical data for 2011, the clearance rate for murders in the U.S. was only 64.8 percent. (FBI, 2011). Given the advances in technology it would be a common assumption the solvability rate in homicide cases would be on the increase. According to a report authored by Richardson and Kosa (2001) for the Police Executive Research Forum, one reason for the low solvability rate may be in the type of homicides being committed. Specifically, in the victim/offender relationship as it relates to a murder (Richardson and Kosa, 2001, p. 2). In the past, homicides were typically committed by a person known to the victim. The solvability of these types of crimes is actually on the increase (Richardson & Kosa, 2001, p. 2). Stranger-to-stranger murders are the most difficult types of homicides to solve. There are many factors for this including the inability to establish a motive between the victim and suspect. Gang violence and drugs in larger crime ridden cities also play a major part in these types of murders. In addition, the lack of cooperation from eyewitnesses is often a major obstacle. This may be due to fear of retaliation or just a sense of indifference towards crime itself (Richardson & Kosa, 2001, p. 2).

Evolution of Crime Scene Technology

When renowned French Criminalist Edmond Locard started his first police laboratory in the small attic spaces at the Lyon Police Department in France in 1910, he probably did not realize the advances in science that would subsequently evolve (Osterburg & Ward, 1992, p. 62). Locard was a pioneer in the field of criminalistics and many of the techniques developed by him are still in use today. Author Barry Fisher explains what eventually became referred to as Locard's Theory:

> When an individual comes in contact with a person or location, certain small, seemingly insignificant changes occur. Small items such as fibers,

> hairs, and assorted microscopic debris may be left by the person or picked up by that person by contact with the environment or another individual. It is not possible to come in contact with an environment without changing it in some small way, whether by adding to it or taking something away. This concept of change is the so-called Locard Exchange Principle and is the basis for the study of trace evidence (Fisher, 1992, p. 165).

Until DNA became a viable technology in forensic science in the mid-1980s, the primary method of testing blood or other bodily fluids collected from a crime scene was through blood-typing. According to Shiro, "DNA analysis wasn't even part of forensic science twenty years ago. Back then, ABO blood types and other genetic markers were used to analyze blood and body fluids. This analysis required a relatively large amount of bloodstain and these genetic markers were susceptible to environmental degradation" (Schiro, 2000, para. 8). Austrian Immunologist, Karl Landsteiner, developed a system of blood typing in the early 1900s. Landsteiner's groundbreaking work became known as the ABO Blood Grouping System. "The four major phenotypes in this system are the A, B, AB, and O types. ABO blood typing has been used in criminal cases for decades, yet it has drawbacks" (Fisher, 1992, p. 234). In the judicial system, blood typing was more beneficial to the exclusion of a suspect as opposed to determining a person's guilt. The statistical breakdown of just four basic blood types was not conclusive enough at the time to stand alone as the cornerstone of evidence in a criminal prosecution (Fisher, 1992, p. 234). Blood-typing was considered the gold standard in the examination of blood and other bodily fluid analysis until the genomic discoveries that developed into today's DNA technology. Therefore, prior to the introduction of DNA, only blood and bodily fluids visible in a crime scene were commonly collected and forwarded to a laboratory for analysis. There was more science in crime scene investigations prior to DNA in the field of trace evidence, such as: hair and fiber analysis, fingerprint comparison, and ballistics analysis. Consequently, evidence collection, and the actual methodology of what was collected, had not evolved in forensic investigations until the arrival of DNA technology in the mid to late 1980s. The collection of fingernail scrapings, swabbing of the victim's hands and other parts of the body were routinely overlooked. Weapons may not have been swabbed for potential biological samples unless there was a noticeable detection of blood or other bodily fluids.

Obstacles to Solving Cold Cases

A case can quickly become "cold" if investigators do not have significant leads and witness cooperation within the first days of a homicide investigation. This is the reality of homicide investigations and is well known to investigators who work tirelessly to solve murders. Current DNA technologies provide a new avenue to solving cold cases that have been reviewed time and time again. Evidence previously submitted that looked promising had been sent back from the lab without a DNA profile obtained. Police agencies had to select only that item of evidence they believe would have the best chance of providing a DNA profile. Other evidentiary items that had a miniscule

chance of producing a DNA profile had to sit in the evidence room unexamined. Over the years this evidence may have been lost, environmentally degraded, or even become the target of rodents or insect infestation. As noted in a report by the National Institute of Justice, "because of the particularly sensitive nature of DNA technology, the potential contamination of evidence should be carefully considered. Technologies used to analyze evidence prior to the forensic application of DNA were not always sensitive to contaminants" (NIJ, 2002, p. 14). Locating witnesses, retired detectives, or previous crime scene personnel becomes more difficult as the years progress. Budgetary concerns, manpower re-allocation, and access to DNA laboratories may all be impairments to the use of new DNA technology in solving cold cases. **"**As with all criminal investigations, chain-of-custody issues are critical to maintaining the integrity of the evidence. In all cases, the ultimate ability to use DNA evidence will depend on the ability to prove that the chain of custody was maintained." (NIJ, 2002, p. 15).

The obligation to resolve cold homicides is apparent in our society. The procedures of evidence collection and processing are catching up with the advances in DNA technology to the extent that some of the evidence stored contains the scientific clues needed to solve many of these cases. A survey was distributed to law enforcement agencies that solicited data to help identify the needs and obstacles to solving cold case homicides using newer DNA technologies.

Methods

The method chosen to obtain data for this research project encompassed the use of an Internet-based survey. This method of data collection was chosen because it provided access to the target group through a means that was suitable and cost effective. The overall objective of the survey was to gather data to identify the obstacles to investigating cold homicide cases, as well as ascertaining how to provide better support for law enforcement in the pursuit of cold case closures. The initial questions in the survey were developed to provide a structure of the responding agency. In order to draw conclusions, it was beneficial to understand the type of agency, jurisdiction, and size of a responding agency. Questions asked later in the survey were designed to determine what obstacles are in place that impedes the closure of cold cases. Other questions in the survey were designed to allow the responding agency to give responses for overcoming the restrictions to resolving these cold cases.

Florida Sheriff's Offices and Municipal Law Enforcement agencies having more than ten employees were selected to participate in the survey. Agencies with less than ten employees were excluded because typically agencies of this size do not have a dedicated cold case unit, or even a dedicated cold case detective. A copy of the survey is included in Appendix A.

Results

A survey of 310 law enforcement agencies in Florida regarding cold homicide cases was launched on May 20, 2013 and concluded on June 28, 2013. Of the 310 agencies surveyed, sixty-one responses were recorded. The response rate to the overall survey was 19.7 %, although some of the survey respondents did not answer every question in the survey.

The survey was distributed by email to all Florida agencies having ten or more full-time certified officers. Of the responding agencies seventy-seven percent were municipal law enforcement agencies while twenty-three percent were county sheriff's offices. Sixty-one percent of the agencies serviced a population of 75,000.00 or less. Fifteen percent of the agencies oversaw a population of more than 250,000. Small to medium agencies (1-300 certified officers) were eighty-five percent of the respondents while the large agencies, defined as an agency of more than 300 officers responded at a rate of fifteen percent.

Fifty-two agencies responded they did not have a dedicated cold case unit while nine agencies affirmed they had a dedicated investigative unit for cold case homicides. Most agencies who responded in the affirmative answered that they had two or less detectives assigned to a cold case unit. Two agencies responded as to having six to eight detectives assigned to a committed cold case unit. Eighty-five percent of responding agencies indicated they collaborated with other agencies on cold case investigations. The majority of respondents to the survey (50) indicated they utilized the Florida Department of Law Enforcement for forensic lab work; six agencies use the Federal Bureau of Investigations for lab analysis; and twenty-nine agencies responded they use either a local or private lab.

Question ten of the survey was designed to rate what agencies believe are the leading obstacles impeding their ability to resolve cold cases. Thirty percent of responding agencies indicated they strongly agreed staffing or personnel allocations were an inhibiting factor in resolving cold cases. Thirty-eight percent responded they were in agreement that degraded evidence and the ability to locate witnesses were factors impairing their ability to successfully close cold cases. Forty-two respondents noted access to DNA lab analysis was not a factor inhibiting case closures.

The last question in the survey inquired from the responding agencies as to what they felt would be the most important mechanism in assisting their agency in solving cold homicide cases. This question was designed as an open-ended comment field to allow an unfiltered response from the participating agency. Fifty-five responses were capture in this field. Twenty-eight responses were directly related to establishing a dedicated cold case unit to focus exclusively on solving cold cases. Six agencies answered that money was the primary obstacle, two responded that access to cost effective DNA lab work was important, and two agencies responded with witness cooperation being the principal impediment to solving cold homicide cases. Other free text responses were a compilation of previously mentioned obstacles for solving cold cases.

Discussion

The primary purpose of this research was to establish a clear pathway for solving cold homicide cases using the most currently available DNA technologies. The developments in DNA seem to be advancing at a pace faster than the ability for the criminal justice system to keep up with science. Training for crime scene investigators, detectives, and case law arising from the judicial system are lagging in the understanding to the advancements in DNA technologies.

In looking for an explanation as to why cold cases were not being readily solved, a number of possible reasons surfaced. Some obstacles are unavoidable while others have the possibility to be corrected. Some of the unavoidable problems include trying to keep track of evidence that, in some cases, occurred fifty or more years ago. Over the years, agencies have moved their evidence control rooms on more than one occasion. Property and evidence storage was frequently done in an area without a climate-controlled environment and in a facility that was not protected from insect or rodent infestation. In addition, evidence packaging methods have also progressed to a much higher standard. The passing of time and the environmental conditions have degraded evidence to the extent even the most advanced DNA technology is not able to produce positive results.

The ability to locate witnesses in older cases is also a problem that must be overcome. Eyewitness testimony can fade over many years as the gap between the date of the crime and courtroom testimony lengthens. Due to a lapse in time, investigators also must contend with witnesses who have died. Detectives and crime scene personnel who retired years ago collected important items of evidence in major cases. The evidence collected from those crime scenes cannot be brought forth in a courtroom, if the person who collected the item, is no longer available to testify. Part of the review process in older cases is to ensure the chain of evidence can be maintained, should an item sent to the lab for DNA analysis subsequently generates a DNA profile.

In reviewing the results from the survey, it appears most law enforcement agencies that responded believe they have adequate access to DNA laboratories. The most prevalent issues learned in the survey from responding agencies are a need for cold case detectives whose assignment is dedicated to these investigations. Secondly, there is a need for financial support of the personnel to include the expenditures related to long-term investigations.

Recommendations

After analyzing the responses to the survey and reviewing the open-text responses at the end of each survey, it was encouraging that eighty-five percent of responding agencies work on cold homicide cases in collaboration with other agencies. It was also a positive that most agencies believe they have access to quality DNA laboratories. Although some of the obstacles to solving cold cases are inescapable (i.e.; lost or degraded evidence), it appears the leading hindrance to cold case investigations is economically driven. The lack of funding in most law enforcement agencies has the direct affect on the amount of staffing that can be put into a specific

task. The financial restraints of operating a law enforcement agency in today's economic climate can be daunting. Fortifying the investigation of cold homicide cases with quality investigators in combination with the advances of new DNA technologies seems to offer the best chance to succeed in solving cold cases.

Lieutenant Michael Holbrook has worked in law enforcement for 26 years with the Pinellas County Sheriff's Office. He currently oversees the Crimes Against Persons Section, which consists of the Robbery/Homicide Unit, the Crimes Against Children Unit, the Special Victims Unit, and the Sexual Predator and Offender Tracking Unit. Lieutenant Holbrook started his career in 1987 and served as a Patrol Deputy and Field Training Officer prior to being reassigned as a detective in 1994. As a detective he worked in the Property Crimes Unit, the Crimes against Children Unit, and the Homicide Unit. Upon promotion to the rank of sergeant in 2005 he supervised the Robbery/homicide Unit, the Crimes against Children Unit, and spent 3 years in the Administrative Investigations Division. In 2010 he was promoted to the rank of Lieutenant and assigned as a shift commander in the Patrol Operations Bureau until being reassigned to his current position. Michael earned an Associates' Degree from St. Petersburg College.

References

Cruz, T. D. (2009, July). *Development and evaluation of a whole genome amplification method for accurate multiplex STR genotyping of compromised forensic casework samples*. U.S Department of Justice, NCJRS (227501). Retrieved from https://www.ncjrs.gov/pdffiles1/nij/grants/227501.pdf

Dale, W.D, Greenspan, O., & Orokos, D. (2006, September). *DNA forensics: Expanding uses and information sharing*. U.S Department of Justice, Bureau of Justice Statistics. (NCJ 217992). Retrieved from: http://bjs.gov/content/pub/pdf/dnaf.pdf

Federal Bureau of Investigation (FBI). (2011) *Uniform Crime Reports: Crime in the United States, 2001.* FBI, Criminal Justice Information Services Division. Retrieved from: http://www.fbi.gov/about-us/cjis/ucr/crime-in-the-u.s/2011/crime-in-the-u.s.-2011/clearances

Fisher, B.J. (1992). *Techniques of crime scene investigation*. (5th ed., p. 165). Boca Raton, FL: CRC Press.

Fisher, B.J. (1992). *Techniques of crime scene investigation*. (5th ed., p. 234). Boca Raton, FL: CRC Press.

Florida Department of Law Enforcement. (2012). *Index crime in the united states, 1972-2012*. Retrieved from: http://www.fdle.state.fl.us/Content/getdoc/98d3a1c0-940d-47ce-bcd8-609596f17d66/fed_ucr-1-.aspx

Gross, B. (2007, Fall). Life sentence: Co-victims of homicide. *Annals of the American Psychotherapy Association*, *10*(3), 39+. Retrieved from http://go.galegroup.com/ps/i.do?id=GALE%7CA169227156&v=2.1&u=22410_sppl&it=r&p=PPCJ&sw=w

Morrall, P. (2011, November). Homicide and its effect on secondary victims: Peter Morrall and colleagues discuss the impact of violent crime on the families, friends and associates of its victims, and the potential forensic role of mental health nurses. *Mental Health Practice*, *15*(3), 14+. Retrieved from http://go.galegroup.com/ps/i.do?id=GALE%7CA272363736&v=2.1&u=22410_sppl&it=r&p=PPCJ&sw=w

National Institute of Justice (NIJ). (2002, July). *Using DNA to solve cold cases.* U.S. Department of Justice, Office of Justice Programs. (NCJ 194197). Retrieved from https://www.ncjrs.gov/pdffiles1/nij/194197.pdf

Osterburg, J. & Ward, R. (1992). *Criminal investigation: A method for reconstructing the past*. (p. 63). Cincinnati, OH: Anderson Publishing Co.

Richardson, D.A. & Kosa, R. (2001). An examination of homicide clearance rates: Foundation for the development of a homicide clearance model. *Police Executive Research Forum*, Retrieved from http://www.policeforum.org/assets/docs/Free_Online_Documents/Homicide/an%20examination%20of%20homicide%20clearance%20rates%20-%20foundation%20for%20the%20development%20of%20a%20homicide%20clearance%20model%202001.pdf

Schiro, G. (2000, Spring). Forensic science and crime scene investigation: Past, present, and future. *American Lawman Magazine*, Retrieved from http://www.forensicscienceresources.com/CSIPPF.htm

Appendix A

Cold Case Homicide Unit Survey

edit page properties

1. What type of law enforcement agency are you employed?*
   - ○ Police Department
   - ○ Sheriff's Office
   - ○ Other, please specify

   [ ]

2. What is the population size in the service area where your agency patrols?
   - ○ 1 - 75,000
   - ○ 75,001 - 150,000
   - ○ 150,001 - 250,000
   - ○ More Than 250,000

3. What is the number of certified law enforcement officers in your agency?
   - ○ 1 - 50
   - ○ 51 - 150
   - ○ 151 - 300
   - ○ 301 or more

4. How many cold homicide cases does your agency average per month?
   - ○ 0 - 9
   - ○ 10 - 15
   - ○ 16 - 20
   - ○ 21 - 25
   - ○ More than 25

5. Does your agency have a dedicated cold case homicide unit?*
   - ○ Yes ○ No

6. If yes, how many detectives are assigned full time to the cold case unit?
   - ○ 0 - 2
   - ○ 3 - 5
   - ○ 6 - 8
   - ○ 9 or more

7. Does your agency use retired detectives or volunteers to assist in cold homicide cases?
   ○ Yes ○ No

8. Does your agency collaborate with other agencies in working on cold homicide cases?
   ○ Yes ○ No

9. What type of lab does your agency utilize for DNA processing?
   ☐ Local
   ☐ FDLE
   ☐ FBI
   ☐ Other, please specify

10. What are the leading obstacles that impede your agency's ability to resolve cold cases (1 being least important and 6 being most important)?

	Strongly Disagree	Disagree	Neither Agree Nor Disagree	Agree	Strongly Agree
Budgetary Constraints	○	○	○	○	○
Locating Witnesses	○	○	○	○	○
Accessibility to current DNA laboratory analysis	○	○	○	○	○
Staffing or manpower allocations	○	○	○	○	○
Degraded evidence	○	○	○	○	○
Loss of warehoused physical evidence over time	○	○	○	○	○

11. In your opinion, what would be the most important mechanism for assisting your agency in solving cold homicide cases?

Launch Done