U.S. Department of Justice
Office of Justice Programs
National Institute of Justice

The U.S. Department of Justice, Office of Justice Programs, National Institute of Justice is seeking applications for funding research to develop a best practices guide and model programs for cold case units in law enforcement agencies. This program furthers the Department's mission by sponsoring research to provide objective, independent, evidence-based knowledge and tools to meet the challenges of crime and justice, particularly at the State and local levels.

Solicitation: Evidence-Based Model Programs for Cold Case Units

Eligibility

(See "Eligibility," page 3)

Deadline

All applications are due **January 16, 2007, 11:59 p.m. eastern time.**

Contact Information

For assistance with the requirements of this solicitation, contact Brett Chapman, Program Manager, 202–514–2187, Brett.Chapman@usdoj.gov.

This application must be submitted through Grants.gov. For technical assistance with submitting the application, call the Grants.gov Customer Support Hotline at 1–800–518–4726.

Grants.gov Funding Opportunity No. 2007–NIJ–1416
SL# 000778

CONTENTS

Evidence-Based Model Programs for Cold Case Units
CFDA No. 16.560

Overview

The National Institute of Justice (NIJ) is the research, development, and evaluation agency of the U.S. Department of Justice and a component of the Office of Justice Programs (OJP). NIJ provides objective, independent, evidence-based knowledge and tools to enhance the administration of justice and public safety. NIJ solicits proposals to inform its search for the knowledge and tools to guide policy and practice.

This solicitation marks the first step in a planned multi-year effort to build, evaluate, and improve the effectiveness of cold case investigations by local law enforcement agencies. This effort will identify current practices of police agencies conducting cold case investigations; develop evaluation criteria for assessing the effectiveness of these practices and approaches; construct alternative model programs and alternative program elements that agencies of various sizes could implement; and estimate the resource requirements implied by these model programs. This effort is designed to produce results that can inform a planned FY 2008 demonstration initiative.

Deadline: Registration

Registering with Grants.gov is a one-time process; however, if you are a first time registrant it could take up to several weeks to have your registration validated and confirmed and to receive your user password. Start the registration process early to prevent delays that may cause you to miss the application deadline. You must complete these three steps before you are able to register: 1) Register with Central Contractor Registry (CCR), 2) Register yourself as an Authorized Organization Representative (AOR), and 3) Be authorized as an AOR by your organization. For more information, visit www.grants.gov. **Note: Your CCR Registration must be renewed once a year. Failure to renew your CCR registration may prohibit submission of a grant application through Grants.gov.**

Deadline: Application

The due date for applying for funding under this announcement is **January 16, 2007, 11:59 p.m. eastern time**.

Eligibility

In general, NIJ is authorized to make grants to, or enter into contracts or cooperative agreements with, States (including territories), local governments (including federally recognized Indian tribal governments that perform law enforcement functions), nonprofit

organizations, profit organizations, institutions of higher education, and qualified individuals. Foreign governments or organizations are not eligible to apply.

Faith-Based and Other Community Organizations: Consistent with President George W. Bush's Executive Order 13279, dated December 12, 2002, and 28 C.F.R. Part 38, it is DOJ policy that faith-based and other community organizations that statutorily qualify as eligible applicants under DOJ programs are invited and encouraged to apply for assistance awards to fund eligible grant activities. Faith-based and other community organizations will be considered for awards on the same basis as other eligible applicants and, if they receive assistance awards, will be treated on an equal basis with all other grantees in the administration of such awards. No eligible applicant or grantee will be discriminated for or against on the basis of its religious character or affiliation, religious name, or the religious composition of its board of directors or persons working in the organization.

Faith-based organizations receiving DOJ assistance awards retain their independence and do not lose or have to modify their religious identity (e.g., removing religious symbols) to receive assistance awards. DOJ grant funds, however, may not be used to fund any inherently religious activity, such as prayer or worship. Inherently religious activity is permissible, although it cannot occur during an activity funded with DOJ grant funds; rather, such religious activity must be separate in time or place from the DOJ-funded program. Further, participation in such activity by individuals receiving services must be voluntary. Programs funded by DOJ are not permitted to discriminate in the provision of services on the basis of a beneficiary's religion.

Applicants are encouraged to review the Civil Rights Compliance section under "Additional Requirements" in this announcement.

Specific Information—Evidence-Based Model Programs for Cold Case Units

In the publication Cold Case Squads: Leaving No Stone Unturned, the Bureau of Justice Assistance (BJA) states that cold cases are among the most difficult and frustrating cases detectives face. These are cases that the initial investigators, for whatever reason, could not solve. To tackle this problem, many U.S. police agencies have established cold case squads. Cold case squads can be especially useful in locating and working with past and potential witnesses and reviewing physical evidence to identify suspects. Cold case squads also perform an outreach and networking role and can assist other jurisdictions with cold case investigations, as appropriate. In a special report entitled Using DNA to Solve Cold Cases, NIJ discussed the role that advances in DNA technology can play in investigating and solving cold cases. Although DNA is not the only forensic tool of value to unsolved case investigations, advances in DNA technology and the success of DNA database systems have inspired law enforcement agencies throughout the country to reevaluate cold cases for DNA evidence.

The Office of Justice Programs expects to conduct a demonstration/evaluation initiative in fiscal year 2008 that will incorporate the lessons learned by existing cold case units into new model programs, and then evaluate the results. The goal of this solicitation is to support that planned initiative by evaluating current practices and building the best

elements into program models that demonstration sites could implement and test, and NIJ could evaluate.

NIJ estimates that there are thousands of law enforcement agencies investigating cold cases. Some 38 units receive support through NIJ grant funds. Applicants should be aware that agencies that receive funding from NIJ may have adopted strategies and organization structures that differ from those in other agencies because of this influx of federal resources.

NIJ wants to identify those factors in current cold case investigations that improve the chances of solving the crime. Applicants should consider several factors in designing a research strategy, including case selection, management structures, resources, team composition, and day-to-day performance metrics. They should consider both quantitative and qualitative methods for assessing and measuring practices. Possible factors to consider include:

- **Case selection.** Clearly some cold cases will involve variables such as age, physical evidence, and the availability of witnesses that make them easier to solve than others. What are current practices for case selection and which variables are most likely to help solve a crime?

- **Management structure.** Staffing and location of the unit within the organization influence the scale of investigations and the resources that can be applied. Where are the units typically located within the agency and what are their capabilities for managing all aspects of the investigation?

- **Resources.** The quantity and quality of the resources available will affect the number of cases reviewed and the amount of effort afforded to them. When do units reach a point of diminishing returns; i.e., additional resources do little to improve solution rates. What evidence can be assembled regarding resource requirements? For example, is it necessary to have a full-time staff or can cold cases be made collateral duties within an investigative unit? Should a cold case squad be a standing unit, or is it sufficient for agencies to order a periodic (e.g., annual) cold case initiative?

- **Team composition.** The ability to work collaboratively across agencies seems essential to success in cold case investigation. It is not clear, however, whether teams need to be formed on a permanent basis or whether flexible arrangements would work as well. Should teams have a formal captain, or should there be memoranda that outline member responsibilities? Can some members of a team be regular and others ad hoc? What problems arise under these various team configurations?

- **Performance metrics.** Units need to collect and analyze certain information to make management decisions about when to spend more effort on a case and when to quit. What variables (e.g., days under investigation, number of leads obtained, etc.) do units currently weigh when making decisions? Would more sophisticated techniques for assessing case solvability help to determine case decisions and make resource allocation more efficient?

- **Baseline data collection.** Moving cold case units toward evidence-based best practices is expected to improve unit performance in certain specific areas; namely, a greater number of selected cold cases will be solved in less time using fewer staff resources. The successful grantee will incorporate the gathering of baseline data on these factors into their research design.

Because the purpose of this project is to provide evidence-based practices for model cold case programs and their subsequent evaluation, applicants should devise strategies for communicating findings not only to NIJ planners but also to potential demonstration site applicants.

The findings from this study can inform the design of the planned FY 2008 demonstration program only if it is concluded within 12 months after the award is made. Applicants should include a realistic time line, including a draft review that delivers a final report in 12 months.

What will *not* be funded:
1. Provision of training or direct service.
2. Proposals primarily to purchase equipment, materials, or supplies. (Your budget may include these items if they are necessary to conduct applied research, development, demonstration, evaluation, or analysis, but NIJ does not fund proposals that are primarily to purchase equipment.)
3. Work that will be funded under another specific solicitation.
4. Proposals that do not offer to complete the solicited study within 12 months after the award is made.

Cost of proposed work: NIJ anticipates that up to $400,000 may become available for an award made through this solicitation. All NIJ awards are subject to the availability of appropriated funds and to any modifications or additional requirements that may be imposed by law. If you propose a project that exceeds the amount of money that may be available for this solicitation, we recommend that you divide the project into phases, stages, or tasks so that NIJ can consider making an award for a specific portion of the work. NIJ cannot guarantee that subsequent phases, stages, or tasks will be funded. Such additional funding depends on NIJ's resources and your satisfactory completion of each phase, stage, or task. Note: Deliverables (e.g., a final report) will be required at the end of each phase, stage, or task.

A grant made by NIJ under this solicitation may account for up to 100 percent of the total cost of the project. See "Cofunding," under "What an Application Must Include."

Performance Measures

To assist in fulfilling the Department's responsibilities under the Government Performance and Results Act (GPRA), P.L. 103-62, applicants who receive funding under this solicitation must provide data that measures the results of their work. Performance measures for this solicitation are as follows:

Objective	Performance Measures	Data Grantee Provides
Develop and analyze information and data having clear implications for criminal justice policy and practice.	1. Relevance to the needs of the field as measured by whether the grantee's substantive scope did not deviate from the funded proposal or any subsequent agency modifications to the scope. 2. Quality of the research as assessed by peer reviewers. 3. Quality of management as measured by whether significant interim project milestones were achieved, final deadlines were met, and costs remained within approved limits.	1. A final report providing a comprehensive overview of the project and a detailed description of the project design, data, and methods; a full presentation of scientific findings; and a thorough discussion of the implications of the project findings for criminal justice practice and policy. 2. Quarterly financial reports, semi-annual progress reports, and a final progress report.

How to Apply

DOJ is participating in the e-Government initiative, one of 25 initiatives included in the President's Management Agenda. Part of this initiative—Grants.gov—is a "one-stop storefront" that provides a unified process for all customers of Federal grants to find funding opportunities and apply for funding.

Grants.gov Instructions: Complete instructions can be found at http://www.grants.gov/applicants/get_registered.jsp. If you experience difficulties at any point during this process, please call the Grants.gov Customer Support Hotline at 1–800–518–4726.

CFDA Number: The Catalog of Federal Domestic Assistance (CFDA) number for this solicitation is 16.560, titled "National Institute of Justice Research, Evaluation, and Development Project Grants," and the Grants.gov funding opportunity number is 2007-NIJ-1416.

A DUNS number is required: The Office of Management and Budget requires that all businesses and nonprofit applicants for Federal funds include a DUNS (Data Universal Numeric System) number in their application for a new award or renewal of an award. Applications without a DUNS number are incomplete. A DUNS number is a unique nine-digit sequence recognized as the universal standard for identifying and keeping track of entities receiving Federal funds. The identifier is used for tracking purposes and to validate address and point of contact information. The DUNS number will be used throughout the grant life cycle. Obtaining a DUNS number is a free, simple, one-time activity. Obtain one by calling 1–866–705–5711 or by applying online at http://www.dnb.com/us. Individuals are exempt from this requirement.

What an Application Must Include

Standard Form 424

Program Narrative
The Program Narrative includes:

a. Abstract (not to exceed 400 words).
b. Table of contents.
c. Main body, which includes:
- Purpose, goals, and objectives.
- Review of relevant literature.
- Research design and methods.
- Implications for policy and practice.
- Management plan and organization.
- Dissemination strategy.

d. Appendixes (not counted against program narrative page limit) include:
- Bibliography/References (if applicable).
- List of key personnel (required).
- Résumés of key personnel (required).
- List of previous and current NIJ awards (required).
- Letters of cooperation/support or administrative agreements from organizations collaborating in the project (if applicable).
- Chart for timeline, research calendar, or milestones (required).
- Other materials required by the solicitation.

Budget Detail Worksheet
Templates for filling out the Budget Detail Worksheet may be found online at www.ojp.usdoj.gov/Forms/budget_fillable.pdf, OJP Standard Forms & Instructions. If you have any questions, please contact the Office of the Comptroller's Customer Service Center at 1–800–458–0786.

Budget Narrative

Indirect Rate Agreement (if applicable)

Applicants that do not have a federally negotiated indirect cost rate and wish to establish one can submit a proposal to their "cognizant" Federal agency. Generally, the cognizant federal agency is the agency that provides the preponderance of direct federal funding. This can be determined by reviewing an organization's schedule of federal financial assistance. If DOJ is your cognizant federal agency, obtain information needed to submit an indirect cost rate proposal at www.ojp.usdoj.gov/oc/indirectcosts.htm.

Other Program Attachments
These include several forms, available on OJP's funding page at www.ojp.usdoj.gov/forms.htm.

Page limit: The program narrative section of your proposal must not exceed 30 double-spaced pages in 12-point font with 1-inch margins. Abstract, table of contents, charts,

figures, appendixes, and government forms do not count toward the 30-page limit for the narrative section.

Cofunding: A grant made by NIJ under this solicitation may account for up to 100 percent of the total cost of the project. You must indicate whether you believe it is feasible for you to contribute cash, facilities, or services as non-Federal support for the project. Your proposal should identify generally any such contributions that you expect to make and your proposed budget should indicate in detail which items, if any, will be supported with non-Federal contributions.

Selection Criteria

Successful applicants must demonstrate the following:

Understanding of the problem and its importance.

Quality and technical merit.

1. Awareness of the state of current research or technology.
2. Soundness of methodology and analytic and technical approach.
3. Feasibility of proposed project and awareness of pitfalls.
4. Innovation and creativity (when appropriate).

Impact of the proposed project.

1. Potential for significant advances in scientific or technical understanding of the problem.
2. Potential for significant advances in the field.
3. Relevance for improving the policy and practice of criminal justice and related agencies and improving public safety, security, and quality of life.
4. Affordability and cost-effectiveness of proposed end products, when applicable (e.g., purchase price and maintenance costs for a new technology or cost of training to use the technology).
5. Perceived potential for commercialization and/or implementation of a new technology (when applicable).

Capabilities, demonstrated productivity, and experience of applicants.

1. Qualifications and experience of proposed staff.
2. Demonstrated ability of proposed staff and organization to manage the effort.
3. Adequacy of the plan to manage the project, including how various tasks are subdivided and resources are used.
4. Successful past performance on NIJ grants and contracts (when applicable).

Budget.

1. Total cost of the project relative to the perceived benefit.
2. Appropriateness of the budget relative to the level of effort.
3. Use of existing resources to conserve costs.

Dissemination strategy.

1. Well-defined plan for the grant recipient to disseminate results to appropriate audiences, including researchers, practitioners, and policymakers.
2. Suggestions for print and electronic products NIJ might develop for practitioners and policymakers.

Relevance of the project for policy and practice:

Higher quality proposals clearly explain the practical implications of the project. They connect technical expertise with criminal justice policy and practice. To ensure that the project has strong relevance for policy and practice, some researchers and technologists collaborate with practitioners and policymakers. You may include letters showing support from practitioners, but they carry less weight than clear evidence that you understand why policymakers and practitioners would benefit from your work and how they would use it. While a partnership may affect State or local activities, it should also have broader implications for others across the country.

Review Process

NIJ is firmly committed to the competitive process in awarding grants. All proposals under this solicitation will be subjected to independent peer-review panel evaluations. External peer-review panelists consider both technical and programmatic merits. Panelists are selected based on their expertise in subject areas pertinent to the proposals.

Peer-review panelists will evaluate proposals using the criteria listed above. NIJ staff then make recommendations to the NIJ Director. The Director makes award decisions.

Reasons for rejection: NIJ may reject applications that are incomplete, do not respond to the scope of the solicitation, do not comply with format requirements, or are submitted after the deadline. No additions to the original submission are allowed.

When awards will be made: All applicants, whether they are accepted or rejected, will be notified. The review and approval process takes about 6 months. You should not propose to begin work until at least 6 months after the proposal deadline on the cover of this solicitation. Also, you should not expect to receive notification of a decision for at least 6 months after that date. Lists of awards are updated regularly on NIJ's Web site at www.ojp.usdoj.gov/nij/funding.htm.

Additional Requirements

- Civil Rights Compliance
- Confidentiality and Human Subjects Protections regulations
- Anti-Lobbying Act
- Financial and Government Audit Requirements
- National Environmental Policy Act (NEPA) compliance
- DOJ Information Technology Standards
- Single Point of Contact Review

- Non-supplanting of State or Local Funds
- Criminal Penalty for False Statements
- Compliance with Office of the Comptroller Financial Guide
- Suspension or Termination of Funding
- Non-profit Organizations
- Government Performance and Results Act (GPRA)
- Rights in Intellectual Property

We strongly encourage you to review the information pertaining to these additional requirements prior to submitting your application. Additional information for each can be found at www.ojp.usdoj.gov/funding/otherrequirements.htm.

If your proposal is funded, you will be required to submit several reports and other materials, including:

Final substantive report: The final report should be a comprehensive overview of the project and should include a detailed description of the project design, data, and methods; a full presentation of scientific findings; and a thorough discussion of the implications of the project findings for criminal justice practice and policy. It must contain an abstract of no more than 400 words and an executive summary of no more than 2,500 words.

A draft of the final report, abstract, and executive summary must be submitted 90 days before the end date of the grant. The draft final report will be peer reviewed upon submission. The reviews will be forwarded to the principal investigator with suggestions for revisions. The author must then submit the revised final report, abstract, and executive summary by the end date of the grant. The abstract, executive summary, and final report must be submitted in both paper and electronic formats.

For program evaluation studies, the final report should include a section on measuring program performance. This section should outline the measures used to evaluate program effectiveness, modifications made to those measures as a result of the evaluation, and recommendations regarding these and other potential performance measures for similar programs. (This information will be particularly valuable to NIJ and other Federal program agencies in implementing performance measures for federally funded criminal justice programs.)

Interim reports: Grantees must submit quarterly financial reports, semi-annual progress reports, a final progress report, and, if applicable, an annual audit report in accordance with Office of Management and Budget Circular A-133. Future awards and fund drawdowns may be withheld if reports are delinquent.

U.S. Department of Justice
Office of Justice Programs
Bureau of Justice Assistance

Bureau of Justice Assistance

Bulletin

Cold Case Squads: Leaving No Stone Unturned

by Ryan Turner and Rachel Kosa

Why Cases Get Cold

Conventional wisdom in homicide investigations holds that speed is of the essence. The notion is that any case that is not solved or that lacks significant leads and witness participation within the first 72 hours has little likelihood of being solved, regardless of the expertise and resources deployed. Over time, unsolved cases become "cold." Cases most likely to be classified as cold include gang- and drug-related deaths; cases involving immigrants, transients, and homeless or unidentified people; unclassified deaths; and unsolved police shootings. Cold cases are among the most difficult and frustrating cases detectives face. These cases are, in effect, cases that other investigators, for whatever reason, could not solve.

Law enforcement agencies, regardless of size, are not immune to rising crime rates, staff shortages, and budget restrictions. Rising crime rates can tax the investigative and administrative resources of an agency. More crime may mean that fewer cases are pursued vigorously, fewer opportunities arise for followup, or individual caseloads increase for already overworked detectives. Transfers, retirements, and other personnel changes may force departments to rely on younger, less experienced investigators to work cases, often unsuccessfully.

www.ojp.usdoj.gov/BJA
July 2003

BJA

About BJA

The Bureau of Justice Assistance was established in 1984 as a component of the Office of Justice Programs, U.S. Department of Justice. BJA provides leadership and resources to state, local, and tribal governments and communities to reduce crime, violence, and drug abuse and to strengthen the nation's criminal justice system. BJA provides this assistance through formula and discretionary grants, training and technical assistance, publications, and the BJA web site.

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Washington, DC 20531
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Web site: www.ojp.usdoj.gov/BJA

For publications and information on other BJA-funded programs, contact:

Bureau of Justice Assistance Clearinghouse
P.O. Box 6000
Rockville, MD 20849–6000
1–800–688–4252
Web site: www.ncjrs.org

Clearinghouse staff are available Monday through Friday, 8:30 a.m. to 7 p.m. eastern time. Ask to be placed on the BJA mailing list.

About the Authors

Ryan Turner and Rachel Kosa are former Research Assistants with the Police Executive Research Forum.

The Police Executive Research Forum (PERF) is a national organization of progressive police executives from the largest city, county, and state law enforcement agencies. PERF is dedicated to improving policing and advancing professionalism through research and involvement in public policy debate. Incorporated in 1977, PERF's primary source of operating revenue comes from government grants and contracts, and partnerships with private foundations and other organizations.

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NCJ 199781

An increase in homicide rates can increase the caseloads for the staff of crime labs and county coroners' and medical examiners' offices. This, in turn, can lead to reports that are delayed for months, increased chances for error, and overlooked evidence. Support services, if available at all, may be spread thin during high-profile cases that force investigative labs to expend large amounts of manpower disproportionately. These overloads can either slow investigations or discourage some detectives from using the support services at all. Criminalists and evidence technicians can also face backlogs that prevent them both from attending all crime scenes and from conducting prompt followup work. As a result, crucial scientific evidence, especially blood and trace evidence, goes uncollected. Investigators with heavy caseloads may be forced to rely on photographs of evidence or on witness testimony, which may be strongly challenged by defense attorneys.

All the obstacles that hamper homicide investigations in their early phases contribute to cold cases. Cold cases may even allow more murders to be committed. People who have killed once, if not arrested, may continue to kill. Police failure to solve murder cases and to put the offenders behind bars often leaves the community feeling helpless. If they feel the police are not doing their job in protecting the community and witnesses of crimes, members of the community may also be less willing to cooperate with police.

How Cold Case Squads Work

A cold case squad may be a viable option for a jurisdiction that is plagued by a significant number of unsolved murders. Some cold case squads are formed because the volume of new cases or police initiatives prevents any work from being done on old cases. Some squads are formed out of convenience when a decline in new murder cases provides departments with the personnel and other resources necessary to begin investigating old cases.

The specific duties of cold case squads may vary among law enforcement agencies. Nearly all of these squads

review and continue the investigation of unsolved homicides or suspected homicides in which the lead detective initially assigned has retired, transferred, or otherwise left the case. Cold case squads can be especially useful in locating and working with past and potential witnesses and reviewing physical evidence to identify suspects. The squads may investigate unsolved homicides currently assigned to a homicide detective when deemed necessary by supervisors—usually when the lead detective has exhausted all leads. Cold case squads also perform an outreach and networking role by assisting other jurisdictions with homicide investigations as appropriate.

The most important component of cold case squads is personnel; the squads must have the right mix of investigative and supervisory talent. The staffing model used for cold case squads is determined mainly by whether the squad works full-or part-time and whether it is based within a police agency or a prosecutor's office. Cold case squads can consist of any of the following:

- Single full-time investigator.
- Squad of two or more full-time investigators.
- Investigators working on cold cases in addition to other investigative duties.
- Former homicide detectives in a part-time or volunteer capacity.
- One-time cold case squads (assigned to high-profile unsolved cases).
- Occasional squads.
- Investigators in a special squad based in a district attorney's or state attorney general's office.
- Interdepartmental partnerships (county or regional cold case squads).

Cold case squads usually include at least the following:

- A supervisor or team manager (usually a lieutenant) from the homicide division, who acts as a liaison among police management, participating law enforcement agencies, the local community, and the press.
- A supervisor (usually a sergeant), who coordinates the daily operations of the team.
- Investigators.

Squads may also contain administrative or "light-duty" detectives to enable full-duty detectives to devote their time to other cases. These detectives review cases, write case summaries, list evidence and witnesses, and perform workups on witnesses and potential suspects to gather current information such as addresses and recent arrests. Light-duty detectives also compile any documentation or records that are not already in the case file.

Using External Resources

Squads may also use, as needed, the services of the Federal Bureau of Investigation (FBI) and U.S. Marshals Service, medical officer's or coroner's office, retired personnel, college students or interns, internal or external criminalists or other specialists (forensic, fingerprint, firearms), and administrative staff. A permanent, fully staffed and supported cold case squad can be more advantageous than a temporary or one-time squad because investigative staff and resources focus solely on solving cold cases and are more likely to be applied to cases over a long period. Budget and staff constraints, however, may determine the particular squad setup.

Not all cold case squads reside in municipal police departments. The Naval Criminal Investigative Service (NCIS), like the Army Criminal Investigation Division and Air Force Office of Special Investigations, investigates cold cases involving homicides that occurred on military bases or involved military personnel. The amount of formal cooperation between military and local law enforcement personnel is limited by the scope of their jurisdictions. NCIS is unique among the armed forces investigative services in that its cold case investigations are all performed as undercover operations.

The U.S. Marshals Service has a number of joint-agency fugitive task force units around the nation. Local or state police departments often send an officer to work with the task force, and a cold case squad may gain assistance in this way. Cold case squads should contact their local Marshals' office to determine what assistance may be available for a specific investigation. The FBI assists local law enforcement agencies with cold cases through its National Center for Analysis of Violent Crimes, which is headquartered in Quantico, Virginia. The FBI formerly helped police departments form cold case squads, but it now focuses its cold case assistance on cases that involve gangs and drugs, as a part of the Safe Streets Violent Crimes Initiative.

Choosing Personnel

Because cold cases can be very labor- and time-intensive and may require innovative investigative techniques, squads are most effective when they consist of investigators who have significant experience in investigating and prosecuting various types of homicide cases. Traits considered essential for cold case investigators include:

- Seniority.
- Strong communication and interpersonal skills (including interviewing and interrogation ability).
- Strong research skills.
- Patience.
- Creativity.
- Persistence.
- High motivation level.
- Enthusiasm for the job.

Some cold case squads encourage additional training about modern criminalistic technology and about services for victims' families (such as support meetings and witness protection resources).

Cold case squads offer various types of additional compensation, such as the ability to work regular daytime shifts, earn increased salary and rank, and use separate offices and equipment (including automobiles).

The size of the staff determines the number and type (team or individual) of investigations that can be conducted. Several investigators may be assigned to a case depending on its nature, the type of work involved, and the size of the squad. If possible, the cold case squad should be given an office separate from that of the general homicide squad. Separate work space may help prevent cold case detectives from being drawn into general homicide cases, especially high-profile cases that require more resources. In some instances, officers rotate periodically between general homicide assignments and cold case squad investigations.

Reviewing Cases

The process by which cases are reviewed and considered for referral to the cold case squad varies. These cases are usually at least a year old and cannot be addressed by the original homicide squad because of workload, time constraints, or the lack of viable leads. Cases are referred to a cold case squad by the homicide squad supervisor or other homicide detectives. In many instances, the supervisor, either with or without the input and consensus of the squad, decides which cases are referred to the cold case squad. In some instances, prosecutors will reopen cold cases or initiate cold case investigations with state and local law enforcement agencies. Witnesses that were previously uncooperative or unknown may come forward with information that leads to the reinvestigation of a cold case.

Cases are reviewed and prioritized according to the likelihood of an eventual solution. The highest priority cases are those in which the murder victim, or even a second surviving victim, has been identified; the death was ruled a homicide; suspects were previously named or identified through forensic methods; an arrest warrant was previously issued; significant physical evidence (such as

fingerprints, DNA, or shell casings) can be reprocessed for further clues; newly documented leads have arisen within the last 6 months; and critical witnesses are accessible and willing to cooperate.

High (but not highest) priority cases generally are those in which witnesses can identify suspects; information or evidence can identify possible suspects; or the initial investigation identified witnesses who could not be located or need to be reinterviewed. Cases of moderate priority include those in which preserved evidence can be processed and analyzed through modern technology (such as an automated fingerprint identification system, DNA analysis, or DRUGFIRE, a computerized program that tracks signatures on spent shell casings) and whose status as a homicide can be reclassified depending on the results of the additional laboratory analysis. Cases that generally receive the lowest priority are those in which no known physical evidence or witnesses are available to help identify a suspect.

Cold case investigators usually start by reviewing the case file, talking with all previous investigators tied to the case, and obtaining any notes they may have that are not in the case file. Investigators are particularly interested in reviewing or locating any gaps of information in the case, including people mentioned in statements that do not have a corresponding interview report in the case file, undocumented investigative actions (such as search warrants without documentation of service), and so forth. Any available evidence is assessed for future usability and additional analysis. The original suspect is rarely reinterviewed.

After reinterviewing significant witnesses and working all viable leads, if no suspect can be identified, the detective writes a summary documenting the followup investigation and recommending either further investigation or inactivation. A homicide case can be closed either through arrest of the suspect or by administrative action. The arrest of a suspect renders a case closed regardless of whether the suspect is convicted or even brought to trial. A case may be closed administratively if the suspect for which the department has probable cause either has died or has been prosecuted for another crime and is behind bars for life.

Resources

Although forensic analysis and investigative techniques have greatly improved over the years, the resolution of cold cases is primarily rooted in a squad's ability to identify, locate, and secure the testimony and cooperation of witnesses and informants.

Cold case investigations place particular emphasis on securing the participation of previously unknown or uncooperative witnesses. Locating them can be a formidable task. Witnesses may lie low because they face threats or retaliation, and informants may have, at best, a faulty recollection of an incident. With the passage of time, however, witnesses may no longer feel intimidated by threats or by the initial shock and publicity of a homicide. Individuals may have access to previously unavailable information, especially when a killer begins to boast about previous crimes. The relationship between suspects and witnesses may also have soured over time; in drug- and gang-related homicides, the killer himself may have been killed by a rival or other parties. Some witnesses may find their personal, professional, or legal circumstances have changed or may need assistance from law enforcement themselves.

Today, cold case squads have at their disposal technology, investigative methods, and resources that were not available to law enforcement agencies in the past. The two most frequently cited technological tools are DNA analysis and fingerprint technology (including automated fingerprint identification systems; cyanocrylate/ "superglue" fingerprint systems that allow investigators to lift prints from surfaces previously considered unprintable, such as leather and cloth; and systems that use lasers to lift prints). The availability of telephone services (such as Crime Stoppers) that offer cash rewards for anonymous informants has increased the flow of cold case information to investigators. Some agencies use the Internet and online forums for their Crime Stoppers efforts. In

addition, some law enforcement web sites offer police-only areas that present examples of *modus operandi* to investigators and agencies worldwide in order to obtain their comments.

Although media outlets sometimes have an uneasy relationship with law enforcement, particularly on a local level, they can help by reaching out to potential or uncooperative witnesses. After an arrest has been made in one cold case, people often contact police with information on other cold cases. Major newspapers and community publications can print articles and photographs relating to old cases. Radio and television stations, through news and community affairs broadcasts, can disseminate information, offer reenactments, and reach more members of a community than most law enforcement agencies can. Moreover, the participation of one media entity may encourage others to participate, increasing the potential for outreach.

Performance Measures

The most visible measure of a cold case squad's effectiveness is the number of cases it solves. Other internal and external gauges include awareness of and participation in investigations by communities, families, witnesses, and outside law enforcement agencies; the number of investigations handled by the squad; the number of resolutions (although a resolution may not result in arrest); and the number of successfully prosecuted cases.

Pros and Cons

The main benefit of a cold case squad is that it reduces the backlog of unsolved homicide cases. The arrest of suspects in one cold case may either solve other cases (through new leads and information from those suspects) or prevent new ones (by keeping killers from committing other crimes). A cold case squad's success in even one case can lead to positive feedback from a family that had been frustrated by law enforcement's previous inability to solve the death of a loved one. The sense of justice and closure gained by the victim's family when a case is closed cannot be overestimated. Even clearing previous suspects from suspicion can be helpful both to the families and the investigators. Arrests made in old cases also provide a good opportunity to present the community with a positive image of police who never stop caring about unsolved cases.

A cold case squad, however, also requires significant staffing and financial resources to pursue leads and track suspects. In addition, it requires input from potentially uncooperative or reluctant parties, especially the community, the victim's family, and witnesses. A cold case squad's success in closing cases and encouraging other investigations may actually hamper its effectiveness if resources for pursuing a flood of additional leads are not available.

Other Options

Not every law enforcement agency can afford a permanent cold case squad. One alternative is to consult a cold case organization like the Vidocq Society, an international nonprofit organization of forensic experts, criminalists, pathologists, investigators, and attorneys who meet regularly to solve unsolved homicides. The group works with the police, prosecutors, and the victim's family, providing assistance on a pro bono basis. In addition, the FBI and various federal, state, or district attorneys' offices may be able to provide investigative resources for cold cases. Funding may also be obtained from federal sources or foundations.

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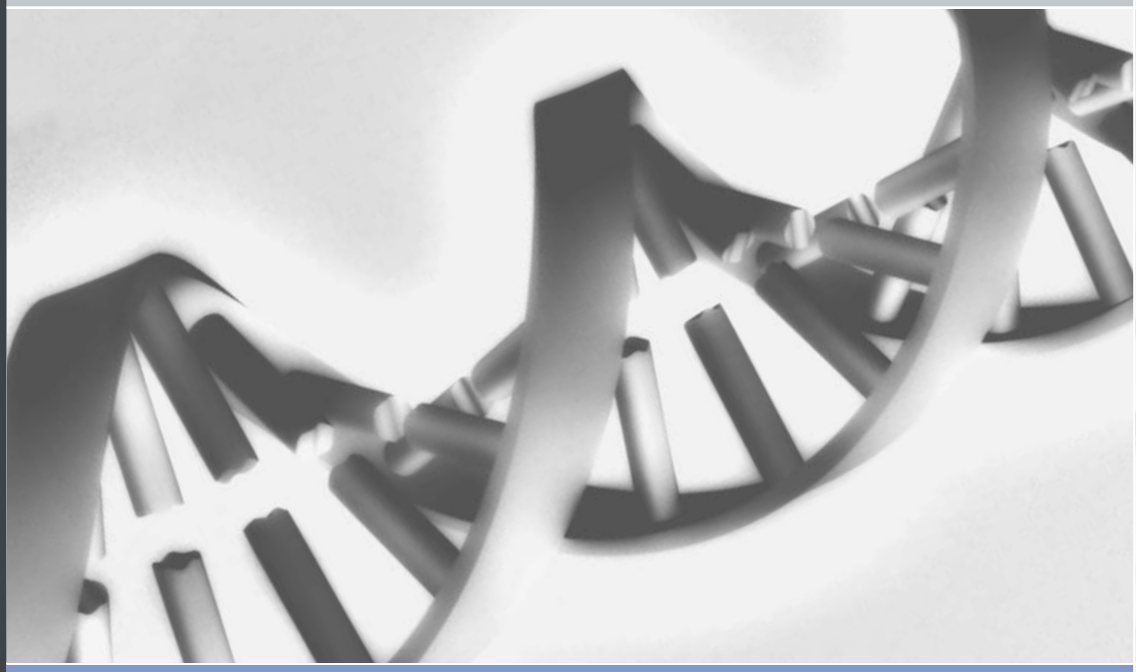
JULY 02

NIJ

Special **REPORT**



Using DNA to Solve Cold Cases

National Commission on the Future of DNA Evidence

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JULY 02

Using DNA to Solve Cold Cases

NCJ 194197

NIJ

Sarah V. Hart
Director
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National Commission on the Future of DNA Evidence

In 1995, the National Institute of Justice (NIJ) began research that would attempt to identify how often DNA had exonerated wrongfully convicted defendants. After extensive study, NIJ published the report *Convicted by Juries, Exonerated by Science: Case Studies in the Use of DNA Evidence to Establish Innocence After Trial,* which presents case studies of 28 inmates for whom DNA analysis was exculpatory.

On learning of the breadth and scope of the issues related to forensic DNA, the Attorney General asked NIJ to establish the National Commission on the Future of DNA Evidence as a means to examine the most effective use of DNA in the criminal justice system. The Commission was appointed by the NIJ Director and represented the broad spectrum of the criminal justice system. Chaired by the Honorable Shirley S. Abrahamson, Chief Justice of the Wisconsin Supreme Court, the Commission consisted of representatives from the prosecution, the defense bar, law enforcement, the scientific community, the medical examiner community, academia, and victims' rights organizations.

The Commission's charge was to submit recommendations to the Attorney General that will help ensure the best use of DNA as a crimefighting tool and foster its use throughout the entire criminal justice system. Other focal areas for the Commission's consideration included crime scene investigation and evidence collection, laboratory funding, legal issues, and research and development. The Commission's working groups, consisting of commissioners and other experts, researched and examined various topics and reported back to the Commission. The working groups' reports were submitted to the full Commission for approval, amendment, or further discussion and provided the Commission with background for its recommendations to the Attorney General.

By nature of its representative composition and its use of numerous working groups, the Commission received valuable input from all areas of the criminal justice system. The broad scope of that input enabled the Commission to develop recommendations that both maximize the investigative value of the technology and address the issues raised by its application.

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Chair

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Members

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Crime Scene Investigation Working Group

The Crime Scene Investigation Working Group is a multidisciplinary group of criminal justice professionals from across the United States who represent both urban and rural jurisdictions. Working group members and contributors were recommended and selected for their experience in the area of criminal investigation and evidence collection from the standpoints of law enforcement, prosecution, defense, the forensic laboratory, and victim assistance.

DNA has proven to be a powerful tool in the fight against crime. DNA evidence can identify suspects, convict the guilty, and exonerate the innocent. Throughout the Nation, criminal justice professionals are discovering that advancements in DNA technology are breathing new life into old, cold, or unsolved criminal cases. Evidence that was previously unsuitable for DNA testing because a biological sample was too small or degraded may now yield a DNA profile. Development of the Combined DNA Index System (CODIS) at the State and national levels enables law enforcement to aid investigations by effectively and efficiently identifying suspects and linking serial crimes to each other. The National Commission on the Future of DNA Evidence made clear, however, that we must dedicate more resources to empower law enforcement to use this technology quickly and effectively.

Using DNA to Solve Cold Cases is intended for use by law enforcement and other criminal justice professionals who have the responsibility for reviewing and investigating unsolved cases. This report will provide basic information to assist agencies in the complex process of case review with a specific emphasis on using DNA evidence to solve previously unsolvable crimes. Although DNA is not the only forensic tool that can be valuable to unsolved case investigations, advancements in DNA technology and the success of DNA database systems have inspired law enforcement agencies throughout the country to reevaluate cold cases for DNA evidence. As law enforcement professionals progress through investigations, however, they should keep in mind the array of other technology advancements, such as improved ballistics and fingerprint databases, which may substantially advance a case beyond its original level.

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Contents

Introduction

In 1990, a series of brutal attacks on elderly victims occurred in Goldsboro, North Carolina, by an unknown individual dubbed the "Night Stalker." During one such attack in March, an elderly woman was brutally raped and almost murdered. Her daughter's early arrival home was the only thing that saved the woman's life. The suspect fled, leaving behind materials intended to burn the residence and the victim in an attempt to conceal the crime. In July 1990, another elderly woman was brutally raped and murdered in her home. Three months later, a third elderly woman was raped and stabbed to death. Her husband was also murdered. Their house was burned in an attempt to cover up the crime, but fire/rescue personnel pulled the bodies from the house before it was engulfed in flames.

When DNA analysis was conducted on biological evidence collected from vaginal swabs from each victim, authorities concluded that the same perpetrator had committed all three crimes. However, there was no suspect.

For 10 years, both the Goldsboro Police Department and the crime laboratory refused to forget about these cases. With funding from the National Institute of Justice, the crime laboratory retested the biological evidence in all three cases with newer DNA technology and entered the DNA profiles into North Carolina's DNA database. This would allow the DNA profile developed from the crime scene evidence to be compared to thousands of convicted offender profiles already in the database.

In April 2001, a "cold hit" was made to the perpetrator's convicted offender DNA profile in the database. The perpetrator had been convicted of shooting into an occupied dwelling, an offense that requires inclusion in the North Carolina DNA database. The suspect was brought into custody for questioning and was served with a search warrant to obtain a sample of his blood. That sample was analyzed and compared to the crime scene evidence, thereby confirming the DNA database match. When confronted with the DNA evidence, the suspect confessed to all three crimes.

Mark Nelson, special agent in charge of the North Carolina State Crime Laboratory, said, "Even though these terrible crimes occurred more than 10 years ago, we never gave up hope of solving them one day."

Every law enforcement department throughout the country has unsolved cases that could be solved through recent advancements in DNA technology. Today, investigators who understand which evidence may yield a DNA profile can identify a suspect in ways previously seen only on television. Evidence invisible to the naked eye can be the key to solving a residential burglary, sexual assault, or murder. The saliva on the stamp of a stalker's threatening letter, the perspiration on a rapist's mask, or the skin cells shed on the ligature of a strangled child may hold the key to solving a crime.

In Austin, Texas, for example, an investigator knowledgeable about DNA technology was able to solve the rape of a local college student. Having read about the potential for obtaining DNA evidence from the ligature used to strangle a victim, the investigator requested DNA testing on the phone cord used to choke the victim in his case. He realized that in the course of

choking someone, enough force and friction is applied to the rope or cord that the perpetrator's skins cells may rub off his hands and be left on the ligature.

The investigator's request paid off in an unanticipated way. In spite of the attacker's attempt to avoid identification through DNA evidence by wearing both a condom and rubber gloves, a reliable DNA profile was developed from the evidence. During the struggle, the attacker was forced to use one hand to hold the victim down, leaving only one hand to pull the phone cord tight. The attacker had to grab the remaining end of the cord with his mouth, thereby depositing his saliva on the cord. Although the developed profile came from saliva rather than skin, DNA not only solved the case in Austin, but also linked the perpetrator to a similar sexual assault in Waco.

The successful review and investigation of unsolved cases require cooperation among law enforcement, the crime laboratory, and the prosecutor's office.

Without the investigator's understanding of DNA technology and where DNA might be found, the case may have gone unsolved. The successful review and investigation of unsolved cases require the same basic elements as the investigation of new cases: cooperation among law enforcement, the crime laboratory, and the prosecutor's office. Investigators should be aware of technological advances in DNA testing that may yield profiles where previous testing was not performed or was unsuccessful. The crime laboratory can be essential to the preliminary review of unsolved cases, for example, by providing investigators with laboratory reports from previous testing and consultation regarding the investigative value of new DNA analysis techniques and DNA database search capabilities. Additionally, the prosecutor's office should be involved as soon as a case is reopened so that legal issues are addressed appropriately. It is also extremely important that case reconstruction considers the victim or victim's family and the importance of finality to closing a case.

Although DNA is not the only forensic tool available for the investigation of unsolved cases, advancements in DNA testing and the success of DNA database systems have inspired law enforcement agencies throughout the country to reevaluate cases previously thought unsolvable. The purpose of this report is to provide law enforcement with a practical resource for the review of old, cold, or unsolved cases that may be solved through DNA technology and DNA databases. "The Long and Short of DNA" and "How Can DNA Databases Aid Investigations?" will educate the reader about the science and technology of DNA testing and DNA databases. "Practical Considerations" provides important background information on legal and practical considerations regarding the application of DNA technology to old, cold, or unsolved cases. Finally, a step-by-step process is provided to help investigators select cases that would most likely be solved with DNA evidence. As investigators advance through this process, they should also keep in mind the array of other technology advancements, such as improved ballistics and fingerprint databases, that may benefit their investigation.

Advancements in DNA technology

Advancements in DNA analysis, together with computer technology and the Combined DNA Index System (CODIS),[1] have created a powerful crimefighting tool for law enforcement. CODIS is a computer network that connects forensic DNA laboratories at the local, State, and national levels. DNA database systems that use CODIS contain two main criminal indexes and a missing persons index. When a DNA profile is developed from crime scene evidence and entered into the forensic (crime scene) index of CODIS, the database software searches thousands of convicted offender DNA profiles

(contained in the offender index) of individuals convicted of offenses such as rape and murder. Similar to the Automated Fingerprint Identification System (AFIS), CODIS can aid investigations by efficiently comparing a DNA profile generated from biological evidence left at a crime scene against convicted offender DNA profiles and forensic evidence from other cases contained in CODIS. CODIS can also aid investigations by searching the missing persons index, which contains DNA profiles of unidentified remains and DNA profiles of relatives of those who are missing. Because of the recidivistic nature of violent offenders, the power of a DNA database system is evident not only in the success of solving crimes previously thought unsolvable, but perhaps more importantly, through the *prevention* of crime.

When properly documented, collected, and stored, biological evidence can be analyzed to produce a reliable DNA profile years, even decades, after it is collected. Just as evidence collected from a crime that occurred yesterday can be analyzed for DNA, today evidence from an old rape kit, bloody shirt, or stained bedclothes may contain a valuable DNA profile. These new analysis techniques, in combination with an evolving database system, make a powerful argument for the reevaluation of unsolved crimes for potential DNA evidence.

Knowledgeable law enforcement officers are taking advantage of powerful DNA analysis techniques by investigating crime scenes with a keener eye toward biological evidence. The same new approach being applied to crime scene processing and current case investigation can be applied to older unsolved cases. Law enforcement agencies across the country are establishing cold-case squads to systematically review old cases for DNA and other new leads. This report will serve as a resource to assist law enforcement with maximizing the potential of DNA evidence in unsolved cases by covering the basics of DNA analysis and its application to forensic casework. The report will also demonstrate how DNA database systems, advancing technology, and cooperative efforts can enhance unsolved case investigative techniques.

New laws

Advancements in DNA technology have led to significant changes in many States' statutes, which may affect the manner in which unsolved cases are investigated, filed, and prosecuted. Advancements in the technology have been so significant that laws are being created, amended, and even repealed to take advantage of its ability to identify and convict the guilty and exonerate the innocent. Laws regarding DNA admissibility in court, its use in post-conviction appeals, the creation and expansion of databases, and the extension or elimination of statutes of limitation are examples of the quickly evolving impact of DNA on the criminal justice system. Given the legal changes occurring throughout the country, constant contact and consultation with the local prosecutor is critical not only for the investigation of older cases but for all cases in which DNA may be relevant evidence.

Statutes of limitation

Statutes of limitation may be one of the most difficult issues to overcome when examining older cases. Statutes of limitation establish time limits under which criminal charges can be filed for a particular offense. These statutes are rooted in the protection of individuals from the use of evidence that becomes less reliable over time. For example, witnesses' memories fade as time goes by. However, although some evidence, such as eyewitness accounts, can lose credibility over time, DNA evidence has the power to determine truth 10, 15, even 20 years

The power of a DNA database system is evident not only in the success of solving crimes previously thought unsolvable, but through the prevention *of crime.*

The reliability of DNA technology may necessitate the reevaluation of statutes of limitation.

after an offense is committed. States are beginning to realize that the reliability of DNA technology may necessitate the reevaluation of statutes of limitation in the filing of cases.

Database expansion

The use of DNA evidence and convicted offender DNA databases has expanded significantly since the first U.S. DNA database was created in 1989. Although State and local DNA databases established in the early 1990s contained only DNA profiles from convicted murderers and sex offenders, the undeniable success of DNA databases has resulted in a national trend toward database expansion. All States require at least some convicted offenders to provide a DNA sample to be collected for DNA profiling and, in 2000, the Federal Government began requiring certain offenders convicted of Federal or military crimes to also provide a DNA sample for the criminal DNA database. Recognizing that the effectiveness of the DNA database relies on the volume of data contained in both the forensic index (crime scene samples) and the convicted offender index of CODIS, many States are changing their database statutes to include less violent criminals. Many States are enacting legislation to require all convicted felons to submit a DNA profile to the State database. The tendency for States to include all convicted felons in their databases dramatically increases the number of convicted offender DNA profiles against which forensic DNA evidence can be compared, thus making the database system a more powerful tool for law enforcement.

New legal approaches

DNA technology and DNA databases have encouraged the development of new approaches to old cases. One such approach is the filing of charges by "John Doe" warrant. These warrants are based on the unique DNA profile obtained from the analysis of unsolved crime scene evidence. Although John Doe warrants are traditionally filed based on the physical description or alias of an unnamed suspect, investigators and prosecutors are now filing charges using the suspect's DNA profile as the identifier. This innovative approach has allowed charges to be filed that toll and permit old cases to be prosecuted when the person matching the John Doe DNA profile is identified. John Doe DNA warrants are one way to permit cases to remain active, allowing them the chance to be solved through the DNA database in the future.

The Long and Short of DNA

DNA is the fundamental building block for an individual's entire genetic makeup. It is a component of virtually every cell in the human body, and a person's DNA is the same in every cell. That is, the DNA in a person's blood is the same as the DNA in his skin cells, saliva, and other biological material.

DNA analysis is a powerful tool because each person's DNA is unique (with the exception of identical twins). Therefore, DNA evidence collected from a crime scene can implicate or eliminate a suspect, similar to the use of fingerprints. It also can analyze unidentified remains through comparisons with DNA from relatives. Additionally, when evidence from one crime scene is compared with evidence from another using CODIS, those crime scenes can be linked to the same perpetrator locally, statewide, and nationally.

If biological evidence is available for testing or retesting in unsolved case investigations, it is important that law enforcement and the crime laboratory work together to review evidence.

DNA is also a powerful tool because when biological evidence from crime scenes is collected and stored properly, forensically valuable DNA can be found on evidence that may be decades old. Therefore, old cases that were previously thought unsolvable may contain valuable DNA evidence capable of identifying the perpetrator.

Similar to fingerprints

DNA is often compared with fingerprints in the way matches are determined. When using either DNA or fingerprints to identify a suspect, the evidence collected from the crime scene is compared with a "known" standard. If identifying features are the same, the DNA or fingerprint can be determined to be a match. However, if identifying features of the DNA profile or fingerprint are different from the known standard, it can be determined that it did not come from that known individual.

DNA technology advancements

Recent advancements in DNA technology have improved law enforcement's ability to use DNA to solve old cases. Original forensic applications of DNA analysis were developed using a technology called restriction fragment length polymorphism (RFLP). Although very old cases (more than 10 years) may not have had RFLP analysis done, this kind of DNA testing may have been attempted on more recent unsolved cases. However, because RFLP analysis required a relatively large quantity of DNA, testing may not have been successful. Similarly, biological evidence deemed insufficient in size for testing may not have been previously submitted for testing. Also, if a biological sample was degraded by environmental factors such as dirt or mold, RFLP analysis may have been unsuccessful at yielding a result. Newer technologies could now be successful in obtaining results.

Newer DNA analysis techniques enable laboratories to develop profiles from biological evidence invisible to the naked eye, such as skin cells left on ligatures or weapons. Unsolved cases should be evaluated by investigating both traditional and nontraditional sources of DNA. Valuable DNA evidence might be available that previously went undetected in the original investigation.

If biological evidence is available for testing or retesting in unsolved case investigations, it is important that law enforcement and the crime laboratory work together to review evidence. Logistical issues

regarding access to and the cost of DNA analysis will be a factor, as well as issues that relate to the discriminating power of each technology and that might affect the outcome of the results. Laboratory personnel can also provide a valuable perspective on which evidence might yield valuable and probative DNA results. Finally, if previously tested biological evidence produced a DNA profile but excluded the original suspect, revisiting those "exclusion" cases in the context of comparing them with DNA databases might prove to be very valuable to solving old cases.

If the convicted offender or forensic index of CODIS is to be used in the investigative stages of an unsolved case, DNA profiles must be generated using STR analysis.

PCR analysis

PCR (polymerase chain reaction) enhances DNA analysis and has enabled laboratories to develop DNA profiles from extremely small samples of biological evidence. The PCR technique replicates exact copies of DNA contained in a biological evidence sample without affecting the original, much like a copy machine. RFLP analysis requires a biological sample about the size of a quarter, but PCR can be used to reproduce millions of copies of the DNA contained in a few skin cells. Since PCR analysis requires only a minute quantity of DNA, it can enable the laboratory to analyze highly degraded evidence for DNA. On the other hand, because the sensitive PCR technique replicates any and all of the DNA contained in an evidence sample, greater attention to contamination issues is necessary when identifying, collecting, and preserving DNA evidence. These factors may be particularly important in the evaluation of unsolved cases in which evidence might have been improperly collected or stored.

STR analysis

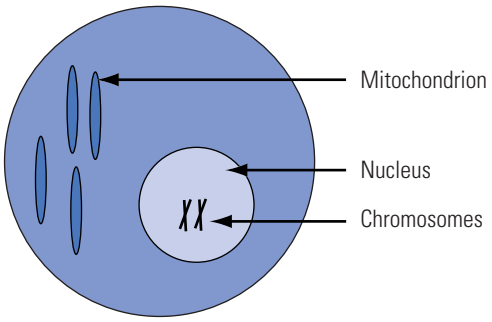
Short tandem repeat (STR) technology is a forensic analysis that evaluates specific regions (loci) that are found on nuclear DNA. The variable (polymorphic) nature of the STR regions that are analyzed for forensic testing intensifies the discrimination between one DNA profile and another. For example, the likelihood that any two individuals (except identical twins) will have the same 13-loci DNA profile can be as high as 1 in 1 billion or greater. The Federal Bureau of Investigation (FBI) has chosen 13 specific STR loci to serve as the standard for CODIS. The purpose of establishing a core set of STR loci is to ensure that all forensic laboratories can establish uniform DNA databases and, more importantly, share valuable forensic information. If the forensic or convicted offender CODIS index is to be used in the investigative stages of unsolved cases, DNA profiles must be generated by using STR technology and the specific 13 core STR loci selected by the FBI.

Mitochondrial DNA analysis

Mitochondrial DNA (mtDNA) analysis allows forensic laboratories to develop DNA profiles from evidence that may not be suitable for RFLP or STR analysis. While RFLP and PCR techniques analyze DNA extracted from the nucleus of a cell, mtDNA technology analyzes DNA found in a different part of the cell, the mitochondrion (see exhibit 1). Old remains and evidence lacking nucleated cells—such as hair shafts, bones, and teeth—that are unamenable to STR and RFLP testing may yield results if mtDNA analysis is performed. For this reason, mtDNA testing can be very valuable to the investigation of an unsolved case. For example, a cold case log may show that biological evidence in the form of blood, semen, and hair was collected in a particular case, but that all were improperly stored for a long period of time. Although PCR analysis sometimes enables the crime laboratory to generate a DNA profile from very degraded evidence, it is possible that the blood and semen would be so highly degraded that nuclear DNA analysis would not yield a DNA profile. However, the hair

shaft could be subjected to mtDNA analysis and thus be the key to solving the case. Finally, it is important to note that all maternal relatives (for example, a person's mother or maternal grandmother) have identical mtDNA. This enables unidentified remains to be analyzed and compared to the mtDNA profile of any maternal relative for the purpose of aiding missing persons or unidentified remains investigations. Although mtDNA analysis can be very valuable to the investigation of criminal cases, laboratory personnel should always be involved in the process.

Exhibit 1. Cell diagram



Y-chromosome analysis

Several genetic markers have been identified on the Y chromosome that can be used in forensic applications. Y-chromosome markers target only the male fraction of a biological sample. Therefore, this technique can be very valuable if the laboratory detects complex mixtures (multiple male contributors) within a biological evidence sample. Because the Y chromosome is transmitted directly from a father to all of his sons, it can also be used to trace family relationships among males. Advancements in Y-chromosome testing may eventually eliminate the need for laboratories to extract and separate semen and vaginal cells (for example, from a vaginal swab of a rape kit) prior to analysis.

Cooperative efforts with the crime laboratory are essential to deciding which analysis methods will be most valuable in a particular case. It is important to note, however, that while RFLP and mtDNA testing may be valuable to the investigation of an old case, current DNA databases are being populated with DNA profiles that are generated using STR analysis. RFLP and mtDNA profiles are not compatible with the convicted offender or forensic indexes of CODIS.[2]

How Can DNA Databases Aid Investigations?

The development and expansion of databases that contain DNA profiles at the local, State, and national levels have greatly enhanced law enforcement's ability to solve cold cases with DNA. Convicted offender databases store hundreds of thousands of potential suspect DNA profiles, against which DNA profiles developed from crime scene evidence can be compared.

Success Story

A "forensic hit" occurred in the National DNA Index System (NDIS) that linked a dead Florida man's DNA profile to eight serial unsolved rapes in Washington, D.C. and three offenses in Florida.

In 1999, Leon Dundas was killed in a drug deal. Investigators remembered Dundas refusing to give a blood sample in connection with a rape investigation in 1998. They were able to obtain Dundas' blood sample through the medical examiner's office and forwarded it to the DNA lab at the Florida Department of Law Enforcement. Dundas' DNA profile was compared with the national forensic index and a match was made between Dundas and DNA evidence from a rape victim in Washington, D.C.

The FBI then entered DNA evidence from additional unsolved rapes committed in Washington. Dundas' DNA matched seven additional rapes in Washington and three more in Jacksonville, Florida. Police in Washington said that without DNA, they would have never identified Dundas, who had no prior recorded history of violent crime.

Given the recidivistic nature of many crimes, such as sexual assault and burglary, a likelihood exists that the individual who committed the crime being investigated was convicted of a similar crime and already has his or her DNA profile in a DNA database that can be searched by CODIS. Moreover, CODIS also permits the cross-comparison of DNA profiles developed from biological evidence found at crime scenes. Even if a perpetrator is not identified through the database, crimes may be linked to each other, thereby aiding an investigation, which may eventually lead to the identification of a suspect.

What is CODIS?

CODIS is a computer software program that operates local, State, and national databases of DNA profiles from convicted offenders, unsolved crime scene evidence, and missing persons. Every State in the Nation has a statutory provision for the establishment of a DNA database that allows for the collection of DNA profiles from offenders convicted of particular crimes. CODIS software enables State, local, and national law enforcement crime laboratories to compare DNA profiles electronically, thereby linking serial crimes to each other and identifying suspects by matching DNA profiles from crime scenes with profiles from convicted offenders. The success of CODIS is demonstrated by the thousands of matches that have linked serial cases to each other and cases that have been solved by matching crime scene evidence to known convicted offenders.

The missing persons index consists of the unidentified persons index and the reference index. The unidentified persons index contains DNA profiles from recovered remains, such as bone, teeth, or hair. The reference index contains DNA profiles from related individuals of missing persons so that they can be periodically compared to the unidentified persons index. All samples for this index are typed using mtDNA and STR DNA analysis (if possible) to maximize the power of advancing technology.

The offender index contains DNA profiles of individuals convicted of certain crimes. The forensic index contains DNA profiles obtained from crime scene evidence.

How does CODIS work?

CODIS uses two indexes to generate investigative leads in crimes for which biological evidence is recovered from a crime scene. The convicted offender index contains DNA profiles of individuals convicted of certain crimes ranging from certain misdemeanors to sexual assault and murder. Each State has different "qualifying offenses" for which persons convicted of them must submit a biological sample for inclusion in the DNA database. The forensic index contains DNA profiles obtained from crime scene evidence, such as semen, saliva, or blood. CODIS uses computer software to automatically search across these indexes for a potential match.

A match made between profiles in the forensic index can link crime scenes to each other, possibly identifying serial offenders. Based on these "forensic hits," police in multiple jurisdictions or States can coordinate their respective investigations and share leads they have developed independent of each other. Matches made between the forensic and convicted offender indexes can provide investigators with the identity of a suspect(s). It is important to note that if an "offender hit" is obtained, that information typically is used as probable cause to obtain a new DNA sample from that suspect so the match can be confirmed by the crime laboratory before an arrest is made.

LDIS, SDIS, and NDIS

CODIS is implemented as a distributed database with three hierarchical levels (or tiers)—local, State, and national. All three levels contain forensic and convicted offender indexes and a population file (used to generate statistics). The hierarchical design provides State and local laboratories with the flexibility to configure CODIS to meet their specific legislative and technical needs.

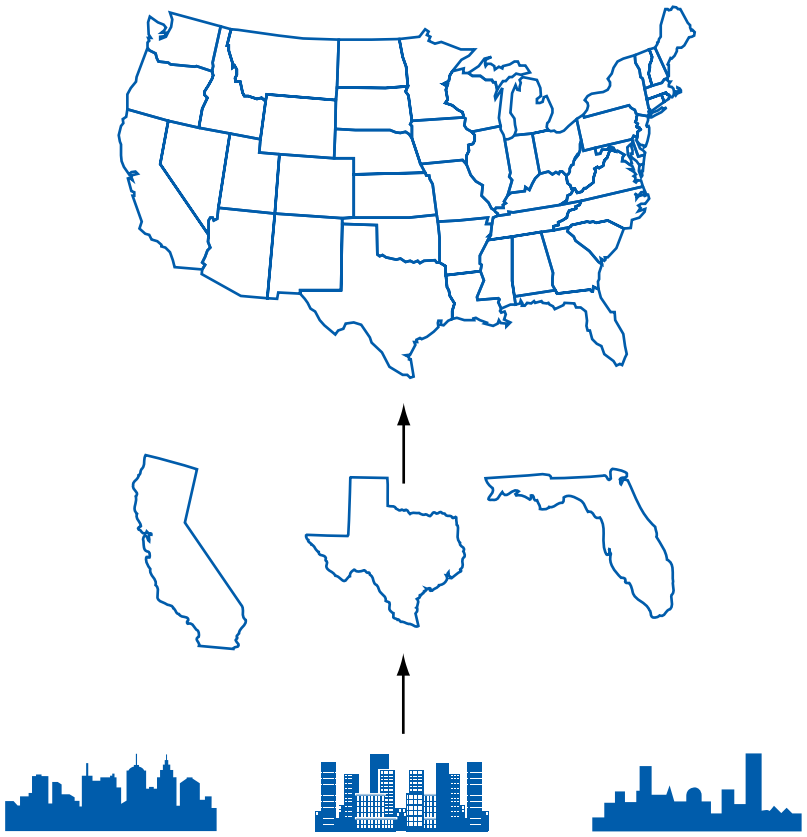
A description of the three CODIS tiers follows (see exhibit 2).

- Local. Typically, the Local DNA Index System (LDIS) installed at crime laboratories is operated by police departments or sheriffs' offices. DNA profiles originated at the local level can be transmitted to the State and national levels.
- State. Each State has a designated laboratory that operates the State DNA Index System (SDIS). SDIS allows local laboratories within that State to compare DNA profiles. SDIS also is the communication path between the local and national tiers. SDIS is typically operated by the agency responsible for implementing and monitoring compliance with the State's convicted offender statute.
- National. The National DNA Index System (NDIS) is the highest level of the CODIS hierarchy and enables qualified State laboratories that are actively participating in CODIS to compare DNA profiles. NDIS is maintained by the FBI under the authority of the DNA Identification Act of 1994.

Limitations of using the DNA database

The more data contained in the forensic and offender indexes of CODIS, the more powerful a tool it becomes for law enforcement, especially in its application to unsolved case investigation. However, because many jurisdictions are in the process of developing and populating their DNA databases, convicted offender and forensic casework backlogs have been created over time and continue to grow for several reasons. First, as States recognize the crime-solving potential of DNA databases, they continue to expand the scope of their convicted offender legislation, which increases the number of

Exhibit 2. CODIS tiers



samples to be collected and analyzed by the DNA laboratory. As a result, more than 1 million uncollected convicted offender DNA profiles are "owed" to the system.

An equally important but more difficult problem to quantify is that of unprocessed casework that contains biological evidence. This casework backlog may include nonsuspect or unsolved cases that could be analyzed and solved as a result of advancements in DNA technology.

Convicted offender backlogs

Although all 50 States have passed DNA database legislation, many States have backlogs of convicted offender samples that have been collected but have not yet been analyzed. Although Federal funding has played an important role in reducing existing backlogs, the crimefighting potential of DNA has prompted many States to revise their statutes to require nonviolent convicted offenders to provide a DNA sample for analysis and upload into CODIS. The trend toward expanding convicted offender DNA statutes to include nonviolent offenders has significantly increased the number of DNA samples requiring collection and analysis. Although the success of using the DNA database as a crime-solving and crime-prevention tool can easily be demonstrated once convicted offender backlogs are reduced, it should be recognized that new backlogs

are instantly created by the passage of expanded DNA legislation laws. Convicted offender backlogs are an ongoing logistical issue that can compound the complexity of investigating cold cases by using the DNA database.

Forensic casework backlogs

Addressing issues that affect the efficient and effective use of DNA databases in the United States is complicated further by the existence of casework backlogs. This refers to biological evidence in perhaps tens of thousands of criminal cases, including violent and nonviolent crimes, that has not been tested or retested for DNA.

Unprocessed rape kits are a clear example of this kind of backlog. Despite the established fact that rape typically yields biological evidence, as of October 1999, at least 180,000 rape kits remained on shelves across the country, unprocessed, because no suspects have been identified. The DNA evidence from these and other criminal cases often is not analyzed and entered into the DNA database because forensic laboratories have to prioritize their work and cases scheduled for trial take precedence over cases in which no suspect is known. In most jurisdictions, nonsuspect criminal cases that contain biological evidence are not being analyzed and entered into the DNA database. In many jurisdictions, DNA from crime scenes is still primarily used to prosecute offenders, not to investigate crimes. The convicted offender backlog and limited resources for casework going to trial preclude State forensic laboratories from analyzing all biological evidence for DNA, which in turn prevents law enforcement from being able to realize the full crime-solving potential of CODIS.

The backlog of forensic cases has practical consequences for most law enforcement agencies in the United States. Laboratory capacity limitations result in the ability to process crime scene samples from only the most serious of offenses. More and more, however, agencies such as those in the United Kingdom are discovering the value of DNA technology in solving property crimes. Blood left on a broken apartment window or saliva found on a discarded beer bottle can be used to identify burglars, and the skin cells rubbed off onto the steering wheel of a stolen vehicle can solve car thefts. However, as long as forensic laboratories remain able to process only the most serious cases, the full potential of DNA technology to solve crime will remain untapped.

Practical Considerations

Local prosecutors can provide valuable insight into legal issues. Victim/witness units or advocates can help locate, educate, and encourage witnesses. Consultation with representatives from the crime laboratory is critical.

A broad range of considerations must be made long before any DNA testing is actually attempted in older, unsolved cases. These include—

- Legal considerations, such as the application or expiration of statutes of limitation.
- Technological considerations, such as the nature and condition of the evidence as originally collected, stored, and in some instances, subjected to other forensic tests.
- Practical considerations, such as the availability of witnesses in the event DNA testing would identify a suspect and lead to an arrest and a trial.
- Resource issues, such as the time and money available for investigation and forensic analysis.

The nature and scope of these issues require that any approach to reexamining old cases for potential DNA evidence be collaborative, whether by an individual investigator or by a specialized unit developed specifically for cold case review. Local prosecutors can provide valuable insight into legal issues that might prevent or help a future prosecution. Victim/witness units or advocates can provide valuable assistance with locating, educating, and encouraging witnesses. Consultation with representatives from the crime laboratory is critical to ensuring that potential DNA evidence can be successfully analyzed.

Evidence considerations

When collecting unsolved case evidence from storage facilities, the case investigator should be ready to handle all types of packaging disasters. Evidence may be stored in heavy-duty plastic bags, stapled shut as the past form of "sealing." Multiple items may be sealed in one plastic bag, or even unpackaged in large, open, cardboard boxes. Unprotected microscope slides from medical facilities might also be found as a result of investigating old cases. No attempt should be made on the part of the investigator to separate and repackage evidence. The condition and position that the evidence has been stored in could provide valuable clues to the forensic scientist for testability of evidence. Only when evidence is found unpackaged should the investigator properly package and label the item(s) to minimize the possibility for contamination from that point forward. It is important that any evidence items are handled minimally and only by individuals wearing disposable gloves. As always, it is also very important that all actions taken as a result of opening, evaluating, packaging, or repackaging evidence are documented thoroughly in the case folder.

Degraded evidence

Prior to the frequent use of DNA technology, biological evidence may have been collected and stored in ways that were not necessarily the best methods for preserving samples for future DNA testing. For example, evidence containing biological fluids that were originally collected for ABO Blood Typing analysis or other serology methods may have been packaged or stored in ways that can limit DNA testing. Some methods of collection and storage may promote the growth of bacteria and mold on the evidence. Bacteria can seriously damage or degrade DNA contained in biological material and inhibit the ability to develop a DNA profile; however, evidence can still sometimes yield DNA results. For example, PCR technology can allow the laboratory to develop profiles

from some moldy biological samples, whereas other evidence may fail to yield a usable DNA profile, even when no mold is visible. Therefore, close consultation with the laboratory is important to determine the type of DNA testing most likely to yield results on the available evidence.

Contamination issues

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. Evidence in older cases may have been collected in ways that lacked appropriate contamination or cross-contamination safeguards, which can make the DNA results less useful or even misleading. In these cases, clarifying results by identifying the contributor of an additional profile can determine whether the DNA results may now be used. When a mixture is detected, a careful reconstruction of the evidence collection, storage, and analysis process must be undertaken. It may be determined that DNA profiles will be required from on-scene officers, evidence technicians, or laboratory scientists who had access to the evidence for comparison with evidence results. In these instances, proper chain-of-custody reconstruction is critical.

Evidence Handling Recommendations

- Wear gloves. Change them between handling each item of evidence.
- Use disposable instruments or clean instruments thoroughly before and after handling each evidence sample.
- Avoid touching the area where you believe DNA may exist.
- Avoid touching your face, nose, and mouth when examining and repackaging evidence.
- Put dry evidence into new paper bags or envelopes; do not use plastic bags.
- Do not use staples.
- If repackaging of evidence is necessary, consult with laboratory personnel.

It is also important to avoid contamination when handling biological evidence during the course of the current review. If evidence that may contain biological material is already sealed, do not reopen it before sending it to the laboratory. (See Evidence Handling Recommendations.)

Legal considerations

Numerous legal issues might arise when examining older cases for potential DNA evidence. These issues are most likely jurisdictionally specific and may differ from State to State. Although most jurisdictions maintain no statute of limitation for filing charges in a homicide case, States can vary widely in the time allowed for filing charges in other cases, such as rape and other sexual assault crimes. Furthermore, in recognition of DNA technology's ability to solve old cases, many States are extending or even eliminating statutes of limitation for certain crimes.

Chain of custody

When a case remains unsolved for a long period of time, evidence is usually handled by an increased number of individuals. Many unsolved cases to be reviewed for DNA evidence may have been previously reinvestigated or handled by several different investigators as a result of new leads or periodic, systematic reviews. Furthermore, as cases age, the likelihood increases that evidence may be moved to new or remote storage locations as evidence from newer cases fills police department shelves.

Many cases may also have had evidence submitted to the laboratory for various forms of forensic testing. Evidence in older cases may have been submitted for standard serological testing, but can now be tested for DNA with much greater success. Hair previously submitted for standard microscopic hair analysis may now

be submitted for mtDNA testing. 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.

Statutes of limitation

One of the first issues to address when reviewing an unsolved case is whether the statutes of limitation on a case have run out. Several considerations arise when addressing a statute of limitation issue. Good communication between law enforcement and local prosecutors is critical when examining these legal questions.

Changes in statutes. Advances in DNA technology and the creation of DNA databases are leading many criminal justice professionals to rethink time limits placed on the filing of criminal charges. Because biological evidence can yield reliable DNA analysis results years after the commission of a crime, many State legislatures have begun to extend, and in some cases eliminate, the statutes of limitation for some crimes and in certain circumstances. Many States have extended the length of time for which a complaint can be filed, other States have eliminated statutes of limitation for certain crimes, and some legislation is retroactive.

Exceptions to statutes. Exceptions often exist under existing and new statutes. Under such exceptions, time can be added to the statute of limitation, giving police the legal authority to arrest even if it appears as though the statute has run out. For example, many jurisdictions have exceptions for a suspect's flight from jurisdiction. In a case for which there is a 5-year statute of limitation, if the government can prove that the suspect has been absent from the jurisdiction for 2 years, the State can still file against the suspect for up to 7 years after the commission of the crime. Exceptions also exist for cases in which child victims are assaulted by a family member, which can be valuable in the context of a current investigation.

Victim and witness considerations

Another important consideration to be made early in the process is the willingness of victims and witnesses to proceed. Although many victims may continuously monitor the progress of their investigations, some choose to detach from the process over time. Reinvestigating a case may cause renewed psychological trauma to the victim and victim's family. It should not be assumed that victims and witnesses, even if they were eager to pursue the case when it occurred, are still interested in pursuing the case. A phone call from an investigator years later may not be a welcome event. Whenever possible, enlist the aid of victim service providers. If a new officer is handling the investigation, enlisting the assistance of the original investigator to make the first contact with the victim may also be helpful.

The older a case is, the more difficult it may be to locate witnesses. However, early identification of victim and witness availability may ultimately save significant resources. Consultation with prosecutors is mandatory when considering whether a witness would be necessary at trial.

It should not be assumed that victims and witnesses are still interested in pursuing the case. Whenever possible, enlist the aid of victim service providers.

Statute of Limitation Recommendations

- Know the original statute of limitation.
- Determine whether the law has changed regarding time limits for filing. If so, is the law retroactive?
- Determine whether there are exceptions to the statute.
- Consult with the prosecutor.

Identifying, Analyzing, and Prioritizing Cases

Good communication between police, laboratories, and prosecutors can help identify and convict serious offenders and save valuable time and resources.

Whether the process of reviewing unsolved cases is initiated by a single officer or by a specialized unit, it must ultimately be a team effort. At all stages of the process, investigators should avail themselves of the scientific advice of the laboratory and the legal expertise of the local prosecutor's office. Close consultation with the laboratory can ensure that evidence integrity is maintained and that limited laboratory resources are allocated effectively. Similarly, prosecutors can help identify issues that might occur at trial if a suspect is identified and arrested upon successful DNA testing. Good communication between police, laboratories, and prosecutors can help identify and convict serious offenders and save valuable time and resources.

Identify potential cases for review

An initial step in the DNA review of unsolved cases is to identify cases that might be amenable to DNA testing. While the cases considered for this kind of review will vary from jurisdiction to jurisdiction, it is important to define minimum requirements that will likely benefit from this approach. Issues such as statutes of limitation and solvability factors should be thoroughly examined in cooperation with a prosecutor and the forensic laboratory to establish guidelines for case selection. It also will be important to identify the ultimate goals of the program so that the selection criteria can be tailored to meet those specific goals.

Cases that could benefit from a review for potential DNA evidence can be identified from numerous sources. In some instances a single police officer or investigator may remember an unsolved case from years ago. In some departments a formalized cold-case unit may systematically review cases for the potential of DNA testing. Other cases may be identified by coordinated, interdepartmental efforts, victims or witnesses who have heard about the potential of DNA evidence, and laboratories taking inventory of their storage facilities. If a department is pursuing a systematic review of cases, either by one or two officers or by a formal unit, there are many sources that can be consulted for valuable investigative information, such as—

- Autopsy, laboratory, prosecutor, and local agency logbooks.
- Retired investigators.
- Computer databases.

Identify statute of limitation issues

Statute of limitation issues might affect the ultimate ability to prosecute a case. Cases should be preliminarily reviewed by investigators in conjunction with the prosecutor's office to identify which prosecutions would be barred by the statutes of limitation. If the goal of the unsolved case review program is to obtain convictions and statutes of limitation have expired on a particular case, a department may wish to save its resources for cases likely to yield convictions. However, if the goal of the program is to solve and close unsolved cases regardless of whether a conviction could be obtained, a jurisdiction may decide to review all cases that qualify under its guidelines. This is an important consideration in the context of investigating serial offenders whose criminal acts might span the course of years or decades.

Define categories of cases—solvability factors

Because the number of cases that qualify for reinvestigation might be very large, it may be beneficial for a jurisdiction to define cases according to several solvability factors. Solvability factors include facts and circumstances of a case that influence the likelihood that it might be solved through advancements in DNA technology. For example, a high probability exists that analysis of nonsuspect rape kits will yield valuable DNA results. Profiles generated as a result of DNA analysis can now be entered into CODIS, which can solve a case by matching to a convicted offender, or aid investigations by linking serial rapes to each other. Additionally, if an unsolved murder case contains biological evidence foreign to the victim that did not produce viable results from ABO blood typing or RFLP DNA analysis, evidence could be reanalyzed with the more discriminating and powerful STR technology. It is also important to recognize and sort out cases that might not be as likely to be solved with DNA technology. An example might be an unsolved drive-by homicide because the perpetrator most likely would not have left biological evidence at this kind of crime scene.

Case review—establish priorities

Once solvability factors and statute of limitation issues are addressed, it is important to continue the process by identifying the cases to be reviewed first. To preserve investigative resources when considering a larger number of unsolved cases for review, jurisdictions may prioritize according to the likelihood that cases will be solved or the likelihood that investigations will be aided. In establishing this priority, the following criteria can be considered:

- How many qualifying cases are there?
- Where are the case files located?
- Are case summaries available?
- How many cases will be assigned to an investigator?

To establish an investigative hierarchy, qualifying cases should be reviewed by experienced, proficient investigators. A checklist can be used throughout the review process so that managers can decide which cases will be worked first. A checklist can also provide review process consistency throughout the agency. (See Sample Checklist at the end of this report.) The following categories may serve as a model for a hierarchy in prioritizing cases:

- There is a known suspect and physical evidence appears to have been preserved in a manner consistent with successful DNA testing and use of CODIS.
- There is no known suspect but physical evidence has been preserved in a manner consistent with successful DNA testing and use of CODIS.
- There is no known suspect and evidence was collected and preserved in a manner that may make it difficult to obtain a DNA profile.

Locating case files, obtaining evidence logs, and other documentation

Locating the case file and original evidence for the investigation may be a challenging endeavor. Changes in personnel, procedure, and facilities and the passage of time may complicate the process. When searching for a case file or evidence, an investigator may need to look in numerous

places. Potential locations include, but are not limited to, the following:

- Police department property rooms (case files, evidence logs, whole evidence).
- Property warehouses (case files, evidence logs, whole evidence).
- Public crime laboratories (previously tested/submitted evidence, lab reports).
- Private laboratories (previously tested evidence, lab reports).
- Hospital/medical facilities (rape kits, medical reports, slides).
- Coroner/medical examiners' offices (autopsy reports).
- Courthouse property rooms.
- Prosecutors' offices (previous trial or suspect investigation).
- Retired investigators' files (case notes and details not contained in file).
- Other investigating agency offices (investigative leads—serial offender).

Forensic testing reports and previously tested evidence

Because advancements in DNA technology enable laboratories to successfully analyze old evidence that might have been improperly stored or subjected to previous forensic analysis, it will be very valuable to locate any and all forensic reports that were produced as a result of previous analysis and/or testing. ABO blood typing, microscopic hair analysis, RFLP DNA analysis, or fingerprint analysis (among others) might have been performed in the course of the original investigation. The original case file should indicate whether and which types of forensic analysis were attempted. These reports also serve to memorialize proper chain of custody. Cooperation with the crime laboratory is crucial to locate and interpret existing forensic reports and to determine whether evidence would be amenable to reanalysis with new DNA techniques.

Many combinations of options are available to investigators and laboratory personnel if biological evidence was available and previously tested. Exhibit 3 may serve to help investigators as they work with the laboratory to discuss options throughout the course of the investigation.

Locate biological evidence

When reviewing the case file for potential DNA evidence, it is important to know what kinds of evidence may yield a DNA profile. Given the power and sensitivity of newer DNA testing techniques, DNA can be collected from virtually anywhere. Only a few cells can be sufficient to obtain useful DNA information to help solve a case. Exhibit 4 identifies some common items of evidence that may have been collected previously but not analyzed for the presence of DNA evidence. Remember, if a stain is not visible it does not mean that there are not enough cells for DNA typing. Further, DNA does more than just identify the source of the sample; it can place a known individual at a crime scene, in a home, or in a room where the suspect claimed not to have been. It can refute a claim of self-defense and put a weapon in the suspect's

DNA Can Do More . . .

. . . than identify a suspect. It can also—

- Place a known individual at a crime scene.
- Refute a claim of self-defense.
- Put a weapon in a suspect's hand.
- Change a suspect's story from an alibi to one of consent.

hand. It can also provide irrefutable evidence that can change a suspect's story from an alibi to one of consent.

Evaluate for probative DNA evidence

On completion of reviewing the case file, reports, and evidence in consultation with the laboratory, it will be necessary to identify which evidentiary items will be amenable to DNA analysis. Consultation with the laboratory will be essential to determine the likelihood of obtaining results from DNA analysis, and consultation with a prosecutor is very important to determine which evidence will be probative to the case. Building the new investigation on cooperative efforts between the laboratory and prosecutor can save valuable resources, develop leads, and identify previously overlooked evidence that may yield a DNA profile.

Continue investigative protocol

If DNA analysis is to be conducted, it may be important to obtain reference samples from prior suspects, and it might be necessary to be creative when obtaining these samples. While a biological sample in the form of blood or saliva can be obtained voluntarily through a consent form, a standard reference sample might already exist if previous forensic analysis,

Exhibit 3. Investigative options

Test conducted	Original results	Original interpretation	Options for investigators
RFLP/PCR	Obtained profiles.	No suspects identified.	Is the original extract remaining? 1. If so, retest using STR technique and submit to CODIS. 2. If not, reextract the original sample using STR technique and submit to CODIS.
RFLP	Inconclusive or no results obtained.	Sample size may have been insufficient or not concentrated enough.	Is the original extract remaining? 1. If so, retest using STR technique and submit to CODIS. 2. If not, reextract the original sample using STR technique and submit to CODIS.
PCR	Inconclusive or result intensity below "S" and "C" dots.	Sample size may have been insufficient.	Is the original extract remaining? 1. If so, retest using STR technique and submit to CODIS. 2. If not, reextract the original sample using STR technique and submit to CODIS.
Conventional serology (ABO, secretor status, enzymes such as EsD, PGM, GLO I, EAP, ADA, AK).	Obtained a type in these systems.	Poor statistics and no searching capability.	If original evidence still exists, extract the sample using STR technique and submit to CODIS.
None		1. Limited sample size. 2. No suspects, did not process further. 3. No request at the time of analysis.	If original evidence still exists, extract the sample using STR technique and submit to CODIS.

such as serological testing, was performed during the course of the original investigation.

Additionally, elimination samples from anyone who had lawful access to the crime scene, such as family members, may be required if the laboratory determines that there is more than one DNA profile present in the evidence sample. Early identification of the location and status of persons who might be requested to submit an elimination sample could save valuable time and resources if the laboratory needs such information. Consultation with the laboratory is essential to properly coordinating this process.

Follow agency procedures for submitting the DNA profile to CODIS

On successful laboratory analysis resulting in a DNA profile developed from crime scene evidence, existing and/or new suspect DNA profiles should be compared with the evidence profile. If the laboratory determines a match between a suspect and the evidence, the prosecutor's office should be consulted on how to proceed. However, if a match is not found, agency procedures should be followed, in accordance with the crime laboratory, to submit the crime scene evidence DNA profile into CODIS.

Exhibit 4. Common items of evidence

Evidence	Possible location of DNA on the evidence	Source of DNA
Baseball bat	Handle	Skin cells, sweat, blood, tissue
Hat, bandanna, or mask	Inside surfaces	Sweat, hair, skin cells, dandruff, saliva
Eyeglasses	Nose or ear piece, lens	Sweat, skin cells
Facial tissue, cotton swab	Surface	Mucus, blood, sweat, semen, ear wax
Dirty laundry	Surface	Blood, sweat, semen, saliva
Toothpick	Surface	Saliva
Used cigarette	Cigarette butt (filter area)	Saliva
Used stamp/envelope seal	Moistened area	Saliva
Tape or ligature	Inside or outside surface	Skin cells, sweat, saliva
Bottle, can, or glass	Mouthpiece, rim, outer surface	Saliva, sweat, skin cells
Used condom	Inside/outside surface	Semen, vaginal or rectal cells
Bed linens	Surface	Sweat, hair, semen, saliva, blood
"Through and through" bullet	Outside surface	Blood, tissue
Bite mark	Surface of skin	Saliva
Fingernail/partial fingernail	Scrapings	Blood, sweat, tissue, skin cells

Note: When reviewing evidence, it is important to maintain chain of custody, consult with laboratory personnel, and take all appropriate precautions against contamination, including wearing gloves and changing them between handling of different pieces of evidence.

Because CODIS contains hundreds of thousands of convicted offender DNA profiles, it is possible that the person who committed the unsolved crime being investigated was convicted of a qualifying offense that required submission of a DNA profile to the database. If that person has not previously been convicted of a qualifying offense, especially in light of expanding database law, it is possible that they will be convicted in the future. Further, because the forensic index of CODIS contains thousands of crime scene evidence profiles, the investigation could be aided if a match is made to another forensic DNA profile already in the database. Finally, an investigator should not assume that a new DNA profile generated from unsolved case evidence and submitted to the laboratory for entry into CODIS will be compared with every possible convicted offender or crime scene index profile. The investigator may need to proactively request that his CODIS administrator search the new profile against the local, State, and national DNA databases.

Prepare a John Doe warrant

CODIS is a powerful crime-solving and crime-prevention tool, but many cases will not be solved as a result of entering a DNA profile into the forensic index of the database. Additionally, many cases will have statute of limitation issues that might prevent the prosecution of the case if a match is not determined in a timely manner. Therefore, if no offender match occurs in cases in which statutes of limitation are an issue, consideration may be given, in consultation with the prosecutor, to preparing a John Doe warrant. These types of warrants can identify the perpetrator according to his or her DNA profile. The 13-loci profile generated by the crime laboratory should be clearly printed on the face of the warrant. The John Doe warrant is not novel; however, the unconventional method of describing an individual by his or her DNA profile may allow for prosecution of a case if a DNA match is determined in the course of future investigations or as a result of the CODIS system being populated with more convicted offender and forensic DNA profiles.

Notes

1. CODIS uses two indexes—the forensic index and the offender index—to generate investigative leads in crimes where biological evidence is recovered from crime scenes. The forensic index contains DNA profiles of biological crime scene evidence and the offender index contains DNA profiles of individuals convicted of a qualifying offense.

2. CODIS has a missing persons index that exclusively contains mtDNA profiles; the convicted offender and forensic indexes of CODIS exclusively contain STR DNA profiles.

Sample Checklist

- Identify potential cases.
  - Identify any statute of limitation issues (consult with prosecutors).
  - Define case categories according to solvability factors.
- Prioritize cases (consider solvability factors).
- Locate and review the case file; obtain evidence logs and other documentation such as laboratory and autopsy reports.
- Locate previous forensic testing reports and location of previously tested evidence. For example—
  - Blood previously ABO typed.
  - Hair analyzed microscopically.
  - Fingerprint evidence.
- Locate crime scene evidence containing biological material.
- Evaluate the case and evidence for potential probative DNA. Be sure to—
  - Consider all evidentiary possibilities.
  - Take appropriate precautions against contamination.
- In consultation with the laboratory and prosecutors, submit appropriate (probative) evidence to the laboratory for testing.
- Continue investigative protocol. If needed, obtain reference samples from suspects—
  - Voluntarily using a consent form.
  - By using a previously obtained sample (e.g., if a reference sample was used for standard serological testing).
- Identify witness issues—
  - Legal availability.
  - Willingness to proceed.
  - Location.
- If a profile does not match suspect profiles, follow agency procedures for submitting the evidence profile to CODIS.
- If no offender match occurs in cases in which statutes of limitation are an issue, prepare a John Doe warrant.

About the National Institute of Justice

NIJ is the research, development, and evaluation agency of the U.S. Department of Justice and is solely dedicated to researching crime control and justice issues. NIJ provides objective, independent, nonpartisan, evidence-based knowledge and tools to meet the challenges of crime and justice, particularly at the State and local levels. NIJ's principal authorities are derived from the Omnibus Crime Control and Safe Streets Act of 1968, as amended (42 U.S.C. §§ 3721–3722).

NIJ's Mission

In partnership with others, NIJ's mission is to prevent and reduce crime, improve law enforcement and the administration of justice, and promote public safety. By applying the disciplines of the social and physical sciences, NIJ—

- Researches the nature and impact of crime and delinquency.
- Develops applied technologies, standards, and tools for criminal justice practitioners.
- Evaluates existing programs and responses to crime.
- Tests innovative concepts and program models in the field.
- Assists policymakers, program partners, and justice agencies.
- Disseminates knowledge to many audiences.

NIJ's Strategic Direction and Program Areas

NIJ is committed to five challenges as part of its strategic plan: 1) *rethinking* justice and the processes that create just communities; 2) *understanding* the nexus between social conditions and crime; 3) *breaking* the cycle of crime by testing research-based interventions; 4) *creating* the tools and technologies that meet the needs of practitioners; and 5) *expanding* horizons through interdisciplinary and international perspectives. In addressing these strategic challenges, the Institute is involved in the following program areas: crime control and prevention, drugs and crime, justice systems and offender behavior, violence and victimization, communications and information technologies, critical incident response, investigative and forensic sciences (including DNA), less-than-lethal technologies, officer protection, education and training technologies, testing and standards, technology assistance to law enforcement and corrections agencies, field testing of promising programs, and international crime control. NIJ communicates its findings through conferences and print and electronic media.

NIJ's Structure

The NIJ Director is appointed by the President and confirmed by the Senate. The NIJ Director establishes the Institute's objectives, guided by the priorities of the Office of Justice Programs, the U.S. Department of Justice, and the needs of the field. NIJ actively solicits the views of criminal justice and other professionals and researchers to inform its search for the knowledge and tools to guide policy and practice.

NIJ has three operating units. The Office of Research and Evaluation manages social science research and evaluation and crime mapping research. The Office of Science and Technology manages technology research and development, standards development, and technology assistance to State and local law enforcement and corrections agencies. The Office of Development and Communications manages field tests of model programs, international research, and knowledge dissemination programs. NIJ is a component of the Office of Justice Programs, which also includes the Bureau of Justice Assistance, the Bureau of Justice Statistics, the Office of Juvenile Justice and Delinquency Prevention, and the Office for Victims of Crime.

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