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*National Institute of Justice*

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# Police Use of Force: The Impact of Less-Lethal Weapons and Tactics

- Toward a Better Way to Interview Child Victims of Sexual Abuse
- Solving the Problem of Untested Evidence in Sexual Assaults
- Extending the Time to Collect DNA in Sexual Assault Cases

## Also in this issue

In Brief: Block by Block: Zeroing in on Crime Trends

Minimizing the Risks of Hazardous Materials: The CBRN Standard

Improving Forensic Death Investigation

In Brief: Expanding Research by Sharing Data

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Building
Knowledge to
Meet the Challenge of
Crime and Justice

**National Institute of Justice**

**John H. Laub**
Director, National Institute of Justice

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# Director's Message

As this issue of the *NIJ Journal* goes to press, I have been director of NIJ for just over six months. My nomination by President Barack Obama and confirmation by the United States Senate was personally gratifying. The ultimate reward, however, lies in the opportunity to lead NIJ in its renewed commitment to science.

The beginning of my tenure coincided with the release of the National Academy of Sciences' evaluation of NIJ, *Strengthening the National Institute of Justice.* The NAS report provided a foundation from which NIJ can engage in critical self-examination and change. But I am certain that one thing will remain the same: We will continue to produce research that makes a difference for criminal justice professionals, such as those who read the *NIJ Journal.*

Several articles in this issue exemplify NIJ's commitment to presenting research in a way that makes its practical implications clear and demonstrates to our readers how the findings can affect their daily decisions.

The research on injuries from less-lethal weapons, for example, is something community leaders and members of police-citizen review boards will find useful. The data show that using conducted energy devices, known commonly by the manufacturer name Taser, can reduce injury rates for suspects and officers when compared to other less-lethal options, such as fists or batons. Though proper training is always essential before officers use CEDs, this research demonstrates that both officers and civilians may benefit from their use.

The articles on interviewing child victims of sexual abuse and on understanding crime at the level of the city block are examples of research that builds on previous work. These studies tease out finer details, allowing us to consider innovative ways to apply these research findings. Through these studies, we also begin to build a cumulative base of knowledge.

The article on improving death investigations is about the needs of the forensic death investigation community and its response to another NAS report — *Strengthening Forensic Science in the United States: A Path Forward* — particularly to the report's controversial recommendation to eliminate the coroner system. NIJ emphasized cooperation and communication among experts on all sides of the issue by bringing them together for the first time to discuss that recommendation and other important issues in forensic death investigation. Convening the Forensic Death Investigation Symposium was a bold, but important, step. I firmly believe that discussing challenging topics in an open and honest way is the first step toward finding creative solutions.

I welcome your feedback on the *Journal* and all of NIJ's publications. Your input is vital as we communicate findings and incorporate wisdom from the field toward the ultimate goal of building a strong body of knowledge that is supported by science.

Contact us by e-mail at NIJJournal@usdoj.gov.

John H. Laub
Director, National Institute of Justice

*Read about the progress NIJ is making in responding to the NAS evaluation at http://www.ojp.usdoj.gov/nij/about/director/strengthening-nij.htm.*

*Visit the NIJ Director's page at http://www.ojp.usdoj.gov/nij/about/director/november-2010.htm.*

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# Publications
## IN BRIEF

Crime laboratories are processing more cases than ever before, but backlogs continue to be a problem. Why? The NIJ Special Report **Making Sense of DNA Backlogs, 2010 — Myths vs. Reality** helps to answer that question. The report, recently updated with 2009 data submitted to NIJ's 2010 DNA Backlog Reduction Program, describes the kinds of backlogs found in crime laboratories and law enforcement agencies. It also explains how supply and demand are affecting crime laboratories and shows how federal funding has made a difference in reducing backlogs during the last several years.

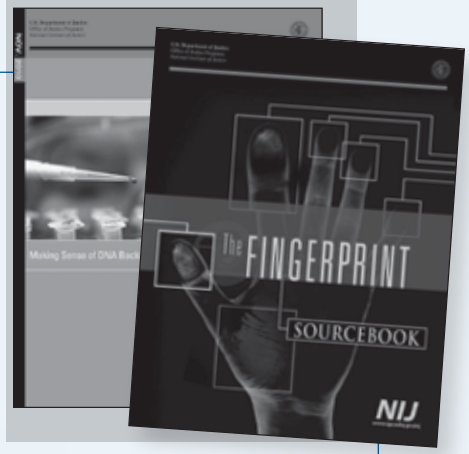
▶ http://www.ncjrs.gov/pdffiles1/nij/232197.pdf

**The Fingerprint Sourcebook** is the definitive guide to the science of fingerprint identification. NIJ is publishing the sourcebook in stages. Eight of 15 chapters are now available online, including three recently released chapters:

- Latent Print Development
- The Preservation of Friction Ridge Information
- Special Abilities and Vulnerabilities in Forensic Expertise

▶ http://www.ojp.usdoj.gov/nij/pubs-sum/225320.htm

In 2009, NIJ published the first comprehensive document outlining the current technology needs of the criminal justice field. This document was the result of a six-year process that involved criminal justice practitioners and technologists in developing a set of validated technology requirements. **High-Priority Criminal Justice Technology Needs 2010** updates the original publication to reflect new developments and summarizes the highest-priority technology needs for which NIJ is seeking solutions. It reviews five focus areas:



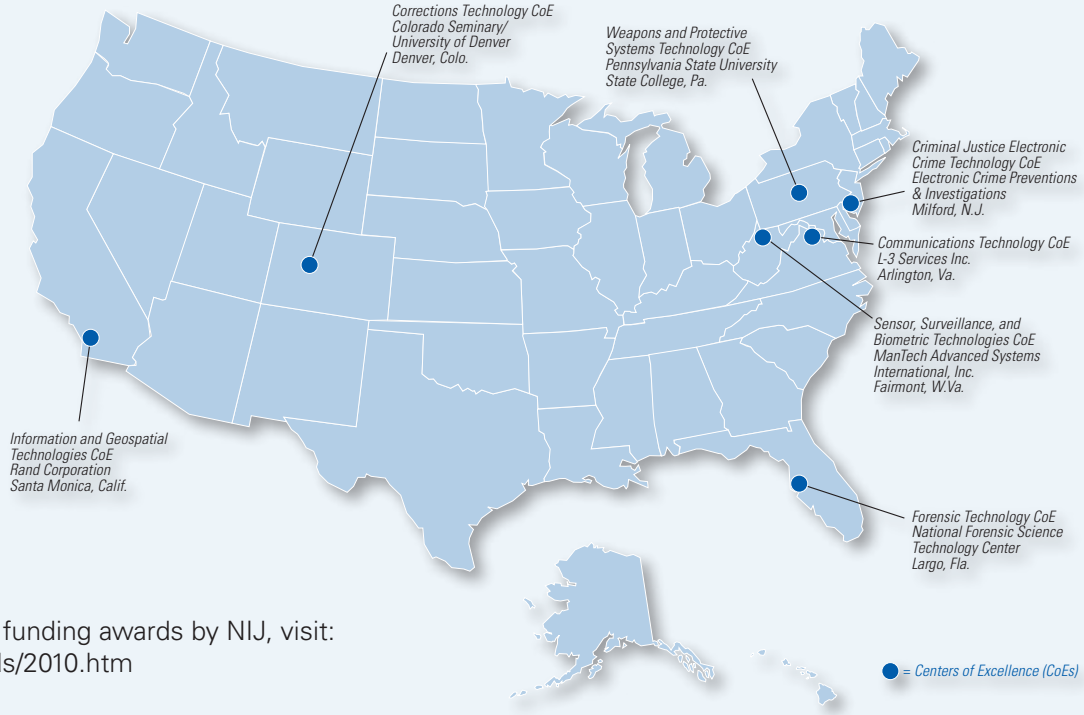

- Protecting the Public
- Ensuring Officer Safety
- Confirming the Guilty and Protecting the Innocent
- Improving the Efficiency of Justice
- Enabling Informed Decision-Making

▶ http://www.ncjrs.gov/pdffiles1/nij/230391.pdf

# News & Notes

### Funding Awarded to Seven Technology Centers of Excellence

NIJ awarded $17 million in funding to seven Technology Centers of Excellence (COEs) in 2010. The COEs, established in 2007, are part of the National Law Enforcement and Corrections Technology Center (NLECTC) System. They are the NLECTC System's authoritative resource for practitioners and developers in their technology areas of focus. The COEs help to transition technology from the laboratory into practice by testing, evaluating and demonstrating new technologies and by providing technical assistance to first adopters.




**For information** about other 2010 funding awards by NIJ, visit: http://www.ojp.usdoj.gov/nij/awards/2010.htm

# Newest Research Findings

## Employing Ex-Offenders: When to Leave a Criminal History in the Past

Criminal background checks are an increasingly common practice among employers. Is there a point at which employers should no longer consider an individual's criminal record relevant to hiring decisions? In their final report to NIJ, *Potential of Redemption in Criminal Background Checks,* Alfred Blumstein and Kiminori Nakamura argue that employers should receive guidance on the possibility of "redemption." They lay out an empirical basis for estimating when an ex-offender has been "clean" long enough for his or her risk of re-offending to be no greater than that of an individual in the general population.

- Read the full report: http://www.ncjrs.gov/pdffiles1/nij/grants/232358.pdf.
  Watch the authors' discussion of criminal background checks and hiring ex-offenders: http://www.ojp.usdoj.gov/nij/multimedia/video-nijconf2009-blumstein-nakamura.htm.

## Strengthening the Scientific Foundation of Firearms Identification

In a criminal investigation, forensic firearms examiners may be asked to determine whether a bullet was fired from a particular firearm. Benjamin Bachrach's research team at Intelligence Automation, Inc., has conducted NIJ-funded research assessing the individuality and repeatability of features that transfer from a barrel to a bullet when a gun is fired. Their initial study demonstrated that barrel markings on bullets are sufficiently unique to allow for a one-to-one association between the two, at least in the case of barrels of typical manufacturing quality.

The follow-up study focused on bullets fired from barrels of very poor and very good manufacturing quality. They found that while bullets could be linked to most such barrels, there were exceptions — sometimes the variability between bullets fired from the same barrel was too extreme to make reliable identifications. They also noted, however, that the ability to make reliable identifications depended on the individual barrel itself and not only on the brand of manufacture.

- Read the full report: http://www.ncjrs.gov/pdffiles1/nij/grants/232136.pdf.
  See presentations and videos from the 2010 Impression and Pattern Evidence Symposium: http://projects.nfstc.org/ipes.

## Elemental Analysis of Glass

Trace elemental analysis and comparison of materials such as glass and paint chips can provide important evidence. For example, forensic examiners might analyze glass fragments from the scene of a hit-and-run to see if the fragments' characteristics are consistent with samples taken from a suspect's car. An NIJ-funded research effort by Tatiana Trejos, Waleska Castro and Jose R. Almirall has developed, validated and implemented methods for the elemental characterization of glass to better compare evidence samples from investigations to a known source.

The researchers validated the methods through a series of round-robin exercises involving forensic laboratories and used the methods in actual casework, leading to positive case resolution. The researchers also transferred the methods to other forensic laboratories that now routinely use them in casework.

- Read the full report: http://www.ncjrs.gov/pdffiles1/nij/grants/232133.pdf.
  See presentations and videos from the 2009 Trace Evidence Symposium: http://projects.nfstc.org/trace/2009/agenda.htm.

**Go to the NIJ website at http://www.ojp.usdoj.gov/nij and subscribe to our e-mail alerts to receive the latest information on funding, publications, trainings, events and topical pages.**

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Look for multimedia links throughout this issue of the *NIJ Journal.* On the NIJ website, look for the following new online content:

- The new digital forensics Web topic pages
- Felton Earls discussing engaging adolescents in research on expo sure to violence
- A recap of the 2010 Predictive Policing Symposium, East
- New Computer Forensic Tool Testing Program reports
- The most recent issue of the *Geography and Public Safety Bulletin*
- NIJ funding opportuni ties, including FY2011 solicitations, and past funding awards
- Current training opportunities
- The online archive of *NIJ Journal* back issues

http://www.ojp.usdoj.gov/nij

# Police Use of Force: The Impact of Less-Lethal Weapons and Tactics

*by Philip Bulman*

A new study suggests that less-lethal weapons decrease rates of officer and offender injuries.

In the mid-19th century, police officers in New York and Boston relied on less-lethal weapons, mostly wooden clubs. By the late 1800s, police departments began issuing firearms to officers in response to better-armed criminals. Today, many law enforcement agencies are again stressing the use of less-lethal weapons, but they are using devices that are decidedly more high-tech than their 19th-century counterparts.

Use of force, including less-lethal weaponry, is nothing new to policing, and in any use-of-force incident, injury is a possibility. Researchers have estimated that between 15 and 20 percent of arrests involve use of force. A group of researchers led by Geoffrey P. Alpert, professor of criminology and criminal justice at the University of South Carolina, recently completed an NIJ-funded study of injuries to officers and civilians during use-of-force events. Injury rates to civilians ranged from 17 to 64 percent (depending on the agency reporting) in use-of-force events, while injury rates to officers ranged from 10 to 20 percent. Most injuries involved minor bruises, strains and abrasions. Major injuries included dog bites, punctures, broken bones, internal injuries and gunshot wounds.

## Can New Technologies Decrease Injuries?

Advances in less-lethal technology offer the promise of more effective control over resistive suspects with

fewer serious injuries. Pepper spray was among the first of these newer, less-lethal weapons to achieve widespread adoption by police forces. More recently, conducted energy devices (CEDs), such as the Taser, have become popular.

More than 11,000 American law enforcement agencies use CEDs, but their use has not been without controversy. Organizations such as Amnesty International and the American Civil Liberties Union have questioned whether CEDs can be used safely, and whether they contribute to civilian injuries and in-custody deaths. Policymakers and law enforcement officials want to know whether CEDs and other less-lethal weaponry are safe and effective, and how police should use them.

## Analysis of Information from Specific Law Enforcement Agencies

Alpert's research on use of force and less-lethal weapons, in part, focused on data gathered from three law enforcement agencies — the Richland County (S.C.) Sheriff's Department, the Miami-Dade (Fla.) Police Department and the Seattle Police Department.

### Richland County Sheriff's Department

Approximately 475 sworn officers from the Richland County Sheriff's Department (RCSD) serve the unincorporated portions of Richland County, S.C. The agency started phasing in Tasers in late 2004. During data collection, about 60 percent of deputies carried Tasers.

Researchers coded 467 use-of-force reports from January 2005 to July 2006. The most frequent force level used by deputies (59 percent of incidents) was soft empty hand control (e.g., holding a suspect to restrain him), which increased the odds of officer injury by 160 percent.

> If injury reduction is the primary goal, agencies that deploy pepper spray and CEDs are clearly at an advantage. Both weapons prevent or minimize the physical struggles that are likely to injure officers and suspects alike.

Pepper spray decreased the odds of suspect injury by almost 70 percent, and a deputy aiming a gun at a suspect reduced his or her injury odds by more than 80 percent (the act of pointing a gun alone often effectively ends a suspect's resistance). The use of a canine posed, by far, the greatest injury risk to suspects, increasing injury odds almost forty-fold. Suspects who displayed active aggression toward deputies were also more likely to suffer injuries.

In contrast to the Miami-Dade and Seattle Police Departments, Taser use by the RCSD had no effect on the likelihood of suspect injury. Also in contrast to the Miami-Dade Police Department, Taser use by the RCSD had no effect on the likelihood of officer injury; Taser use by the Seattle Police Department, however, similarly showed no effect on the likelihood of officer injury. This suggests that not every agency's experience with CEDs will be the same.

### Miami-Dade Police Department

With 3,000 officers, the Miami-Dade Police Department (MDPD) is the largest law enforcement agency in the southeast.

The MDPD started using Tasers in 2003. By May 2006, about 70 percent of the officers carried Tasers. The researchers examined 762 use-of-force incidents between January 2002 and May 2006. Most injuries were minor, and officers were substantially less likely to be injured than suspects, with 17 percent of officers injured and 56 percent of suspects injured.

Use of both soft hand tactics and hard hand tactics (e.g., using kicks or punches to restrain a suspect) by officers more than doubled the odds of officer injury. Hands-on tactics also increased the odds of injury to suspects, as did the use of canines. Taser use, however, was associated with a reduction in the likelihood of both officer and suspect injury.

### Seattle Police Department

The Seattle Police Department (SPD) has about 1,200 sworn officers. The agency started using Tasers in December 2000. The SPD recorded 676 use-of-force incidents between December 2005 and October 2006. Suspects suffered injuries in 64 percent of the incidents, while officers suffered injuries in 20 percent of the incidents. Officers used hands-on tactics in 76 percent of the incidents. The next most frequent type of force

## What Is Use of Force, and What Is a Use-of-Force Continuum?

"Use of force" refers to the "amount of effort required by police to compel compliance by an unwilling subject."[1] The Fourth Amendment forbids unreasonable searches and seizures, and various other legal and policy controls govern how and when officers can use force. Most agencies tightly control the use of force, and supervisors or internal affairs units routinely review serious incidents.

Many law enforcement agencies instruct officers in, and have policy guides for officers regarding, appropriate responses to an escalation of activities in an encounter with a civilian. "The use-of-force continuum" is a phrase to describe this kind of guide. The continuum of a particular agency may cover a full spectrum of actions from no-force, in which having officers present is enough to defuse the situation or deter crime, to lethal force, in which officers use deadly weapons. For a sample continuum, see NIJ's topic page.

▶ http://www.ojp.usdoj.gov/nij/topics/law-enforcement/officer-safety/use-of-force/continuum.htm.

When any kind of physical use of force is required, there is always a chance of injury to the officer or the suspect. When police in a democracy use force and injury results, concern about police abuse arises, lawsuits often follow and the reputation of the police is threatened. Injuries also cost money in medical bills for indigent suspects, workers' compensation claims for injured officers, or damages paid out in legal settlements or judgments.

1. Definition by the International Association of Chiefs of Police, *Police Use of Force in America, 2001,* http://www.theiacp.org/Portals/0/pdfs/Publications/2001useofforce.pdf.

When police in a democracy use force and injury results, concern about police abuse arises, lawsuits often follow and the reputation of the police is threatened.

officers used was the Taser (36 percent), followed by pepper spray (8 percent).[1]

Taser use was associated with a 48 percent decrease in the odds of suspect injury in a use-of-force incident (it was not associated with a significant change in the odds of officer injury). The use of physical force by officers increased the odds of officer injury 258 percent. Not surprisingly, the odds of officer injury also increased when suspects resisted by using physical force or when suspects used or threatened to use a weapon.

### Combined Agency Analysis

The researchers conducted a combined analysis of use-of-force data from 12 large local law enforcement agencies (including Miami-Dade, Seattle and Richland County).[2] The large sample, representing more than 24,000 use-of-force incidents, allowed the researchers to use statistical techniques to determine which variables were likely to affect injury rates. The use of physical force (e.g., hands, fists, feet) by officers increased the odds of injury to officers and suspects alike. However, pepper spray and CED use decreased the likelihood of suspect injury by 65 and 70 percent, respectively. Officer injuries were unaffected by CED use, while the odds of officer injury increased about 21 percent with pepper spray use.

### Longitudinal Analysis

To see if the introduction of CEDs was associated with changes in injury rates in individual police

departments, the researchers reviewed monthly reports of use-of-force incidents and of officer and suspect injuries from police departments in Austin, Texas, and Orlando, Fla., both before and after the introduction of CEDs.[3]

The Orlando data included 4,222 incidents from 1998 to 2006 (CED use began in February 2003). The Austin data included 6,596 incidents from 2002 to 2006 (CED use was phased in beginning in 2003 and was completed in June 2004). Use-of-force cases increased in Orlando after CEDs were deployed, but they dropped after full deployment of CEDs in Austin. A large drop in injury rates for suspects and officers alike occurred in both cities following CED introduction.

In Orlando, the suspect injury rate dropped by more than 50 percent compared to the pre-Taser injury rate. In Austin, suspect injury rates were 30 percent lower after full-scale Taser deployment.

In Orlando, the decline in officer injury rates was even greater than for suspects, with the average monthly rate dropping by 60 percent after Taser adoption. In Austin, officer injuries dropped by 25 percent.

## Interviews with Officers and Suspects

Researchers also collected qualitative data through interviews with officers and suspects involved in use-of-force incidents. Researchers conducted interviews with 219 officers from the Richland County Sheriff's Department, 35 officers from the Columbia (S.C.) Police Department (CPD) and 35 suspects involved in use-of-force situations. Unlike the RCSD, the CPD does not use CEDs.

In nine incidents (out of 109), officers in the RCSD reported that a Taser did not work properly or did not have the desired effect. Researchers received reports of multiple Taser hits on a suspect (i.e., more than one officer using a Taser on a single suspect) and multiple uses of the Taser in drive stun mode (when the Taser is pressed against a suspect rather than firing darts).

> The use of physical force by officers increased the odds of officer injury 258 percent. Not surprisingly, the odds of officer injury also increased when suspects resisted by using physical force or when suspects used or threatened to use a weapon.

Nine percent of the officers reported injuries, almost all of which were scrapes, cuts or bruises suffered while struggling with resistant suspects. Officers also reported that 26 suspects (12 percent) were injured. Most suspect injuries were cuts or abrasions, but there were also two dog bites, and one suspect was shot in the arm after firing at officers.

### Suspect Perceptions

In 22 cases, researchers interviewed both the officers and the suspects involved in an incident. Suspects often told a different story than the officer who arrested them. In almost all cases, suspects said officers used excessive force and that they were not resisting. Some suspects said officers used Tasers early in the interaction, and several said the officers seemed to enjoy watching them endure the pain. Some suspects said officers kneed them in the back and kicked or punched them after they were in handcuffs. Some also said officers used Tasers on them after they were handcuffed.

## Implications for Policy, Training and Future Research

CED use is widespread and often controversial. Based on their findings, the researchers involved in this study made recommendations about whether and how CEDs should fit into the range of less-lethal force alternatives available to law enforcement officers.

If injury reduction is the primary goal, however, agencies that deploy pepper spray and CEDs are clearly at an advantage. Both weapons prevent or minimize the physical struggles that are likely to injure officers and suspects alike.

The researchers compared injuries reported by the RCSD and by the CPD. Most injuries in both agencies occurred when officers and suspects struggled on the ground, but the

differences between the agencies in terms of percentage of officers and suspects injured were striking. The RCSD deputies, most of whom carry Tasers, reported fewer injuries to themselves and suspects from ground fighting than did CPD officers, who do not carry CEDs (9 percent and 31 percent, respectively). Injuries to suspects caused by contact with the ground were also lower in RCSD incidents. Some of the injuries to CPD officers and suspects might have been prevented had officers used CEDs instead of hands-on tactics.

Although both pepper spray and CEDs cause pain, they reduce injuries; and, according to current medical research, death or serious harm associated with their use is rare.[4] In that sense, both are safe and similarly effective at reducing injuries. The researchers recommend that both should be allowed as possible responses to defensive or higher levels of suspect resistance. This recommendation is followed by most agencies that responded to a national survey conducted by the Police Executive Research Forum.[5]

**Policy and Training Issues Related to CEDs**

CEDs are rapidly overtaking other force alternatives. Although the injury findings suggest that substituting CEDs for physical control tactics may decrease the chance of injury, their ease of use and popularity among officers raise concerns about overuse.

CEDs can be used inappropriately. Law enforcement executives can manage this problem with policies, training, monitoring and accountability systems that provide clear guidance (and consequences) to officers regarding when and under what circumstances CEDs should and should not be used.

Although both pepper spray and CEDs cause pain, they reduce injuries; and, according to current medical research, death or serious harm associated with their use is rare.

Besides setting the resistance threshold appropriately (that is, determining the level of suspect resistance at which officers should be allowed to use CEDs), good policies and training would require that officers evaluate the age, size, sex, apparent physical capabilities and health concerns of a suspect. In addition, policies and training should prohibit CED use in the presence of flammable liquids or in circumstances where falling would pose unreasonable risks to the suspect (e.g., in elevated areas, adjacent to traffic, etc.). Policies and training should address use on suspects who are controlled (e.g., handcuffed or otherwise restrained) and should either prohibit such use outright or limit it to clearly defined, aggravated circumstances.

In addition to the possibility of CEDs being used in too many cases (i.e., inappropriately in instances of low-level resistance), there are also concerns about CEDs being used too many times in a single case. Deaths associated with CED use often involve multiple CED activations (more than one CED at a time) or multiple five-second cycles from a single CED. CED policies should require officers to assess continued resistance after each standard cycle and should limit use to no more than three standard cycles. Following CED deployment, the suspect should be carefully observed for signs of distress and should be medically evaluated at the earliest opportunity.

**Directions for Future Research**

A critical research question is whether officers can become too reliant on CEDs. During interviews with officers and trainers, the researchers heard comments that hinted at a "lazy cop syndrome." Some officers may turn to a CED too early in an encounter and may rely on a CED rather than on their conflict resolution skills or even on hands-on applications.

Another important CED-related research project would be a study of in-custody deaths involving CED use and a matched sample of in-custody deaths when no CED use occurred. Advocacy groups argue that CEDs can cause or contribute to suspect deaths.[6] The subjects in CED experimental settings have all been healthy people in relatively good physical condition who were not under the influence of alcohol or drugs. However, not all subjects in actual cases of CED use would meet experimental requirements of good health. Law enforcement officials typically argue that most, if not all, of the citizens who died when shocked

## Study Findings: Factors Affecting Injuries

### Physical Force

Physical force and hands-on control increased the risk of injury to officers and citizens. When controlling for the use of CEDs and pepper spray in the multiagency analysis, using force increased the odds of injury to officers by more than 300 percent, and by more than 50 percent to suspects.

### Suspect Resistance

Increasing levels of suspect resistance were associated with an increased risk of injury to officers and suspects. The increased injury risk was especially acute for officers. These findings suggest that officers, rather than suspects, face the most increased injury risk when suspects resist more vigorously.

### Pepper Spray

The overall analysis (of 12 agencies) showed that pepper spray use reduced the likelihood of injury to suspects. For officers, however, pepper spray use increased the likelihood of injury. This finding was unexpected, and further research may help to explain how officers choose to use pepper spray instead of CEDs.

### CEDs

Except for Richland County, where its effects were insignificant, CED use substantially decreased the likelihood of suspect injury. The analysis of 12 agencies and more than 24,000 use-of-force cases showed that the odds of suspect injury decreased when a CED was used. CED adoption by the Orlando and Austin police departments reduced injuries to suspects and officers over time.

### Demographic Characteristics

The 12-agency analysis showed that male suspects were twice as likely to be injured as female suspects. In that analysis, the presence of a male suspect slightly increased injury risk to officers. In Seattle, female officers were more than twice as likely to be injured as male officers. In Miami-Dade and Seattle, where suspect race was available as a variable for analysis, the odds of injury for non-white suspects were lower than they were for white suspects.

by a CED would have died if the officers had controlled and arrested them in a more traditional hands-on fashion. Research is needed to understand the differences and similarities in cases where suspects died in police custody, including deaths where a CED may or may not be involved.

The National Institute of Justice funded this study. The complete study is available at http://www.ncjrs.gov/pdffiles1/nij/grants/231176.pdf.

Philip Bulman is a writer with the National Institute of Justice.

NCJ 233281

## Notes

1. Note that more than one use-of-force tactic could be recorded for each incident.
2. The other nine agencies included police and sheriff's departments in Austin, Texas; Cincinnati, Ohio; Harris County, Texas; Hillsborough County, Fla.; Los Angeles (both the city and the county); Nashville, Tenn.; Orlando, Fla.; and San Antonio, Texas.
3. For a more in-depth description of the researchers' approach to their longitudinal analysis, see section 6 of the report, "A Multi-Method Evaluation of Police Use of Force Outcomes." Available at http://www.ncjrs.gov/pdffiles1/nij/grants/231176.pdf.
4. National Institute of Justice, *Study of Deaths Following Electro Muscular Disruption: Interim Report,* Washington, DC: National Institute of Justice, June 2008, NCJ 222981, http://www.ncjrs.gov/pdffiles1/nij/222981.pdf.
5. Details about the national survey can be found in section 3 of the report.
6. Amnesty International, *'Less Than Lethal?' The Use of Stun Weapons in US Law Enforcement,* London, England: Amnesty International Publications, 2008, http://www.amnesty.org/en/library/info/AMR51/010/2008/en.

*Visit NIJ's Web topic page at http://www.ojp.usdoj.gov/nij/topics/technology/less-lethal/how-ceds-work.htm.*

*CED safety and effectiveness was a topic of discussion at the 2010 NIJ Conference. To listen to the panel, go to http://nij.ncjrs.gov/multimedia/audio-nijconf2010-ceds.htm.*

### For more information


- Smith, M.R., R.J. Kaminski, G.P. Alpert, L. Fridell, J. MacDonald, and B. Kubu, *A Multi-Method Evaluation of Police Use of Force Outcomes,* Final report submitted to the National Institute of Justice, Washington, DC: National Institute of Justice, July 2010, NCJ 231176, http://www.ncjrs.gov/pdffiles1/nij/grants/231176.pdf.
- National Institute of Justice, *Study of Deaths Following Electro Muscular Disruption: Interim Report,* Washington, DC: National Institute of Justice, June 2008, NCJ 222981, http://www.ncjrs.gov/pdffiles1/nij/222981.pdf.

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

## The National Institute of Justice congratulates recipients of the 2010 Graduate Research Fellowships:

**Chanin, Joshua.** "Negotiated Justice: The Legal, Administrative, and Policy Implications of 'Pattern or Practice' Police Misconduct Reform." Chaired by Dr. David Rosenbloom; Ph.D. expected August 2011, American University.

**Johnson, Lallen.** "Journeys to Buy and Sell Illegal Narcotics in Philadelphia Drug Markets." Chaired by Dr. Jerry Ratcliffe; Ph.D. expected May 2011, Temple University.

**Ruther, Matthew.** "Immigrant Concentration and Homicide Mortality: A Spatial and Temporal Analysis of the Effects of Ethnic Enclaves." Chaired by Dr. John MacDonald; Ph.D. expected August 2011, University of Pennsylvania.

**Sexton, Lori.** "Under the Penal Gaze: An Empirical Examination of Penal Consciousness Among Prison Inmates." Chaired by Dr. Valerie Jenness; Ph.D. expected June 2012, University of California, Irvine.

**Socia, Kelly.** "Residence Restriction Legislation and Sex Offender Residential Locations in New York." Chaired by Dr. Alan Lizotte; Ph.D. expected December 2011, University at Albany, SUNY.

**For more information on** the Graduate Research Fellowship Program, visit http://www.ojp.usdoj.gov/nij/funding/graduate-research-fellowship/welcome.htm.

NIJ

# Toward a Better Way to Interview Child Victims of Sexual Abuse

*by Sara Harris*

A study tests interview protocols in the hope of getting better case outcomes.

Child protection authorities substantiated 68,000 cases of child sexual abuse in 2008, according to the Department of Health and Human Services.[1] In many child sexual abuse cases, there is no witness other than the child and no corroborating evidence — the entire case can hang on a child's recollection of the alleged abuse. One way to help avoid false accusations and ensure justice in these cases is to strengthen law enforcement's ability to elicit accurate information from children. As the authors of the study discussed in this article note, "The quality of forensic interviewing practices is of utmost importance if child victims are to be protected, at the same time as the rights of the innocent suspects are to be upheld."[2]

We have gained considerable knowledge in the last two decades about child development, memory and cognition, and researchers have developed several techniques for improving the way child victims of sexual abuse are interviewed. One technique that showed promise in a laboratory has now been tested in the field in Utah's criminal justice system. The interview protocol was developed by the *Eunice Kennedy Shriver* National Institute of Child Health and Human Development (NICHD). The NICHD began developing its interview protocol in the 1990s. According to Margaret-Ellen Pipe, a member of the team that has developed and tested the protocol, "In the '80s people started recognizing children could provide reliable

evidence. There had been real skepticism prior to that whether you would believe children."

In an NIJ-funded study, a team of researchers led by Pipe investigated how the NICHD protocol might affect prosecution outcomes. Their findings make it clear that the training and NICHD protocol elicit more information from possible victims. The findings cannot, of course, determine whether the information is more accurate — that is, the findings cannot definitively confirm details of what happened. But it is clear that after the protocol was introduced, prosecutors accepted more cases; and more cases that went to trial resulted in conviction than before the protocol was introduced.

## The NICHD Protocol

The techniques employed by the NICHD protocol were designed to integrate advances in scientific understanding about memory and children's linguistic and cognitive development.

Over the years, various aspects of the NICHD protocol have been evaluated in the field. In fact, the authors note, the techniques developed under the auspices of the NICHD constitute the *only* protocol for forensic interviews with children to have been evaluated systematically. "The NICHD protocol has been researched in the field; that's what sets it apart," Pipe said.

Training in forensic interviewing techniques often increases interviewer knowledge without resulting in any meaningful change in how interviewers conduct the interviews.[3] NICHD training is effective in getting interviewers to use the new information learned. Studies testing the protocol have examined how best to train people in its use and, in particular, how to ensure that interviewers reliably acquire and actively use the new skills. Training can raise awareness, Pipe et al. note in their report, but it is important to guarantee that new techniques are adopted as a matter of practice. The NICHD training model promotes this by providing guidance and feedback for interviewers even after training has concluded.

> "The quality of forensic interviewing practices is of utmost importance if child victims are to be protected, at the same time as the rights of the innocent suspects are to be upheld."

The NICHD interview protocol includes three phases:

- Introductory
- Rapport-building
- Substantive or free recall

At the beginning of the conversation, the child and the interviewer discuss expectations and set ground rules: this is the introductory phase. Interviewers then ask children to talk about events unrelated to the suspected abuse; the idea is to encourage the child to be comfortable leading the conversation by developing this rapport. In this phase, the "child learns the conversational rules, because they are different from many conversations in which children take part," Pipe explained.

Later, interviewers encourage children to recall the target incident and talk about it in a narrative stream, as opposed to answering directed questions about it, one after another. Evidence indicates open-ended prompts draw out more accurate information than ones that simply elicit a child's recognition. The techniques discourage suggestive leads or questions with yes/no or either/or answers: "Where were his clothes?" for example, is preferred over, "Were his clothes on the floor?"

Nearly a decade of research confirms that when interviewers follow the guidelines outlined in the NICHD protocol, children give both more and higher-quality information. Their narrative accounts reveal greater detail when the NICHD protocol is implemented.

## How the Study Was Conducted

The study examined the outcomes of cases before and after police detectives were trained on the NICHD Investigative Interview Protocol. The 11 detectives in the study performed forensic interviews at the Salt Lake County Children's Justice Center (CJC), an arm of the Utah Attorney General's Office. They were all experienced in conducting child abuse investigations and child forensic interviews but had never been trained in the NICHD protocol. The detectives' NICHD training took place over several days, included both simulated and actual forensic interviews, and included ongoing contact and feedback from the trainers.

Researchers from the City University of New York, Cambridge University in England, the NICHD and the CJC examined 1,280 sexual abuse cases between 1994 and 2000 that were referred to authorities in Salt Lake County, Utah, and investigated by the 11 detectives. Of the total sample, these detectives conducted 551 interviews before receiving

## Tailoring the Interview for Special Populations

Evidence shows the NICHD protocol is an effective forensic interviewing technique for eliciting information from children in general, but researchers want to know how to develop similar techniques to be used in a wider range of situations. There is now a sufficient body of research on child interviewing using the NICHD protocol to see if the same methods can be adapted for use in other populations that need specialized protocols, such as the youngest victims, particularly reluctant victims, victims with developmental disabilities and minority populations.

In the Utah study described elsewhere in this article, researchers hypothesized that the NICHD protocol might increase the rate at which prosecutors filed charges in cases involving the youngest suspected victims included in the study (2.8- to 4-year-olds). While that rate increased, children in this age group were still the least likely to have charges filed against the suspect; and when charges were filed, a higher proportion of them were dismissed than in cases involving older children.

Researcher Margaret-Ellen Pipe and her colleagues note that young children typically give less complete accounts and relay less information in interviews than older children, requiring interviewers to use more prompts. Of greater concern are studies showing that, when compared with their older counterparts, more suspected victims in this age group do not reveal abuse in interviews — perhaps because they do not understand that the information is significant. Findings suggest they might also be more likely to keep a secret when someone asks them to. The vulnerability of these children is understandable, said Pipe, but it "highlights the need to further develop protocol for these youngest suspected victims."

Professionals in the field also work to adapt interviewing techniques to a variety of cultural environments. In April 2009, the Office of Justice Program's Office for Victims of Crime hosted a Web forum to encourage discussion of approaches to forensic interviewing in Native American communities. Participants with expertise in this area emphasized how important it is for interviewers to understand the importance of the family and ceremonies and to pay attention to non-verbal behaviors.

Sometimes adaptations to the standard guidelines are a matter of raising awareness among interviewers about differences among particular groups of children, but the need for modifications also suggests potential new avenues for research. Interview techniques that are appropriate to the developing linguistic and cognitive abilities of children at younger ages, for example, require specific approaches researchers are still developing. This is a particularly urgent message regarding children who are more vulnerable to abuse because of age or developmental delays.

In addition to tailoring its use to specific children's needs, researchers also hope to test the use of the NICHD protocol for a greater variety of investigations. Other research efforts in expanding the uses of the protocol may focus on its applicability to interviews about children's exposure to family violence.

www.

*Read the April 2009 OVC Web Forum on Forensic Interviewing in Tribal Communities at http://ovc.ncjrs.gov/ovcproviderforum/asp/sub.asp?Topic_ID=117.*

training on the NICHD protocol and 729 after they had implemented the protocol. The same detectives, prosecutors and judges who handled the cases were used throughout the study period.[4]

Among the cases of alleged abuse that the researchers reviewed, nearly 60 percent involved improper touching and 5 percent were characterized by exposure; penetration was alleged in 35 percent of the cases reviewed. Detectives interviewed children between the ages of 2 and 14 and then presented their evidence to the district attorney, who decided whether or not to prosecute.[5]

## Impact of Using the Interview Protocol

Researchers compared the outcomes of the cases that used the interview protocol with cases that did not. They found that after local detectives adopted the NICHD interview protocol, the percentage of investigated cases in which the district attorney filed charges rose from 45 percent to over 54 percent. Furthermore, these cases held up as they progressed through the system.

**Table 1.** Case Outcome by Interview Type

| | Pre-Protocol | Protocol |
|---|---|---|
| **Total** | **551** | **729** |
| Cases accepted for prosecution | 198 (35.9%) | 315 (43.2%) |
| Cases with plea agreements | 160 (80.8%) | 255 (81%) |
| Pled guilty | 105 (53%) | 177 (56.2%) |
| Reduced | 52 (26.3%) | 76 (24.1%) |
| Cases with charges dismissed | 15 (7.5%) | 36 (11.4%) |
| Cases that went to trial | 13 (6.6%) | 17 (5.4%) |
| Not guilty verdict | 6 (3%) | 1 (0.3%) |
| Guilty verdict | 7 (3.5%) | 16 (5.1%) |

(Cases that were diverted or were active/had no outcome information available were omitted from this table.)

Although the number of cases that went to trial was small — 30 of a total of 513 cases in which charges were filed — 94 percent of those prosecuted after implementation of the NICHD protocol resulted in conviction (16 of 17 cases), compared with 54 percent before its introduction (7 of 13 cases). In the majority of cases, both before and after the NICHD protocol was implemented, a plea agreement was reached. Of those, 81 percent led to a guilty plea on one or more charges. See Table 1 for more details on case outcome.

While the percentage of cases in which charges were filed increased for three of the four age groups after the protocol was implemented, the impact of the protocol was strongest in cases in which the children were between 7 and 9 years old. This age group accounted for approximately 26 percent of the pre-protocol and post-protocol samples (135 and 167 cases respectively). For children in this age group, the rate at which prosecutors filed charges rose from 42 percent before to 64 percent after detectives were trained.

Given the nature of testing an interview protocol in the field, results like those in this study cannot definitively determine whether or not a protocol elicits more *complete* or *accurate* information from children; there is usually no way for researchers to know with absolute certainty if the alleged sexual abuse occurred.

Previous studies have established that use of the NICHD protocol increases the amount of information children report with little or no interviewer input, a core feature of the NICHD protocol. There is a significant body of research demonstrating that interview techniques emphasizing the use of open-ended prompts and other methods that encourage a child's free recall elicit more accurate details than more focused prompts — ultimately, the kind of details on which investigators build their case. These techniques have proven effective at getting better information from preschoolers, elementary school children and teenagers alike. The evidence-based nature of the NICHD protocol lends credence to the researchers' assertion that, when employed by well-trained interviewers, the protocol likely improves the detail and accuracy of information elicited from children in most age groups during forensic interviews and positively affects case outcome.

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## Notes

1. U.S. Department of Health and Human Services, Administration for Children and Families, Administration on Children, Youth and Families, Children's Bureau, *Child Maltreatment 2008,* Washington, DC: U.S. Government Printing Office, 2010, http://www.acf.hhs.gov/programs/cb/pubs/cm08/cm08.pdf.
2. Pipe, M., Y. Orbach, M. Lamb, C. Abbott, and H. Stewart, *Do Best Practice Interviews with Child Sexual Abuse Victims Influence Case Outcomes?,* Final report for the National Institute of Justice, Washington, DC: National Institute of Justice, November 2008, NCJ 224524, http://www.ncjrs.gov/pdffiles1/nij/grants/224524.pdf.
3. Lamb, M., Y. Orbach, I. Hershkowitz, P. Esplin, and D. Horowitz, "Structured Forensic Interview Protocols Improve the Quality and Informativeness of Investigative Interviews with Children: A Review of Research Using the NICHD Investigative Interview Protocol," *Child Abuse & Neglect* 31 (2007): 1201-1231.
4. The judges and prosecutors were likely aware that the detectives received new training on a forensic interview protocol.
5. The study divided the children into four age groups: 2- to 4-year-olds; 5- to 6-year-olds; 7- to 9-year-olds; and 10- to 13-year-olds. The youngest child in the study was 2.80 years old; the oldest was 13.97 years old.

# Block by Block: Zeroing in on Crime Trends

*by Philip Bulman*

## Hot spot policing drills down to the micro-level.

Police and researchers have long focused on crime at the neighborhood and precinct levels. More recently, law enforcement agencies have been finding that identifying and focusing on "hot spots" is a fruitful approach to crime prevention. A new study shows that it may be even more effective to take such approaches down to the level of individual city blocks.

Researchers studied block-by-block crime incidents in Seattle from 1989 to 2004. They identified 24,023 "street segments" (the streets at both sides of an intersection) and 1,697,212 crime reports. They found that crime rates declined in Seattle as a whole during the study period (as they did in many American cities) but that at the micro-level of city blocks, crime trends could vary from city-wide and even neighborhood trends.

The research team also assembled block-level information to answer two research questions related to social disorganization theory and opportunity theories of crime. The first was whether or not hot spots of social disorganization and crime opportunities existed and varied at the street-segment level. The second was whether or not social disorganization and crime opportunity hot spots coincided with, and could explain, known crime hot spots.

Social disorganization theory is based on the idea that relationships among people and institutions within an ecological unit (like a neighborhood) are generally organized. When they become disorganized due to the absence or breakdown of certain communal and social characteristics (such as supervision of teenagers, physical order and engagement in community affairs), crime is more likely to occur.[1] The theory is usually applied at the neighborhood or community level. The researchers in this study were interested in seeing if it could be meaningfully applied to an even smaller unit — the street segment. In particular, they wanted to know if the characteristics of social disorder varied systematically at that level and if this variation was related to concentrations of crime.

Opportunity theories of crime suggest that when offenders want to commit a crime, they look for an opportunity or a practical target. The researchers examined, among other things, routine activity theory, which they identified as a type of opportunity theory. Routine activity theory suggests that crime occurs when a motivated offender, a suitable target and the lack of a capable guardian converge in the same place at the same time.[2] Criminals choose or find their targets within the context of their routine activities, such as traveling to and from work.

## Where Crime Really Happens

### Concentration of Crime at Place

The study confirmed prior research showing that in urban areas crime is highly concentrated in specific places and that most places have little or no crime. Researchers found that 50 percent of the crime occurred in just 5-6 percent of the blocks. One percent of the blocks with chronically high crime rates accounted for more than 20 percent of all crime incidents in the city. Additionally, some areas that had been labeled as bad neighborhoods had high crime rates only on certain blocks — but other blocks in the same neighborhood had little or no crime.

The researchers also found that crime trends were largely stable — that is, most blocks had the same

crime rate throughout the study period. Some were free of crime for years at a stretch, while others had chronically high crime rates. However, the researchers also found evidence of changing crime rates in some places.

### Distribution of Social Disorganization and Opportunity Across Places

The geographic picture that emerged showed hot spots of social disorganization and crime opportunities at the street-segment level. For example, 50 percent of truant students lived on only 2-3.5 percent of the more than 24,000 blocks included in the study. (Student truancy is a measure of social disorganization.) Similarly, more than 50 percent of the physical disorder reports occurred on 1.5-3 percent of the blocks. These blocks were spread throughout the city rather than being clustered together.

The researchers similarly found that measures of routine activity theory, such as the presence of potential offenders and potential victims (crime opportunities), were concentrated on a small percentage of street segments. For the purpose of the study, researchers defined "motivated offenders" as the high-risk juvenile population on a street segment. They found that half of the high-risk juveniles lived on 3-4 percent of the blocks. Half of all employees (used by researchers as a stand-in for suitable targets) worked on less than 1 percent of the blocks. Like the social disorder hot spots, crime opportunity hot spots were not clustered in specific neighborhoods but instead were found throughout the city.

### Correlates of Crime at Place

Researchers found not only that hot spots of social disorganization and crime opportunities existed at the street-segment level but also that these hot spots were likely to have high concentrations of crime. That is, social disorganization and crime opportunity hot spots overlapped with crime hot spots. In many cases, street-level variation in key theoretical measurements of place — such as motivated offenders, suitable targets, accessibility (opportunity theory) and truancy and physical disorder (social disorganization theory) — could explain why crime patterns developed differently among street segments within a single neighborhood. The researchers noted that perhaps the most important finding of their work was that crime at street segments is highly predictable and that the factors from social disorganization and opportunity theories can be used to develop a very strong level of crime prediction.

## Preventing Crime Block by Block

The study could have important implications for crime prevention policy. The researchers pointed out that crime prevention efforts aimed at entire neighborhoods or groups of neighborhoods are not efficient uses of limited police resources, because most crime is concentrated in a small percentage of street segments. If law enforcement agencies can identify street segments with high crime rates, they can direct resources toward those places rather than spread them across an entire neighborhood. This means that they can potentially achieve the same level of crime prevention with a smaller number of targets.

Additionally, the research findings regarding social disorganization and opportunity theories can help direct law enforcement efforts. Particular social and physical characteristics from both theories were highly correlated with crime at the street-segment level. By focusing on the characteristics that had strong predictive power for crime at street segments, law enforcement can craft carefully focused interventions targeting particular streets rather than entire neighborhoods.

The study was conducted by David Weisburd of George Mason University and Hebrew University, Elizabeth R. Groff of Temple University, and Sue-Ming Yang of Georgia State University. NIJ funded the research. The researchers will detail the complete findings in a forthcoming volume to be published by Oxford University Press.

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## Notes

1. Kubrin, C., and R. Weitzer, "New Directions in Social Disorganization Theory," *Journal of Research in Crime and Delinquency* 40 (November 2003): 374-402.
2. Sherman, L.W., P.R. Gartin, and M.E. Buerger, "Hot Spots of Predatory Crime: Routine Activities and the Criminology of Place," *Criminology* 27 (February 1989): 27-56.

*Visit NIJ's Web topic page on hot spots: http://www.ojp.usdoj.gov/nij/topics/law-enforcement/hot-spot-policing/welcome.htm.*

*To watch an interview with David Weisburd, go to: http://www.ojp.usdoj.gov/nij/journals/media.htm.*

# Solving the Problem of Untested Evidence in Sexual Assaults

*by Nancy Ritter*

NIJ's forthcoming special report, *The Road Ahead: Unanalyzed Evidence in Sexual Assault Cases,* looks into ways to move sexual assault kits forward.

Lately it seems that, every few months, thousands of untested rape kits are discovered in another police evidence room around the country: 10,000 in Los Angeles; 12,000 in Dallas; 10,500 in Detroit.

For resource-strapped jurisdictions dealing with the discovery of large numbers of older, unanalyzed sexual assault kits (SAKs), the solutions are anything but straightforward. Every stakeholder in the nation's criminal justice system is affected: police and crime laboratories, courts, victim-service agencies, federal, state and local policymakers, and, of course, the victims.

A rape kit — more accurately called a sexual assault kit — is a box or envelope used to collect and store biological and trace evidence in cases of alleged sexual assault. SAKs generally include vaginal, oral or anal swabs that, upon testing, may yield the perpetrator's DNA.

Untested SAKs can be stored in a number of places, such as a police department evidence room, crime laboratory, hospital, clinic or rape-crisis center. It is unknown how many unanalyzed SAKs there are across the United States.

As a nation, we need to understand more about how law enforcement officials decide whether or not to submit SAKs to the crime laboratory for analysis and how cases are triaged for other investigation (i.e., in which order are cases submitted

for investigation, if at all, and on what criteria). In October 2010, NIJ issued an "action-research" solicitation to better understand why so many SAKs are not forwarded from police evidence rooms to crime laboratories and to develop innovative approaches to solve the problem. In phase one, NIJ will award up to $200,000 to each of three to five sites for the creation of teams; these teams will include a criminal justice researcher and representatives from the police department, the crime laboratory, prosecutor's office and a community-based victim services organization. The teams will first audit untested SAKs in their jurisdiction to determine why the cases were not sent to the laboratory. Then they will develop a plan to tackle the problem. In phase two of the project, NIJ hopes to award up to a total of $4 million to help the selected sites implement their plans.

## Understanding the Evidence

One of the primary questions that must be answered, with empirical evidence, is this: Should all previously untested SAKs be tested — even kits that may be 25 years old?

To answer this question, it is important to understand the evidence itself. On average, only an estimated 50 to 60 percent of SAKs contain biological material that does not belong to the victim, and that percentage is much lower in some parts of the country.

To shed more light on this issue, NIJ is currently funding researchers at California State University, Los Angeles, to study a random sample of Los Angeles cases. The researchers will look at data, such as the percentage of SAKs that yielded a DNA profile and the percentage that were uploaded to the Combined DNA Index System (CODIS) and resulted in a hit to other crimes or offenders. Results of the study are expected in 2011.

> As a nation, we need to understand more about how law enforcement officials decide whether or not to submit SAKs to the crime laboratory for analysis and how cases are triaged for other investigation.

Technological advancements in DNA analysis are also likely to play a major role in testing older SAKs. In Georgia, for example, the state crime laboratory first tests evidence to determine if male DNA is present; and, if it is not, the laboratory doesn't proceed with the full, time-consuming analysis that would develop an actual DNA profile.

## Victim Notification

Whether a jurisdiction with a large number of previously untested SAKs decides to test all or only some of the kits, notifying the victims is an important part of the process. Determining best practices for doing this, however, will not be easy.

When, for example, should the victim be notified? When her unanalyzed SAK has been located after many years? When the kit is sent to the laboratory for analysis? Should the victim be notified even if analysis reveals that there is no probative evidence or only if a DNA profile is determined? Should she be notified only if the rapist's identity is revealed through a CODIS hit? What if the suspect is not in CODIS, but the police issue a John Doe warrant?

At first blush, it may seem that there is no question that sexual assault victims should be notified at some point in the process. After all, why wouldn't a victim want to know if DNA analysis of evidence from a rape when she was a college freshman had — 20 years later — revealed the rapist's identity?

Experts say there could be as many answers to that question as there are victims. What if the victim, now 38 years old, never told her husband or 15-year-old daughter about the rape? What if she has had years of counseling and moved past it? Beyond simply being notified at one step or another in the criminal justice process, does the victim get a say in whether or not her case moves from the police evidence room to the laboratory, or from the prosecutor's office to the courtroom?

Victim safety is also a factor in the notification issue. Victim advocates warn that a victim of past rape could be living in a domestic violence situation, and contact by the police could act as a violence trigger in her current partner. In addition, they note, victims who are told that an unsolved crime may now be investigated may suddenly feel threatened again by the rapist.

## Post-testing: The Domino Effect

Beyond the notification of victims and decisions regarding the forensic testing of recently discovered SAKs, there are major implications for downstream partners in the criminal

> Delays in evidence being sent to a laboratory — as well as delays in analyzing evidence — result in delays in justice.

justice system. Some questions jurisdictions might face include:

- Where will the resources come from as already-strapped police departments and crime laboratories receive additional demands for follow-up investigations and DNA analysis?
- What protocols will a police department follow, for example, when testing yields a DNA profile but it does not match a profile in CODIS or a local database? Will a John Doe warrant be issued?
- If an investigation results in a suspect, how will already overworked prosecutors and public defenders handle additional cases?

Jurisdictions facing the discovery of a large number of older SAKs must also consider what their testing policy will be if the statute of limitations in a case has been reached. If a case can't be prosecuted because the deadline for filing has passed, is it a wise use of resources to have the SAK evidence tested? The answer is not as obvious as it may seem.

Some proponents of testing all SAKs argue that, even if a case can't be prosecuted, the evidence should nevertheless be tested to determine if the rapist might have committed other rapes. Evidence of prior, unadjudicated sexual assaults may be considered in the sentencing of a rapist.

Ultimately, at the heart of this latest challenge for our criminal justice system are the victims. Delays in evidence being sent to a laboratory — as well as delays in analyzing evidence — result in delays in justice. In worst-case scenarios, such delays can lead to additional victimization by serial offenders or the incarceration of people wrongly convicted of a crime.

As the nation grapples with the discovery of thousands of older SAKs, it is crucial that we balance justice, public safety and victims' needs. In the end, our goal must be to move beyond the crisis management of the moment to the adoption of systematic practices, procedures and protocols that will prevent such situations from ever arising again.

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## Resources

- To learn more about funding challenges for public crime laboratories, see *2007 DNA Evidence and Offender Analysis Measurement: DNA Backlogs, Capacity and Funding,* http://www.ncjrs.gov/pdffiles1/nij/grants/230328.pdf.
- To learn more about evidence in police custody that is not sent to a crime laboratory, see http://www.ojp.usdoj.gov/nij/journals/266/untested.htm. The full report is available at http://www.ncjrs.gov/pdffiles1/nij/grants/228415.pdf.
- To read the story of one man's exoneration after a wrongful conviction, see http://www.ojp.usdoj.gov/nij/journals/262/one-mans-story.htm.
- To read about NIJ-funded research on extending the period of time to obtain a possible DNA profile after a sexual assault, see "Extending the Time Available to Collect DNA in Sexual Assault Cases" (issue 267), http://www.ojp.usdoj.gov/nij/journals/267/extending.htm.
- To learn more about action research, see http://www.ojp.gov/nij/topics/crime/gun-violence/prevention/action-research-model.htm.
- In May 2010, the U.S. Department of Justice brought sexual assault nurse examiners, crime laboratory directors, cold case detectives, prosecutors and victim advocates to Washington, D.C., to discuss the challenges surrounding untested evidence in sexual assault kits. A full report of the meeting is available at http://www.ovw.usdoj.gov/docs/rape-kit-roundtable-summary-10262010.pdf.

# Harvard Executive Session

## Law enforcement methods, technologies and priorities evolve to meet a changing world.

The second Executive Session on Policing and Public Safety is a forum for experts to debate and discuss the issues of the day and how law enforcement will continue to change in the future. The Executive Session is a collaboration between NIJ and Harvard's Kennedy School of Government.

The first Executive Session on Policing and Public Safety took place in the 1980s and produced products and concepts that revolutionized the field, such as community policing.

**The second Executive Session has now published several papers, including:**

- Police Science: Toward a New Paradigm, David Weisburd and Peter Neyroud, January 2011.
- Governing Science, Malcolm K. Sparrow, January 2011.
- Making Policing More Affordable: Managing Costs and Measuring Value in Policing, George Gascón and Todd Foglesong, December 2010.
- The Changing Environment for Policing, 1985-2010, David H. Bayley and Christine Nixon, September 2010.
- One Week in Heron City: A Case Study, Malcolm K. Sparrow, September 2009.

At least six more papers discussing the issues and potential solutions that will help in the ever-changing policing environment are expected.

- Learn more about the Executive Sessions and read papers from the second Executive Session: http://www.ojp.usdoj.gov/nij/topics/law-enforcement/administration/executive-sessions/welcome.htm.
- Read the papers from the original Executive Session: http://www.ojp.usdoj.gov/nij/topics/law-enforcement/administration/executive-sessions/past.htm#papers.
- For additional information, visit Harvard's website: http://www.hks.harvard.edu/criminaljustice/executive_sessions/policing.htm.

# Extending the Time to Collect DNA in Sexual Assault Cases

*by Terry Taylor*

## New research offers hope for extending the timeline for collecting samples suitable for DNA profiling in sexual assault cases.

DNA profiling plays a major role in sexual assault cases, but it has a significant shortcoming: Using the current standard DNA profiling method, many jurisdictions require the collection of evidentiary samples within three days of the assault. After that, it may become difficult to obtain a usable DNA profile of the male suspect.

What if we could extend the window of time for collecting evidence?

We know that sperm cells are found in the female reproductive tract for seven days after ejaculation or longer. Researchers are testing a hypothesis that may extend the length of time in which DNA profiling is possible in sexual assault cases.

Dr. Jack Ballantyne, professor of chemistry at the University of Central Florida in Orlando and an internationally recognized expert on DNA profiling, believes that real evidence is being lost because of some jurisdictions' adherence to the three-day window.[1] Ballantyne believes that new techniques may make it possible to collect samples for as long as five to six days after a sexual assault and still do viable analysis.

A DNA profile is a set of numbers that represent regions, or loci, of variable, repeated DNA sequences. Short sequences of DNA that repeat a number of times are known as short tandem repeats (STRs). The number of times a sequence repeats varies from person to person and,

except in the case of identical twins, this variability can be used to tell people apart. STR analysis is a forensic technique that develops and distinguishes DNA profiles by evaluating these regions.

Most DNA is located in the nucleus of the cell. Within the nucleus, DNA is divided into long, tightly coiled pieces called chromosomes. Humans have 23 pairs of chromosomes. Of these, 22 pairs are autosomal chromosomes (or autosomes), which are not involved in determining a person's sex. The other pair are sex-determining chromosomes. There are two types of sex chromosomes – X chromosomes and Y chromosomes. Women have two X chromosomes; men have one X chromosome and one Y chromosome. (See Fig. 1, page 25.)

STR analysis is traditionally performed on autosomes because the manner in which they are inherited results in a higher degree of variation than Y chromosomes and thus produces profiles that have far stronger statistical power.[2] (See sidebar, "STR Analysis.")

The standard DNA profiling technique of using STR analysis, however, has shortcomings. One, as mentioned above, is that it is difficult to obtain a DNA profile using STR analysis more than three days after a sexual assault.

A second shortcoming of current DNA profiling techniques is the inability to get a male profile when — in evidence collected after an alleged sexual assault — female cells vastly outnumber the available sperm cells. In such cases, the amount of the female's DNA is so great compared to the male's DNA that the female DNA swamps the process and laboratory analysis is extremely difficult. (See sidebar, "New Technologies Promise Better Future Results.")

An approach that has shown promise in solving both of these difficulties is called Y-STR analysis, based on the male Y chromosome. An NIJ-funded pilot study of Y-STR DNA profiling by Ballantyne and his colleagues offered hope for a solution to the problem of analyzing postcoital samples collected more than three days after the incident.[3] His team was able to obtain complete Y-STR profiles on samples collected as many as five days after coitus and a partial profile at six days.

> Using the current standard DNA profiling method, many jurisdictions require the collection of evidentiary samples within three days of the assault. After that, it may become difficult to obtain a usable DNA profile of the male suspect.

Y-STR analysis also helps solve the swamping problem because it is selective for Y chromosome DNA, which has little overlap with female DNA. As long as the quantity of male DNA is sufficient, the amount of female DNA present is not a problem.

Ballantyne is quick to caution that Y-STR profiling "cannot supplant autosomal DNA profiling." Y-STR profiles do not have the statistical power of autosomal STR profiles and therefore do not carry the same power to discriminate among individuals. In many cases, scientists are unable to obtain a DNA profile based on Y chromosome DNA, and only a few Y-STR systems are currently available for use.[4]

The likelihood of obtaining an autosomal DNA profile, however, is small in several situations:

- When a sample contains both male and female body fluids other than semen (e.g., saliva-saliva, saliva-vaginal fluids, fingernail scrapings).
- When the number of sperm is low, or they are in a fragile state.
- When there is more than one semen donor, as in cases of multiple perpetrator rape.

Ballantyne and his colleagues continue their work to increase the number of Y-STR systems, but other than adding more Y-STR loci to the analysis, little can be done to change Y chromosome DNA's relative lack of power to distinguish individuals — the greatest weakness of this type of DNA profiling.

Still, Y-STR profiling is sometimes the only option available.[5]

Because their pilot study involved collection of postcoital samples from only three consenting male-female couples, Ballantyne and his team

## STR Analysis

The most common type of DNA profiling today for criminal cases and other types of forensic uses is called "STR" (short tandem repeat) analysis.

Using DNA to distinguish between two individuals is a tricky matter, because close to 99.9 percent of our DNA is the same as everybody else's DNA.[1] DNA that actually codes for proteins cannot vary much without rendering the proteins ineffective. The four nucleotide bases that make up the backbone of DNA provide instructions for assembling the amino acids in proteins by being in a precise sequence, with each three-base group coding for a specific amino acid. If that DNA base sequence is altered (or "mutated," as scientists generally say), the sequence of amino acids in the resulting protein can also be altered. As a result, because protein function derives from a specific amino acid sequence, the protein may not work.

Think of DNA as the "blueprint" for a house and proteins as the steel, timber, bricks and mortar, from which the house will be built. A brick that is mostly sand instead of clay will crumble, and mortar with the wrong ratio of cement to aggregate will fail. Likewise, a protein with the wrong sequence of amino acids often won't function. (This analogy fails to capture the complexity of the DNA-protein system, however, because proteins are not only the "bricks" and "timber." Some "read" the "blueprint" and supervise the building, others are the "bricklayers" and "carpenters," and still others maintain and keep the house functioning after it is built.) Non-functional or missing proteins are the basis for many genetic diseases. Useful differences in the DNA must be found in the remaining one-tenth of one percent, which is not known to code for anything specific. Because this section of the DNA's precise sequence is not so important, it is quite variable, which makes it possible to use DNA to distinguish between individuals.

Among the 3 million or so DNA bases that do not code for proteins are regions with multiple copies of short repeating sequences of these bases, which make up the DNA backbone (for example, TATT).* These sequences repeat a variable number of times in different individuals. Such regions are called "variable-number short tandem repeats," and they are the basis of STR analysis. A collection of these can give nearly irrefutable evidence statistically of a person's identity because the likelihood of two unrelated people having the same number of repeated sequences in these regions becomes increasingly small as more regions are analyzed.

Autosomal chromosomes are those not involved in determining a person's gender, and STRs on these chromosomes are called autosomal STRs. Other STRs used for forensic purposes are called Y-STRs, which are derived solely from the male sex-determining Y chromosome. Profiles based on autosomal STRs provide far stronger statistical power than profiles based on Y-STRs, because autosomal DNA is randomly exchanged between matched pairs of chromosomes in the process of making egg and sperm cells. That's how, with billions of humans on the planet, no two people who are not identical twins are exactly alike. Profiles based on Y-STRs are statistically weaker because only males have a Y chromosome and all males get theirs from their fathers, so all males in any paternal line have nearly identical Y chromosomes. Given enough Y-STRs, which scientists call loci, a Y-STR profile can offer substantial power to discriminate between individuals, but this type of profile is certainly not as powerful as an autosomal STR profile.

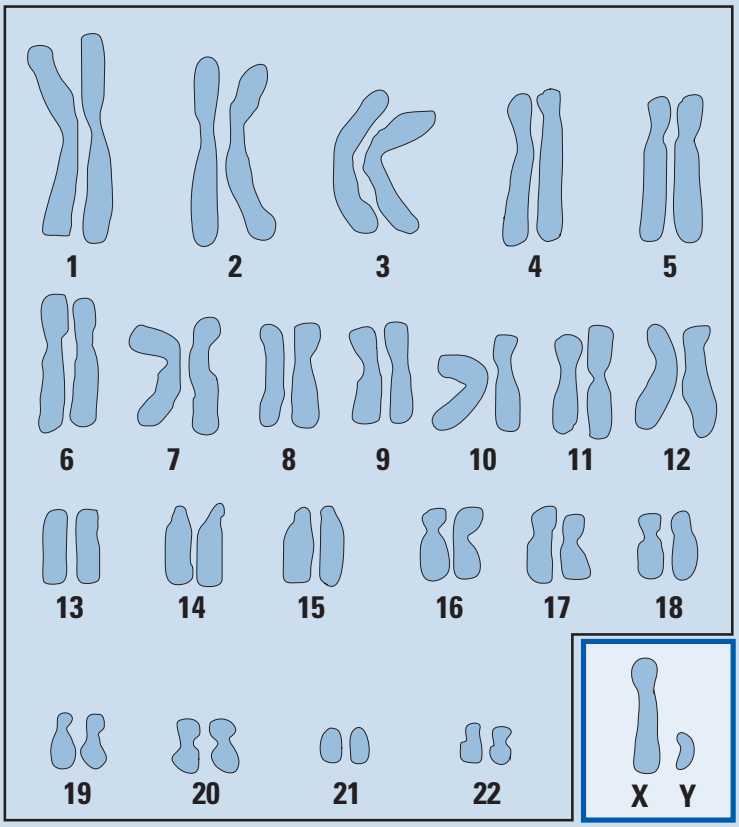
plan to add statistical power to their experimental evidence with a new NIJ-funded study that will include 150 consenting male-female couples. His co-principal investigator is Dr. Patricia M. Speck, associate professor of nursing at the University of Tennessee Health Science Center College of Nursing in Memphis.

"Given the variables in the collection of samples, we don't know what we can do and with whom," Speck explained. The large study aims to expand knowledge about the limits of DNA profiling in sexual assault cases. The study will examine the impact of a number of factors

In the United States, 13 autosomal STR loci are now accepted as the system used for forensic purposes.[2] Given a robust crime scene DNA sample with good data for all 13 STRs, the likelihood of a person unrelated to the actual perpetrator having a perfect match for all 13 is typically around 1 in 1 billion. By contrast, experimental work with a very robust set of 30 Y-STR loci showed a probability of about 1 in 50,000 for a perfect match.[3]

* TATT stands for a specific string of nucleotide bases, thymine-adenine-thymine-thymine. Thymine and adenine are two of the four bases frequently found in DNA. The other two are cytosine (C) and guanine (G).

**Figure 1.** Human Chromosomes




Humans have 23 pairs of chromosomes – 22 pairs of autosomes and one pair of chromosomes that determine gender (the X and Y chromosomes).

## Notes

1. Basics of DNA Typing. http://dna.gov/basics/ (accessed July 7, 2010).
2. Norrgard, K., "Forensics, DNA Fingerprinting, and CODIS," *Nature Education* 1(1) (2008): http://www.nature.com/scitable/topicpage/forensics-dna-fingerprinting-and-codis-736.
3. Hanson, E., and J. Ballantyne, "A Highly Discriminating 21 Locus Y-STR 'Megaplex' System Designed to Augment the Minimal Haplotype Loci for Forensic Casework," *Journal of Forensic Sciences* 49 (January 2004): 1-12.

— from sampling timeline to menstruation cycle — on the ability of investigators to obtain a DNA profile. To ensure rigorous, uniform methods, qualified forensic nurses will collect all samples. After the couples have abstained from sexual intercourse for 10 days, they will engage in unprotected intercourse, and vaginal samples will be collected at 4, 7 and 9 days, with each collection following a new unprotected coitus episode. The collection process will also include a cervical sample because sperm cells live longer in the cervix than in the vagina, where they are quickly eliminated.

## New Technologies Promise Better Future Results

A routine difficulty encountered in producing autosomal DNA profiles in rape cases is obtaining enough sperm cells for the analysis. Cells can be damaged or degraded due to time, or simply stuck to epithelial cells (those that line the cavities and structures of the body, such as the vagina), making it difficult to carry out a standard autosomal STR analysis.

A session at the 2010 NIJ Annual Conference highlighted two promising technologies for enhancing the separation of sperm cells from other cells in a mixed sample. Gary Stacey, vice president of technology at Haemonetics Corporation, presented a technique called holographic optical trapping (HOT). HOT is an automated system now commercially available from Arryx, a Haemonetics subsidiary. This system allows small particles, such as sperm cells or cell fragments, to be directly manipulated using a computer-controlled hologram array. Stacey showed video and presented data offering evidence that HOT can separate sperm cells from female epithelial cells (or other contaminants) before micro-dissection to obtain DNA, enhancing the resulting STR analyses. The system is simple to use, provides visual confirmation of the process as it proceeds and allows video data tracking.

Henry K. Lin, a member of the Biosciences Division, of the Oak Ridge National Laboratory, discussed a microfabricated filter technology originally developed to separate metastatic cancer cells from the blood. Because sperm cells are substantially smaller than the female epithelial cells with which they are likely to be mixed in rape cases, this two-tier filtration process first selects out the larger cells, allowing the sperm cells to pass through and be drawn off separately. Experiments testing this application of the system have successfully separated sperm cells in mixtures where they were outnumbered 25 to 1, with a higher DNA recovery rate and cleaner STR profiles than are obtained with standard methods. The investigators intend to continue this research with epithelial cell-to-sperm cell ratios up to 100 to 1.

Ballantyne explained the importance of such research: "If we can separate sperm cells accurately and efficiently in challenging samples, it will permit standard autosomal DNA analysis in more cases. This will be a great move forward."

Participants in the study will also be asked questions about their menstrual cycle, general health background and various social indicators. To help answer questions about the effects of menstruation on DNA collection, participants will be divided between women whose sample collection comes before menstruation and women whose menstruation has started between the episode of intercourse and the sample collection.

"The variables are complex and potentially confounding," Speck said. An open question is whether estrogen protects from injury. "Knowing this could be important to testimony about injury in a sexual assault case

because where the woman is in her menstrual cycle at the time of the event could play a role in whether she is physically injured."

According to Ballantyne, another possible aim of the study will be to document exactly when autosomal DNA analysis fails. At seven or nine days, the current consensus is that there is no hope for an autosomal STR profile. "If we successfully obtain a Y-STR profile with a sample collected seven or nine days later, we can perhaps use the expertise we have gained to also tease out an autosomal profile," Ballantyne explains. "We'll be more certain whether or not it should be a routine matter to collect samples more than a few days after the assault. For example, if the study shows that more than 50 percent of the samples yield a reportable DNA profile after four days, it would have important policy implications. It won't be just a report in a scientific journal."

Speck agrees: "This study could have the effect of changing the timeframe for bringing victims in, or it could confirm cutting off sample collection earlier." The important thing is to develop interventions that will help victims. "The bottom line is," she said, "we want to take rapists off the street."

The important thing is to develop interventions that will help victims. "The bottom line is, we want to take rapists off the street."

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## Notes

1. The three-day window may be in part due to the jurisdiction's protocol, the laboratory's protocol or both.
2. For each of their 22 pairs of autosomes, children inherit one autosomal chromosome from each parent. The autosomes the child receives, however, are not identical to their parents' autosomes — before a parent passes on his or her autosomes, each pair goes through a process called recombination, which randomly shuffles that pair. The mixed autosome produced by that process is what gets passed on to the child from the parent. In the mother, the X chromosome pair also goes through recombination, just like autosomes, and the mixed X chromosome is passed on to the son or daughter. Because men only have one X chromosome, recombination does not occur and they pass their X chromosome on unchanged to their daughters. Similarly, because men only have one Y chromosome, it is passed unchanged to their sons.
3. Mayntz-Press, K., L. Sims, A. Hall, and J. Ballantyne, "Y-STR Profiling in Extended Interval (≥ 3 Days) Postcoital Cervicovaginal Samples," *Journal of Forensic Sciences* 53 (March 2008): 342-348.
4. A collection of Y-STR markers or Y-STR loci (see sidebar, "STR Analysis") must be discovered and validated as useful before it can be used as a Y-STR system for DNA profiling.
5. In addition to its usefulness in sexual assault cases, investigators might be able to identify a disaster victim using the Y-STR profile of a close male relative.

# Minimizing the Risks of Hazardous Materials: The CBRN Standard

*by Philip Bulman*

## NIJ's new ensemble standard is designed to meet the special needs of law enforcement officers.

The National Institute of Justice has released a new performance standard for the protective ensembles that law enforcement officers wear when they risk exposure to dangerous chemical, biological, radiological or nuclear (CBRN) substances. The CBRN standard is the first of its kind to address the specific needs of law enforcement.

Law enforcement officers can encounter a variety of potentially dangerous scenarios in their day-to-day jobs. They might enter suspected methamphetamine laboratories, which can contain toxic fumes and chemicals, or be called to investigate possible terrorist attacks involving the deliberate release of dangerous substances. Law enforcement officers must have appropriate attire to protect them in these situations.

Standards already exist for CBRN ensembles for firefighters, but they do not address the unique needs of law enforcement. Unlike firefighters, law enforcement officers may need to use stealth when approaching a potential crime scene. They must be able to handle firearms and other equipment. Finally, officers need to be able to put on or take off protective ensembles, which include suits, gloves and foot protection, within a short time frame. The new standard, designed specifically for law enforcement officers, accommodates these needs.

The *CBRN Protective Ensemble Standard for Law Enforcement, NIJ Standard 0116.00*, includes minimum performance requirements for the ensembles. NIJ will also publish conformity requirements for independent, third-party certification

of ensembles and a selection and application guide for agencies that want to buy and use the ensembles.

The standard includes four Law Enforcement Response Levels (LERL) based on expected mission requirements, durability and duration and on the specific CBRN threat.

Level 1 indicates the most risky situations. LERL-1 ensembles could be worn to enter a clandestine drug laboratory or a building containing chemical warfare agents or other toxic chemicals. The mission might require a stealth approach and dynamic entry techniques involving speed and surprise. The initial approach could, for example, be made on the outside platform of an armored personnel carrier, followed by a stealth approach on foot. To protect officers, an ensemble must provide protection against hazards such as a flash fire, jagged metal on pried doors, shards of glass and wood splintering from doors. It must also be flexible enough to allow officers to deal with combative suspects.

An LERL-2 ensemble could be worn in a hostage incident in a location containing chemical warfare agents or other dangerous chemicals. The mission could involve a stealth approach and dynamic entry techniques to rescue hostages. Tasks could include remaining stationary for an extended time, moving quickly during a rescue, communicating with other officers and making arrests. The hazards are similar to LERL-1 but without the threat of a flash fire.

An LERL-3 ensemble could be used in a building containing low levels of chemical warfare agents or industrial chemicals. The ensemble would be appropriate for moving slowly and deliberately through a building to clear it. The pace would allow for the use of equipment such as mirrors and cameras to locate a suspect while limiting exposure to gunfire. The mission might require officers to be still for extended periods, carry ballistic shields, search for suspects remotely or arrest suspects. Challenges could include combative suspects, moving past barricades or trip wires, and kneeling or crawling on broken glass or other sharp objects.

LERL-4 ensembles could be worn by officers setting up and maintaining a perimeter around an area containing low levels of CBRN hazards. They would allow officers to safely stay in the area for an extended period. Officers could secure the perimeter while directing vehicular or pedestrian traffic, communicating with groups of people, and making arrests as necessary. Hazards could include combative people and kneeling on glass or other sharp objects.

The four types of ensembles provide different degrees of protection from liquid hazards, as well as various degrees of "stealth" with respect to the visibility of an ensemble and the noise it makes.

The new standard was one of the law enforcement community's highest-priority technology needs. It was developed by representatives from federal, state and local law enforcement agencies working closely with scientists and engineers familiar with hazardous materials and protective ensembles. Representatives from the International Association of Chiefs of Police, the National Sheriffs' Association, the Fraternal Order of Police and the National Tactical Officers Association also participated in its development and review. The standard is the result of several years of developing collaborative partnerships with the Department of Homeland Security; the U.S. Army Natick Soldier Research, Development and Engineering Center; and, most importantly, the National Fire Protection Association, which shared crucial information based on its experience developing similar standards for the fire service.

NIJ standards are voluntary and define what a potential solution must accomplish rather than specifying a particular solution. The goal is to ensure that equipment is safe and reliable and that it performs according to established minimum requirements. Standards articulate practitioners' operational needs and performance levels with regard to particular tools and technology. They relate practitioners' experiences in a way that enables testing in a valid, consistently replicable manner, and they tell manufacturers how the equipment they produce must perform to meet law enforcement's needs. They allow comparisons among products based on standardized testing methods and minimum performance requirements. Finally, standards provide law enforcement agencies with performance information on key equipment characteristics, giving them a level of confidence in a product's fitness for use.

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**For more information:**

- CBRN Protective Ensemble Standard for Law Enforcement, NIJ Standard 0116.00 http://www.ncjrs.gov/pfdfiles1/nij.221916.pdf

# Improving Forensic Death Investigation

*by Beth Pearsall*

## The death investigation community searches for solutions for a fragmented system.

In its 2009 report, *Strengthening Forensic Science in the United States: A Path Forward,* the National Academy of Sciences (NAS) stated that, "Death investigations in the United States rely on a patchwork of coroners and medical examiners" and that "these vary greatly ... in the quality of services they provide."[1] Forensic death investigation, the report stated, took place in the context of a "fragmented," "deficient" and "hodgepodge" system that made it difficult to standardize performance.

J.C. Upshaw Downs, coastal regional medical examiner for the Georgia Bureau of Investigation, acknowledged as much at the Forensic Death Investigation Symposium in June 2010.

"Currently, there is a disjointed patchwork of medical examiners, coroners and mixed offices," Downs said. He added, "The field must come together to have a clear, unified message," if it hopes to set goals and improve the quality of forensic death investigations. "The lack of uniformity is having a negative impact on justice, on public health and on public safety."

At the symposium, convened by the National Institute of Justice and the National Center for Forensic Science, the findings of the NAS report spurred participants' discussion about the forensic death investigation field.

While *Strengthening Forensic Science in the United States: A Path Forward* provided an objective, external review of forensic sciences as a whole, the Academy highlighted a number of long-standing issues within the medicolegal death

community in Chapter 9, "Medical Examiner and Coroner Systems: Current and Future Needs."

Like the rest of the report, the findings in Chapter 9 received considerable attention from the press. For those in the forensic death investigation community, however, the report's findings were anything but surprising.

The Forensic Death Investigation Symposium brought members of that community together for three days to discuss the field's current and future needs, many of which were highlighted in the Academy's report. Coroners, medical examiners, forensic pathologists, death investigators, law enforcement officers and members of the legal community gathered to explore and develop suggestions for improving the field. In particular, they sought to address enhancing communication; legal and ethical issues; education, training and certification programs; technology; and areas for future research in death investigation.

## Medical Examiners or Coroners?

One of the most controversial sections in Chapter 9 of the NAS report calls for the elimination of coroner systems.

The United States has several different systems for handling death investigation. The four main systems in the U.S. are centralized state medical examiner systems, county coroner systems, county medical examiner systems, and mixed county medical examiner and coroner systems.[2]

State statute determines whether a medical examiner or coroner delivers death investigation services. Coroners — often elected officials who fulfill state requirements — may or may not be physicians or have medical training. Some serve as administrators, while others are responsible for determining the cause and manner of death. Medical examiners, on the other hand, are almost always physicians, are appointed and are often pathologists or forensic pathologists.

> "Currently there is a disjointed patchwork of medical examiners, coroners and mixed offices. The field must come together to have a clear, unified message."

According to *Strengthening Forensic Science in the United States: A Path Forward,* assessing the dead is a "medical decision," and thus a medical professional — not "a layperson with investigative and some medical training" — should make this decision. The report concluded: "The disconnect between the determination a medical professional may make regarding the cause and manner of death and what the coroner may independently decide and certify as the cause and manner of death remains the weakest link in the process."

Jay Siegel, director of the Forensic and Investigative Sciences Program at Indiana University-Purdue University and member of the NAS committee, told symposium participants that the recommendation to eliminate the coroner system does not come in a vacuum. "This is a system-wide problem," he said. "The NAS report examines the difficulties of the whole forensic science field, including a lack of research, funding, standards and accreditation."

Dr. Lakshmanan Sathyavagiswaran, Chief Medical Examiner-Coroner for the Los Angeles County Department of Coroner and current president of the National Association of Medical Examiners (NAME), presented the NAME resolution which supports the NAS recommendation of providing incentive funds to states and jurisdictions with the goal of replacing coroner systems with medical examiner systems to improve death investigations. He also indicated that this process will take several years and required a dialogue with coroners and law makers. He stated that medical examiners were in a better position to educate and to improve the quality of forensic death investigations.

On the other side of the debate is Dr. O'dell Owens, a previously elected coroner and former president of the International Association of Coroners and Medical Examiners. Dr. Owens disagrees with the notion that an office is necessarily best served by a medical examiner. "It is not about who runs the office," he said. "It is about how well you run the office. And the public should decide this state by state."

"Eighty-four percent of coroners say they want standards and certification, but they lack access to resources and training," Owens said. "We should work to give coroners education and training opportunities."

P. Michael Murphy, coroner for the Clark County (Nevada) Office of the Coroner/Medical Examiner, urged symposium participants not to argue about which system is better. Instead, he asked them to discuss quality and to determine what constitutes a competent medicolegal death investigation.

"All of us have different ideas about what the solution is," Murphy said. "We have an opportunity to air our differences, identify challenges and provide possible solutions. We need a better-coordinated effort. This is our opportunity to make a difference."

## A Competent Death Investigation

To help identify solutions for improving death investigation, symposium participants broke into groups to discuss the field's current and future needs. They then made recommendations for moving forward with ways to improve the quality of death investigation.

### Communication Breakdown

"Communication — or lack thereof — is the single greatest hurdle to performing our daily work," Murphy said. Communication difficulties with other agencies and with decedents' families hinder the coroner/medical examiner's work.

Clear, well-defined channels of communication between the coroner/medical examiner and the various agencies that play a role in death investigations, from law enforcement to public health, are critical for collaboration, information-sharing and coordinating activities. Participants identified educating other agencies about the role of the coroner/medical examiner as a first step, because many agencies do not understand the coroner/medical examiner's function, much less the importance of his or her involvement and the appropriate stage to initiate that involvement. This lack of communication can lead to delaying notification of coroners/medical examiners of deaths, failing to maintain communication or hindering attempts to collect information.

Sathyavagiswaran discussed the importance of building professional relationships. He emphasized that collaboration among staff in different agencies and acknowledging their expertise can improve communication. He also indicated that developing an official protocol for the involvement of the coroner/medical examiner would help ensure timely communication between agencies and build relationships.

> "Communication — or lack thereof — is the single greatest hurdle to performing our daily work."

To address the communication breakdown that occurs too often in death investigations, participants recommended providing education and training to all death investigation professionals and stakeholders, including medical examiners, coroners, law enforcement, EMS personnel, hospitals, the media, elected officials and students.

Symposium participants also recommended encouraging the use of technology to communicate during death investigations. Participants noted that in general, the field does not use potentially valuable tools like teleconferencing, mobile communication technology and social communication platforms that can enhance collaboration, information collection, communication and command.

Proper communication with the family of the deceased is also a primary concern of the death investigation community. Participants recommended creating trainings to enhance communication with the families of the decedent.

Julie Howe, executive director of the American Board of Medicolegal Death Investigators, noted that communicating with families can be a challenge, especially when they expect high-tech investigations and quick answers. "Families often lack understanding of the multi-agency approach to death investigations and are reluctant to talk about the same things to different agencies," Howe explained.

Communicating with families can be even more difficult in the case of a mass disaster. While the National Transportation and Safety Board has a well-organized family communication process for aviation disasters, in most other cases, there are no comparable systems in the U.S. The group recommended creating a centralized mechanism for the public to communicate with responding federal agencies.

### Education, Training and Certification Programs

Participants identified a strong need for increased education and training opportunities in all of the disciplines related to medicolegal death investigation, including opportunities for medical examiners, coroners, death investigators, forensic pathologists, forensic anthropologists and forensic toxicologists.

The field must find a way to provide education and training opportunities to those who do not have the resources, participants said. To help do this, they recommended:

- Providing incentive funds to encourage training.

- Developing regional training programs for coroners.
- Funding forensic pathology fellowship programs.
- Establishing leadership and management programs to train death investigation administrators.

But, as Owens pointed out, money drives everything. "We must find a way to increase funding so the field can have better training," he said.

### Leveraging R&D and Technology in the Death Investigation Community

According to *Strengthening Forensic Science in the United States: A Path Forward,* investigators do not take full advantage of technology and tools, such as CT scans and digital X-rays, that are routinely used in medical disciplines. Incorporating this technology could assist practitioners in medicolegal death investigations. The report ties this disuse of technology back to the lack of education and training in the field.

The report also states that little research on death investigation and forensic pathology is being conducted in the United States. Forensic pathologists carry heavy caseloads and often lack the time, expertise, facilities or funding for research. According to the report, research is further limited because universities fail to promote research in basic forensic pathology.

To overcome these obstacles, symposium participants recommended:

- Establishing a registry of offices interested in partnering with academic institutions.
- Establishing centers of excellence and partnerships for forensic pathology research.
- Forming an expert panel to evaluate the utility of available technology.
- Offering incentives to draw people to the field, such as loan forgiveness.

### Navigating Legal and Ethical Issues in Death Investigation

Finally, participants discussed the ethical and legal issues that can arise during death investigations. They asked: Should conversations between medical examiners and their staff — and any disagreements over the manner of death — be documented? And what happens when the forensic pathologist who originally worked on a case has left the office? Should someone else testify in his or her place?

In addition, symposium participants highlighted a lack of training in courtroom presentation. Medical examiners and coroners must be trained not to use medical and legal jargon in court, they said, because jury members need to understand their statements to make a fair decision.

To address these concerns, they recommended:

- Creating guidelines, best practices and model legislation for the release of records.
- Developing a model discovery packet.
- Offering medical examiners and coroners training with prosecutors and the defense.

## Moving Forward

As the symposium drew to a close, Barbara Butcher, chief of staff and director of the Forensic Science Training Program at New York City's Office of Chief Medical Examiner, reminded participants that they are doing "noble work — we speak for the dead and help protect and care for their families. We are the last voice of someone who is gone."

Beth Pearsall is a freelance writer and frequent contributor to the *NIJ Journal.*

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## Notes

1. National Academies' National Research Council, *Strengthening Forensic Science in the United States: A Path Forward,* Washington, DC: National Academies Press, 2009, http://www.ncjrs.gov/pdffiles1/nij/grants/228091.pdf.
2. Hickman, M., K. Hughes, J. Ropero-Miller, and K. Strom, *Medical Examiners and Coroners Offices, 2004,* Special Report, Washington, DC: Bureau of Justice Statistics, June 2007, http://bjs.ojp.usdoj.gov/content/pub/pdf/meco04.pdf.

*See videos and PowerPoint presentations from the Forensic Death Investigation Symposium: http://www.ncfs.org/Death_Investigation/index.html.*

# Expanding Research by Sharing Data

*by NIJ staff*

## NIJ makes data available for future research.

Collecting, cleaning, organizing and analyzing data are expensive and time-consuming, but these activities are essential to scientific inquiry. NIJ created the Data Resources Program to preserve data produced by NIJ-funded studies and to make them available for secondary analysis by other researchers. The Data Resources Program extends the value of NIJ's initial investment in the original data and ultimately the reach of the research.

When an NIJ-funded study ends, researchers submit their data to the National Archive of Criminal Justice Data, which has been collecting data since 1978. The National Archive was created as part of the Inter-University Consortium for Political and Social Research (ICPSR) at the University of Michigan. ICPSR provides access to the world's largest archive of computer-readable social science data and offers training in both basic and advanced methods of quantitative analysis in social science research.

Archiving data and making them available to other scientists contribute to NIJ's efforts to:

- Increase transparency
- Replicate findings
- Extend research to the field

**Increase Transparency:** Making data and analytic methods available for scrutiny by others increases the transparency of the research process, gives other researchers the chance to validate findings, and enhances scientific integrity. Such openness, in turn, leads to more rigorous and credible science. This is especially important when research informs policies, practices and programs that are controversial or complicated — such as the impact of sex offender notification policies or the arrest practices employed in domestic violence cases.

**Replicate Findings:** When original research is replicated, policymakers and practitioners can make more informed decisions about applying research to their own work. Successful replication can give them greater confidence in the original findings.

**Extend Research to the Field:** Today's research is the cornerstone of tomorrow's better ideas. By conducting research with data collected by others, by applying statistical techniques that did not exist when the data were originally collected or by combining crime data with those from other fields (such as health, housing and education), researchers extend the value of the data and make the resulting knowledge useful to a wider audience. Having other researchers look at data from different angles can also provide insight into other ways to make the data relevant to practice.

Problems in society are complex and interconnected. Patterns in crime and housing, for example, share a connection to patterns in stress and health. The distribution of schools and patterns of neighborhood density are related to patterns of crime and delinquency. When researchers archive their criminal justice data, they create opportunities for others to draw connections to research from different disciplines and to study to complex issues in greater depth or from a new perspective.

Making criminal justice data available in a systematic way opens the door to further exploration.

NIJ-funded researchers have contributed more than 800 data sets, both large and small, to the National Archive of Criminal Justice Data. The National Archive allows researchers from all disciplines to perform meta-analytic studies and combine criminal justice data with other publicly available data, such as those from the Centers for Disease Control and Prevention and the Department of Housing and Urban Development.

Researchers participate in NIJ's Data Resources Program in three ways:

1. **Submitting data when research is finished.** Most data collected with funding from NIJ must be archived and made available through the National Archive of Criminal Justice Data.
2. **Applying for funding to conduct new research through NIJ's annual solicitation, "Data Resources Program: Funding for the Analysis of Existing Data."** NIJ receives roughly 30 applications annually for funding to conduct secondary analysis using data in the archive. External, anonymous peer reviewers and NIJ staff select two to six proposals that ask the most compelling questions or test the best new hypotheses. In many instances, applicants combine criminal justice data sets with another publicly available data set.
3. **Using the data.** Many researchers have used data from large data sets in the archive, such as the U.S. Sentencing Commission's data sets, or data from longitudinal studies, such as the Project on Human Development in Chicago Neighborhoods (PHDCN), to extend knowledge gained from the original data. PHDCN, for example, offers data from several sources. These include community surveys, systematic social observation and a longitudinal cohort study. When researchers wanted to know more about the consequences of childhood exposure to intimate partner violence, they used data from the PHDCN's longitudinal cohort study.

To help aspiring researchers use the National Archive of Criminal Justice Data, NIJ supports a summer workshop program every year. In 2010, the 4-and-a-half-day workshop focused on reentry and recidivism, using the evaluation of the Serious and Violent Offender Reentry Initiative. Pam Lattimore, one of the evaluation's principal investigators, showed students in the workshop how to access, manipulate and analyze the data set that her team compiled over several years.

Making data and analytic methods available for scrutiny by others increases the transparency of the research process, gives other researchers the chance to validate findings, and enhances scientific integrity.

Through secondary data analysis, researchers can build on existing findings, replicate results and conduct new analyses — all ways to build a broader and deeper scientific understanding of crime and justice.

Several NIJ staff contributed to this article, including Jolene Hernon, Jade Stasulli and Ron Wilson.

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## Editor's note

The National Archive of Criminal Justice Data is also funded by the Bureau of Justice Assistance, the Bureau of Justice Statistics and the Office of Juvenile Justice and Delinquency Prevention.

**For more information:**

- Data Resources Program
  www.ojp.usdoj.gov/nij/funding/data-resources-program
- National Archive of Criminal Justice Data
  http://www.icpsr.umich.edu/NACJD/
- Inter-University Consortium for Political and Social Research
  http://www.icpsr.umich.edu/icpsrweb/ICPSR/index.jsp
- ICPSR's Summer Program in Quantitative Methods of Social Research
  http://www.icpsr.umich.edu/icpsrweb/sumprog/
- Project on Human Development in Chicago Neighborhoods
  http://www.icpsr.umich.edu/icpsrweb/PHDCN/

**NIJ SEMINARS**

# Bringing Research to the Streets

Why do some cases of domestic violence escalate to murder?

Does intense police presence at hot spots cause crime to rise in other areas?

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NIJ's Research for the Real World seminar series features provocative presentations answering these and other questions. Researchers who are changing the way we think about policies and practices describe their ideas and take questions from the audience.

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- Edward Latessa, Solutions in Corrections: Using Evidence-based Knowledge.
- Lawrence Sherman, Less Prison, More Police, Less Crime: How Criminology Can Save the States from Bankruptcy.
- David Olds, The Nurse-Family Partnership Program: From Trials to International Replication.
- David Adams, Jackie Campbell and Richard Gelles, Men Who Murder Their Families: What the Research Tells Us.
- Tracey Meares, Don't Jump the Shark: Understanding Deterrence and Legitimacy in the Architecture of Law Enforcement.
- Jeffrey Edelson, Taryn Lindhorst and Sudha Shetty, Mothers and Children Seeking Safety in the U.S.: A Study of International Child Abduction Cases Involving Domestic Violence.
- Chris Stone, Police-on-Police Shootings and the Puzzle of Unconscious Racial Bias.
- Dennis Rosenbaum, et al., From the Academy to Retirement: A Journey Through the Policing Lifecycle.
- David Weisburd, Crime Mapping and Hot Spots Policing.
- Felton Earls, Children as Citizens: Engaging Adolescents in Research on Exposure to Violence.

**Upcoming seminars include:**

- Jens Ludwig and Roseanna Ander, Benefit-Cost Analysis for Crime Policy (February, 2011).

**Visit** **http://www.ojp.gov/nij/events/research-real-world.htm** to watch past Research for the Real World seminars, read the transcripts or see interviews with the presenters.

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The National Institute of Justice is a component of the Office of Justice Programs, which also includes the Bureau of Justice Assistance; the Bureau of Justice Statistics; the Community Capacity Development Office; the Office for Victims of Crime; the Office of Juvenile Justice and Delinquency Prevention; and the Office of Sex Offender Sentencing, Monitoring, Apprehending, Registering, and Tracking (SMART).

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