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## DNA: The future of forensics

### Ethical concerns shadow investigative advantages of national genetic databases

*Scientific advancements in the field of genetics have not only led to breakthroughs in the field of medicine, but they have also contributed to new milestones in forensics. Just as the introduction of fingerprinting revolutionized criminal investigations during the early 20th century, the advent of DNA testing marks the beginning of a new era in police forensics. When performed properly, the precision of DNA fingerprinting can allow law enforcement to ascertain beyond a reasonable doubt both innocence and guilt since the likelihood of two people sharing identical genetic information is less than one in one billion.*

*New developments in genetic testing have enabled scientists to obtain DNA from virtually any tissue sample, including older samples stored for years. In April 2000, for instance, two professors at European universities confirmed the identity of a young boy who died in a Paris prison more than 200 years ago as the son of King Louis XVI and Marie Antoinette and heir to the French throne. British authorities have re-opened and solved crimes dating back nearly 25 years by matching samples collected at crime scenes with suspects' DNA.*

*At the same time, the forensic advantages of DNA fingerprinting exact a high price: individual right to privacy. European law enforcement efforts to collect genetic information on a widespread basis arouse the ire of civil liberties groups, who express concerns about the potential abuse of blanket sampling. Police officers and civilian staff members balk at providing DNA samples that would allow investigators to identify and rule out genetic traces they might have left at crime scenes. Members of the scientific community fear that databases linking a person's genetic fingerprint and identity could generate public distrust and undermine future genetic research.*

*Further advances in DNA testing will only increase its value as an investigative tool and, consequently, its use, forcing society to confront and resolve the delicate ethical matters involved.*

Last August, British Prime Minister Tony Blair pledged to provide an extra £109 million (\$160.7 million) to enable law enforcement officials to take DNA samples from every person arrested, regardless of the charges. Part of an overhaul of the criminal justice system, the plan would place the DNA of virtually every active criminal in

Britain—from shoplifters to murderers—in a searchable database, similar to the Integrated Automated Fingerprint Identification System (IAFIS) used in the United States.

British law already grants police the authority to take DNA samples from anyone that is suspected, charged or convicted of a crime, but they have heretofore exercised this right solely on suspects in the most serious cases due to lack of resources. The database currently holds 940,000 samples, obtained by running a swab around the inside of a person's mouth. At \$60 a swab, British law enforcement could collect almost three million additional samples over the next four years, significantly enhancing their ability to match criminals with unsolved crimes. Already, DNA evidence has helped to convict more than 65,000 people in Britain during the last five years.

England is not alone in the effort to develop a genetic database of the criminal population. Although the sophistication levels vary, all of the nations in the European Union have some sort of DNA data bank. Germany has maintained its database since 1998, which contained more than 50,000 entries as of July 2000. Similar databases in The Netherlands and in Austria date back to 1997. In Scotland, the justice minister has earmarked an additional £1.7 million (\$2.5 million) for DNA testing, which will permit the collection of genetic material from an extra 15,500 offenders and increase the national database to 75,000.

### Tracking criminals at home

The United States also has a national database of DNA profiles. Introduced by the Federal Bureau of Investigation (FBI) in October 1998, the National DNA Index System (NDIS) allows forensic laboratories across the nation to exchange and compare DNA samples, enabling them to link unsolved crimes to each other and to known offenders. The database uses the Combined DNA Index System (CODIS), developed by the FBI, to generate

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investigative leads by comparing an index of convicted violent offenders against an index of biological evidence collected at crime scenes.

All 50 states have passed legislation requiring convicted offenders to provide DNA samples for a database, although the types of crimes that mandate inclusion in the data bank vary from state to state. All 50, for instance, collect samples from convicted sex offenders. Forty require specimens from individuals convicted of offenses against children; 36 include convicted murderers. Only six currently take DNA from all convicted felons, but at least five other states have pending proposals that would expand their database to include all felony offenders. To date, 44 states use CODIS to track DNA samples. Thirty states presently participate in the national index, along with the U.S. Army and the District of Columbia, and the remaining states have plans to join.

In July 1999, the NDIS received its first “cold” hit, in which an offender is linked to a crime scene without an investigative lead. The FBI Laboratory had linked six sexual assaults in Washington, D.C., to a single, unknown assailant. In early June, the Florida Department of Law Enforcement compared a DNA sample obtained from one of three related rape cases to the national index and found a possible association with the attacker in Washington, D.C. The following month, the Florida laboratory matched the DNA to a man involved in a drug-related shooting. Further analysis linked three additional Washington, D.C., assaults to the same perpetrator. The NDIS ultimately solved nine D.C. and three Florida rapes.

### **Convicting the guilty, freeing the innocent**

Although relatively new, genetic fingerprinting has already become a formidable weapon in forensic science. This investigative tool can definitively link unsolved crimes to a single perpetrator. In many cases, DNA tests can quickly confirm the guilt of a suspect or, conversely, attest to his or her

innocence. Stories abound in which DNA samples have produced both convictions and exonerations.

Police in Sacramento, Calif., recently charged a man with a 1994 rape based on a warrant that listed a DNA code instead of a name. In September 2000, state computers matched his genetic code to that of the nameless arrest warrant issued the month before as the six-year statute of limitations approached on the August 1994 assault. Law enforcement officials had collected DNA samples from the man after arresting him on an unrelated criminal matter.

National databases have proven especially helpful in identifying criminals on the move. On the very day that the state of Nevada uploaded its DNA database into the NDIS, the system matched a sample from a 23-year-old rape and murder of a child with that of a man incarcerated elsewhere in the United States on a similar charge. In November 2000, the national index, which has helped law enforcement officials identify more than 500 suspects, matched the DNA of a man in Chicago to a sample taken from a 1989 sexual assault in Maryland; he had lived in at least four states during the past two decades.

Some countries are taking DNA testing a step further.

In April of last year, Australian police in the small town of Wee Waa, New South Wales, asked the 500 male residents between 18 and 45 years of age to voluntarily provide DNA samples to assist in the investigation of a rape case. The incident marked the nation’s first mass DNA crime test of a community. Despite protests from lawyers and civil libertarians that the screening constituted an invasion of privacy, the men who agreed to provide saliva did so to demonstrate their support for the victim. The screening convinced the rapist, who had willingly submitted to the testing and accompanying questionnaire, to turn himself in 10 days later.

The Australian test illustrates the ability of genetic profiling to ascertain both guilt and innocence.

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Since 1987, DNA testing has cleared at least 77 prisoners—including eight death-row inmates—nationwide, according to a New York-based group that has provided legal counseling to dozens of wrongfully convicted prisoners. In 65 of those cases, the convictions resulted from witness errors. In July 2000, DNA evidence freed a Kentucky man who had served eight years of a 70-year prison sentence after two women positively identified him as the man who raped them. A man in Georgia spent 16 years in prison before DNA evidence proved him innocent of the 1983 rape for which he had been sentenced; the victim had picked him out of a photo lineup, although she later failed to identify him in person.

### **Invasion of privacy**

Around the world, the immense value of DNA testing has been accepted by experts in a variety of fields, yet much controversy remains regarding individual right to privacy.

In England, Blair's decision to increase funding for DNA collection raised vocal protests from civil liberties groups and genetics experts. One civil liberties group alleged that the British authorities have broken the law by failing to destroy DNA samples taken from people who are subsequently cleared. A spokesperson claimed that the British forensic science laboratory holds at least 50,000 DNA samples unlawfully. Meanwhile, representatives of a think tank that advises the British government on human genetics questioned the privacy aspects of the proposed database expansion. The vice chairman of the Human Genetics Commission voiced concern over the inclusiveness of Blair's initiative, questioning whether people who commit traffic offenses should be included in the data bank along with violent offenders. Also, how long should a convicted criminal's genetic fingerprint stay in the database? He warned that DNA databases, if viewed as intrusive and threatening, could discourage people from taking part in genetic research.

While they agree that DNA fingerprints can prove invaluable in forensic medicine, U.S. scientists have expressed similar reservations regarding the development of national data banks. "Clearly, there are going to be repositories of genetic information. In scientific use, all of this information is stored anonymously," said a West Coast-based research physician. "At this point, I don't see it as a priority to have a database that would actually identify individuals for tracking purposes. That would raise issues about the privacy, and we want to reassure the public that there is a real effort to keep genetic information anonymous and restrictive in its use."

The FBI addressed such concerns in establishing the NDIS. While preparing to launch the national index, the U.S. Department of Justice filed a Privacy Act notice announcing the new system of records that the database would contain. To protect the privacy of the individuals included in the database, the bureau put into place extensive administrative, physical and technical safeguards to prevent unauthorized access to the DNA records. The DNA Identification Act of 1994, which enabled the creation of the national index, explicitly defines the type of information maintained in the national database, as well as disclosure requirements. The profiles in the index, for instance, do not reveal information relating to health conditions or diseases; in fact, the genetic markers used were specifically chosen because they have no direct link to genetic code for medical conditions. Furthermore, the legislation includes a provision that cancels access to the NDIS for parties that fail to meet the quality control and privacy stipulations.

### **Proceeding with caution**

During the past decade, genetic fingerprinting has demonstrated its importance as an investigative tool countless times. Still, many members of the criminal justice community refrain from offering wholesale endorsement of the practice.

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"DNA, if tested accurately, is a wonderful technique, a wonderful tool," said a respected U.S. criminologist. "The question that concerns me is the quality of the testing, the quality of the handling of the evidence and what is to be made about the evidence. If someone's DNA was at a location, it doesn't necessarily mean that they were there when a crime was committed. Sometimes juries can get overly persuaded by highly scientific evidence."

In the United Kingdom, critics of Blair's expansion share the fear that juries will perceive DNA evidence as infallible, despite the possibility for manipulation through improper collection or handling. Jurors often accept the word of the scientific community as gospel, leading some experts to worry that they will convict defendants based on genetic evidence alone. Even if other evidence exists, the possibility remains that jurors will grant it unwarranted weight because of DNA support. "It's a halo effect," said the criminologist cited above. "DNA is so powerful that it has the potential to color the observations that juries make about other evidence."

The precision of the science makes genetic evidence difficult to refute—provided no contamination or mishandling has occurred. To increase the acceptance of DNA evidence in criminal investigations, law enforcement agencies will need to develop strict guidelines and standards governing the collection, handling and testing of tissue samples, ensuring that test results are clear and legible. Even then, law enforcement authorities and jurors alike will have to maintain an open mind and consider all evidence fairly, lest excessive confidence in modern technology lead to the imprisonment of innocent men and women.

Another step that would contribute to the efficacy of genetic fingerprinting is the adoption of national standards regarding the types of crimes

included in DNA databases. While this decision rightly belongs in the hands of the states, such interstate cooperation via the NDIS can be a powerful tool in the fight for criminal justice.

*In the face of protests from civil liberties groups, lawyers and scientists, genetic fingerprinting has come too far for the law enforcement community to discard the practice. In fact, its unparalleled value as a forensic tool guarantees that DNA testing will only become more pervasive in the years to come, forcing the world to reckon with the ethical issues it brings. Perhaps nowhere else on the planet will the controversy rage as hotly as in the United States, where the right to privacy is upheld as an extension of the personal freedoms protected in the U.S. Constitution's Bill of Rights.*

*The ongoing battle between protecting the general public and preserving personal rights demands a delicate balancing act. "What we constantly weigh in the United States is our individual liberty and our right to privacy—as to whether or not we sacrifice some part of our right to privacy in order to achieve our goal of a crime-free society," said a former high-ranking FBI official. "How much of our freedom are we willing to give up? Society has not yet answered that question in the United States."*

*The issue of genetic testing in forensics cannot be ignored. Thus far, the United States has proceeded with caution, allowing each state to determine not only the types of offenses that warrant inclusion in a DNA database, but also whether or not to share that information with other states. The fact remains, however, that genetic fingerprinting is a young science; its role in the criminal justice system must be tried in the crucible of the courtroom. Only then can society determine the proper use for this miracle of modern technology.*



The Lipman Report Editors