Forensic Science Research

RTI has conducted research on violence, forensic science, and justice systems for more than 30 years. RTI researchers use rigorous, multidisciplinary approaches to advance basic and applied forensics knowledge and inform national and international policy, practice, and programs.

RTI researchers have professional backgrounds spanning a wide variety of disciplines, including forensic sciences, political science, and criminology. Social science researchers collaborate closely with forensic scientists, providing comprehensive expertise and guidance in practical applications of research for law enforcement and criminal justice systems.

We specialize in forensic sciences (e.g., chemistry, analytical techniques, and laboratory processes) and provide expertise in criminal justice and social science areas—data collection, statistical analysis, criminal justice operations, and public health.

Overview

Forensic science is a critical and rapidly growing field in the United States and abroad. Forensics refers to the use of a wide range of sciences to answer questions relevant to the criminal justice system. In recent years, the effects of forensics on the operation and efficiency of the criminal justice system in the United States has increased dramatically. As forensic science evolves, examination and comparison of biological evidence (e.g., DNA analysis and serology), trace evidence (e.g., paints, hairs, fibers, gun shot residue, explosives), latent prints, controlled substances, and firearm and toolmarks identification greatly enhance our ability to successfully apprehend and convict criminal offenders.

RTI has capabilities in numerous forensic science research areas including workplace drug testing, performance testing, postmortem forensic toxicology, forensic operations and reporting systems, data collection and analysis, and drug testing in various biological matrices (i.e., urine, hair, and oral fluids).

Forensic Projects at RTI

Forensic Laboratory Reporting Systems

RTI implemented and maintains the **National Forensic Laboratory Information System (NFLIS)**, which is funded by the Drug Enforcement Administration (DEA). NFLIS systematically collects drug analysis results reported by forensic laboratories nationwide. These laboratories analyze drug evidence secured in law enforcement operations and are an important resource for monitoring drug abuse and trafficking in the United States. Operational since 2001, NFLIS obtains information on more than 80% of the nation's annual state and local drug seizure analysis cases. DEA uses NFLIS to monitor drug trends and assist in drug scheduling efforts. Results from NFLIS also serve other audiences, including forensic laboratories, policy makers, law enforcement, and researchers.

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Forensic Science Research *(continued)*

Drug Testing and Laboratory Accreditation

Under the **National Laboratory Certification Program (NLCP)**, RTI has been producing performance testing materials for over 20 years. These materials include urine as well as pilot programs for alternate matrices like hair and oral fluid. RTI also manages and conducts NLCP inspections of forensic testing laboratories. Under this program, laboratories may become certified by the Department of Health and Human Services (DHHS) to test workplace specimens for the Federal Government, Federal contractors, and specific regulated industries under Federal guidelines.

RTI also is engaged in ongoing analysis of drugs of abuse in human hair to determine the acceptance of hair testing as an alternative testing matrix. As part of this research, RTI is determining if environmentally exposed individuals can be accurately differentiated from drug users by means of current analytical technologies and results interpretation. This research project has included collaboration with commercial laboratories, DEA, National Institute on Drug Abuse (NIDA), and the Armed Forces Institute of Pathology. In 2007, RTI began producing reference materials for hair for use as calibrators and controls for quality assurance and quality control measures.

Postmortem Analysis and Data Collection

RTI administered the **2005 Census of Medical Examiner and Coroner Offices (CMEC)**, the Department of Justice's first systematic data collection on medico-legal death investigations in the United States. CMEC provided a national picture of medical examiner and coroner offices, including personnel, expenditures, workload, capabilities and procedures, and resource needs.

RTI also is evaluating a novel "time of flight mass spectrometer" with a direct, real-time sample introduction system (AccuTOF-DART™) for its applicability in postmortem toxicology. As part of this project, RTI is partnering with state medical examiner and coroner offices to evaluate the technology using archived cases. This new analytical technique has the potential to dramatically affect the field of postmortem forensic toxicology by minimizing sample preparation, improving the sensitivity of screening technologies, decreasing costs, and ultimately reducing laboratory backlogs. The technology also promises improved applications for the detection of explosives, accelerants, chemical agents, and unidentified substances.

Technology Transfer and Web-based Continuing Education

Applied sciences like forensics advance by using innovative technologies and new or improved methodologies. Yet developing new technologies and techniques does not ensure their adoption and successful integration by forensic laboratories in the field. Thus RTI is working to develop improved web-based tools for disseminating information in a user-friendly format to forensic scientists throughout the United States.

RTI also is investigating new approaches to deliver continuing education courses for forensic scientists for professional training and development. For example, RTI is developing synchronous and asynchronous web-based training courses for a variety of forensic professionals with topics ranging from laboratory procedures to advanced interpretation.

RTI has a long and trusted record of effective collaboration in forensic science research with a wide range of institutions, from commercial entities to local, state, and Federal agencies, including DEA, FBI, DHHS, NIDA, National Institutes of Health, and the National Institute of Justice. RTI's forensic scientists collaborate with research institutes such as the University of Florida and the University of Utah's Center for Human Toxicology, as well as with professional organizations such as the National Association of Medical Examiners, the American Society of Crime Laboratory Directors, and the American Academy of Forensic Sciences.

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