



National Institute of Justice

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Solicitation for Forensic DNA Research and Development for FY 2003

APPLICATION DEADLINE:

January 16, 2003

**U.S. Department of Justice
Office of Justice Programs**
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Washington, DC 20531

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800-421-6770

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National Institute of Justice**
World Wide Web Site:
<http://www.ojp.usdoj.gov/nij>

Solicitation for Forensic DNA Research and Development

I. Introduction

The National Institute of Justice (NIJ), a component of the Department of Justice Office of Justice Programs, seeks to stimulate all areas of research or development that can enhance or increase the capacity, capability, applicability, and/or reliability of DNA for forensic uses. Proposals that build or improve upon existing technologies, methods, or approaches as well as proposals based on new or novel technologies, methods, or approaches are encouraged to meet the goal of maximizing the value of DNA evidence to the criminal justice system.

This solicitation includes a brief background on forensic DNA and NIJ's program, a general discussion of the areas of research required, substantive guidance for preparing your proposal, NIJ's selection criteria under this solicitation, NIJ's performance measures for this program, details on how to apply, and information about the awards that will be made under this program. Applicants are encouraged to carefully read this year's solicitation, as significant changes from previous years have been made.

II. Background

Forensic DNA analysis has played a crucial role in the investigation and resolution of thousands of violent crimes since the late 1980s. Heralded as the most powerful method of identifying the source of biological evidence available to the criminal justice system, forensic DNA testing has evolved both in the technologies it uses and in its protocols to promote reliability and courtroom admissibility.

Originally, DNA evidence was analyzed by million-plus cell extracts using restriction fragment length polymorphism testing of variable number of tandem repeats (VNTRs). Southern blotted membranes were generally probed with four to six hypervariable minisatellite markers to establish a DNA profile that, statistically, could differentiate virtually all unrelated individuals. The process, which is both time consuming and technically demanding, has largely been replaced by less labor-intensive, more sensitive molecular methods.

The advent of the polymerase chain reaction (PCR) and its subsequent incorporation into forensic DNA testing has substantially increased the successful analysis of degraded or small DNA samples. The first PCR-based forensic DNA tests used sequence specific oligonucleotide (SSO) probes in a "reverse dot blot" assay to detect single nucleotide polymorphisms (SNPs) in the HLA DQA1 locus and, later, in five additional loci. Although these SNPs lacked the discriminatory power of VNTRs, the results were robust and reliable. Additionally, the development of commercially available reverse dot blot kits permitted mass technology transfer of the PCR method to public crime labs, which in turn led to a broader use of forensic DNA testing.

Currently, short tandem repeats (STRs) are the most widely used markers for forensic DNA testing. Plentiful in the human genome, their high discriminatory power enhances forensic application beyond the reverse dot blot method while continuing to use the power of PCR amplification. Samples can be rapidly processed since numerous loci can be multiplexed in a single PCR reaction. Because of this high discriminatory power and good resolution of alleles, 13 STRs have been chosen as the core loci upon which the FBI's National DNA Index System (NDIS) of convicted offenders is being built.

In recent years, other genetic polymorphisms, such as those found in the mitochondrial DNA (mtDNA) hypervariable regions and the non-recombining portion of the Y chromosome, have been shown to provide effective results that can augment traditional STR data. MtDNA analysis is especially useful for cases involving extremely degraded or limited biological residues, such as skeletal remains or shed hairs. Y chromosome markers can be beneficial in resolving sexual assault cases, particularly those with multiple male contributors. Single nucleotide polymorphisms, now known to be abundant throughout the nuclear genome, as well as Alu sequences, may become important genetic markers for the forensic scientist in the future. An increased understanding of the genetic properties of these systems, as well as the continued development of

methods for detection, will increase their value as forensic tools.

NIJ has been a strong supporter of new technologies and tools for criminal justice applications, especially in the area of DNA testing. Examples of projects funded under the Forensic DNA Research and Development Program include development of microchips, microdevices, and mass spectrometry assays for high-throughput DNA analysis; improved methodologies for separating sperm and epithelial cell fractions in sexual assault evidence; improved human DNA quantitation methods; exploration of mtDNA, Y chromosome, and interspersed nuclear element polymorphisms with potential forensic applications; and reduced-size PCR amplicons for use in STR analysis of degraded biological evidence.

Current research projects funded by NIJ are described in the CD-ROM *2001 DNA Grantees' Workshop*. Copies are available through the National Criminal Justice Reference Service by calling 1-800-851-3420 or sending an e-mail to puborder@ncjrs.org. Request document number NCJ 193060.

Applicants may also view current forensic DNA research and evaluation projects in NIJ's Online Portfolio at <http://nij.ncjrs.org/portfolio/searchlink.asp?qid=16>.

III. Areas of Research Required

High-throughput databasing and customized casework continue to be issues of concern to the forensic DNA community. All areas of forensic science, including DNA testing, suffer from demand that is far greater than the available means. The forensic DNA community, now comprised of more than 150 public and private crime laboratories, would greatly benefit from technical tools and innovations that can be appropriately validated, quality-controlled, quality-assured, and implemented for forensic use.

The following areas would benefit from continued research and development. These areas are not exclusive, and other areas that fit the overall goals of this solicitation will be considered:

- Tools and technologies that will allow faster, more reliable, more robust, less costly, or less labor-intensive identification, collection,

preservation, or analysis of DNA evidence and/or interpretation of DNA results.

- Identification and/or characterization of genetic marker systems that have the potential to reveal additional or more discriminatory information about the source of the biological evidence.
- Miniaturized and/or portable forensic DNA testing tools and technologies.
- Tools or technologies that can increase the success rate of the analysis of aged, degraded, limited, or otherwise compromised biological evidence.
- Exploration of *relevant* non-human (e.g., plant, animal, insect, bacterial) DNA markers with the potential to provide information about a victim or suspect and/or the circumstances surrounding a violent criminal offense (e.g., determination of post-mortem interval using appropriate entomological evidence; trace plant residues found at a crime scene or on a victim or suspect).

IV. Substantive Guidance

Applicants should have an appreciation of, and general familiarity with, the current use of forensic DNA testing. Applicants should also consider the costs to implement and maintain the new technology as well the training required to use the new technology. Issues such as chain of custody, courtroom admissibility, degraded or limited DNA, and mixtures of DNA from multiple tissues or individuals significantly impact forensic DNA analysis. These issues are not typically encountered in similar disciplines, such as molecular diagnostics.

NIJ *strongly* encourages researchers to seek guidance from, or partner with, appropriate State or local crime laboratories. Such associations foster a greater understanding of the issues unique to the field of forensic DNA, and may strengthen the scope of the proposed research plan.

When developing proposals, applicants should further consider guidelines for forensic validation, quality control, and quality assurance as detailed in

the *DNA Advisory Board Quality Assurance Standards for Forensic DNA Testing Laboratories* (available at <http://ww.cstl.nist.gov/biotech/strbase/dabqas.htm>), as well as recommendations put forth by the Scientific Working Group for DNA Analysis Methods (SWGDM).

The National Commission on the Future of DNA Evidence (<http://www.ojp.usdoj.gov/nij/dna>) also has identified research and development agendas for criminal justice applications of DNA. Additional information about these research and development agendas can be found in the Commission's publication *The Future of Forensic DNA Testing: Predictions of the Research and Development Working Group* (<http://www.ojp.usdoj.gov/nij/pubs-sum/183697.htm>).

This solicitation is open to a wide variety of proposals in order to achieve a balanced portfolio of product development. NIJ will consider proposals that focus on near-term tools and innovations that can be completed in a one to three year framework. NIJ also will consider longer term projects that may require multiple stages (and subsequent phases of funding) to develop a transferable product ready for crime laboratories. Feasibility and "demonstration of concept" projects will be considered where appropriate for such multiple stage projects, with the intention of developing future "demonstration of application" projects upon successful completion.

NIJ will only consider proposals containing a research and/or development component. Applications proposing to evaluate, validate, or implement existing forensic DNA technologies will not be considered, nor will other applications that do not meet the general goals of this solicitation.

Applicants are encouraged to include preliminary data, if available, in addition to appropriate scientific and legal citations that will help demonstrate the potential contribution of the proposed research to the forensic DNA community. A list of objectives, approximate time line, expected deliverable(s), and commercialization plan (if appropriate) should also be included.

Cooperative agreements between U.S.-based organizations and international organizations are also

encouraged. However, NIJ is unable to fund foreign organizations directly.

V. Selection Criteria

NIJ is firmly committed to the competitive process for awarding grants. All proposals are subjected to an independent, peer-review panel evaluation. The peer-review panel consists of members with academic, practitioner, technical, and operational expertise in the subject areas of the solicitation. Selection criteria used to evaluate proposals are as follows:

1. Quality and Technical Merit

- Soundness of methodology, analytic, or technical approach.
- Innovation and creativity.
- Feasibility of proposed project; awareness of pitfalls.
- Awareness of existing research and related applications.

2. Impact of the Project

- Understanding the importance of the problem.
- Potential for significant advance in crime prevention, law enforcement, forensic science, courts, corrections, or other practice or policy areas.
- Potential for advancement of scientific understanding of the problem area.
- Relevance to practice, including development and demonstration in application domains (if applicable).
- Affordable end products (if applicable).

3. Capabilities, Demonstrated Productivity, and Experience of Applicants

- Qualifications and experience of personnel as related to proposed project.

- Responsiveness to the goals of the solicitation.
- Demonstrated ability to manage proposed effort.
- Adequacy of proposed resources to perform effort.

4. Budget Considerations

- Total cost relative to perceived benefit.
- Appropriate budgets and level of effort.
- Use of existing resources to conserve costs.
- Cost-effectiveness of program or product for application in the criminal justice system (if applicable).

After peer-review panelists' consideration, Institute staff make recommendations to NIJ's Director based on the results of the independent reviews. Final decisions are made by the NIJ Director following consultation with Institute staff.

VI. Program Performance Measures

To ensure compliance with the Government Performance and Results Act, Public Law 103-62, this solicitation notifies applicants that NIJ's performance under this solicitation is measured by:

- Number of research/development studies for forensic DNA techniques and tools.
- Number of projects researching new forensic DNA markers.
- Number of computer programs developed for forensic DNA analysis.
- Number of prototypes for forensic DNA analysis.

Award recipients will be required to collect and report to NIJ data in support of these measures. Your assistance in obtaining this information will facilitate future funding planning and will allow OJP to provide the Congress with measurable results of federally funded programs.

VII. How to Apply

Applicants first need two packets: (1) application forms (including a sample budget worksheet) and (2) guidelines for submitting proposals (including requirements for proposal writers and requirements for grant recipients). To receive them:

- Download them from the NIJ Web site (<http://www.ojp.usdoj.gov/nij/funding.htm>).
- Request hard copies by mail from the National Criminal Justice Reference Service at 800-851-3420 or from the Department of Justice Response Center at 800-421-6770 or 202-307-1480.
- Request copies by fax. Call 800-851-3420 and select option 1, then option 1 again for NIJ. Code is 1023.

Complete the required application forms and submit related required documents, including the following:

- **Standard Form (SF) 424—application for Federal assistance.** Applicants must include the Catalog of Federal Domestic Assistance (CFDA) on the SF 424. The CFDA number for the Forensic DNA Research and Development Program is 16.560.
- **Geographic Areas Affected Worksheet**
- **Assurances**
- **Certifications Regarding Lobbying, Debarment, Suspension, and Other Responsibility Matters; and Drug-Free Workplace Requirements (one form)**
- **Disclosure of Lobbying Activities**
- **Budget Detail Worksheet OJP form 7150/1.** The instructions provided on the Budget Detail Worksheet must be followed carefully, using the designated budget categories and providing breakdowns as instructed.

- **Budget Narrative:** Applicants must provide a complete Budget Narrative that includes a discussion of the purpose for every item, service, or personnel member listed in the Budget Detail (OJP Form 7150/1). The Budget Narrative describes the basis of the numbers presented in the Budget Detail, and may be presented using the format in the sample budget worksheet (found on the NIJ Web site) or may be prepared as a separate document. See “How much detail should be included in the budget narrative?” in the Guidelines for Submitting Proposals for National Institute of Justice-Sponsored Research.
- **Negotiated indirect rate agreement (if appropriate)**
- **Names and affiliations of all key persons from applicant and subcontractor(s), advisors, consultants, and advisory board members.** Indicate which of the key persons is the Principal Investigator, and include his/ her title, organizational affiliation, department (if institution of higher education), address, phone, fax, and e-mail.
- **Proposal Abstract.** The proposal abstract, when read separately from the rest of the application, is meant to serve as a succinct and accurate description of the proposed work. You must concisely describe the research goals and objectives, research design, and methods for achieving the goals and objectives. Summaries of past accomplishments are to be avoided, and proprietary/confidential information is not to be included. Length is not to exceed 400 words. Use the following two headers:
 - **Privacy certificate**
 - **Form 310 (Protection of Human Subjects Assurance Identification/ Certification/ Declaration).** NIJ has adopted new policies and procedures regarding the confidentiality of information and human subjects protection. Please see the *Guidelines for Submitting Proposals for National Institute of Justice-Sponsored Research* (http://www.ojp.usdoj.gov/nij/funding_app.htm) for details on the new requirements.
 - **Environmental Assessment.** Not required to be submitted with this initial application. After the proposals are reviewed, you will be contacted and then required to submit an environmental assessment.
 - **References (i.e., bibliography)**
 - **Letters of cooperation** from organizations collaborating in the research project
 - **Résumés** of key individuals
 - **Appendixes**, if any (e.g., list of previous NIJ awards, their status, and products [in NIJ or other publications])

No other materials will be provided to the peer-review panels for consideration. Please do not send video or audio tapes, computer files or other, non-paper support materials. Photographs, diagrams or other paper figures are accepted as part of your application.

- Do not use 3-ring binders. Staples, rubber bands, binder-clips or paper-clips are acceptable.
- Facsimile transmissions will not be accepted.

Project Goals and Objectives:

Proposed Research Design and Methodology:

- **Table of Contents.** Lists the contents of the sections of the Program Narrative.
- **Program Narrative (technical proposal).** The Program Narrative must not exceed 30 double-spaced pages, no matter the amount of the funding requested.

Due date. Completed proposals **must be received** at the National Institute of Justice by the close of business on **January 16, 2003**. Extensions of this deadline will not be permitted.

Send ten copies of the completed application, plus a diskette containing the proposal abstract in a word-processor format to:

Solicitation for Forensic DNA Research and Development
National Institute of Justice
810 Seventh Street N.W.
Washington, DC 20531
[overnight courier ZIP code 20001]

Additional guidance and information. If you wish to receive additional guidance and information, contact the U.S. Department of Justice Response Center at 800-421-6770. Center staff can provide assistance or refer you to an appropriate NIJ professional. You may, for example, wish to discuss their prospective research topics with the NIJ professional staff.

VIII. About Awards

Award period. In general, NIJ limits its grants and cooperative agreements to a period of 12 to 36 months. However, longer budget periods may be considered.

Number of awards. Pending the availability of appropriations, NIJ anticipates that approximately \$3 million in total funding will be available under this solicitation. Out of that amount, NIJ anticipates supporting multiple cooperative agreements.

For more information on the National Institute of Justice, please contact:

National Criminal Justice Reference Service
Box 6000
Rockville, MD 20849-6000
800-851-3420
e-mail: askncjrs@ncjrs.org

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