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

DNA Laboratory Efficiency Program:
Fiscal Year 2010 Awards and Abstracts

This document lists grants awarded by NIJ in 2010 under the DNA Laboratory Efficiency Program. The abstracts are reproduced here exactly as they were submitted by the grantee.

FY10 DNA Unit Efficiency Abstracts

This table is a summary of DNA Unit Efficiency Awards issued in FY2010. Following this table are their respective abstracts.

FY10 Recipient Name	Award Number	Award Amount
City of Oakland	2010-DN-BX-K182	$114,600
City of New York, Office of Chief Medical Examiner	2010-DN-BX-K181	$62,334
	TOTAL FUNDING	**$176,934**

FY10 Recipient Name: City of Oakland
Award Number: 2010-DN-BX-K182
Award Amount: $114,600
Abstract: Forensic Biology casework efficiency at the Oakland Police Department Criminalistics Laboratory is limited by two major factors: 1) insufficient physical space which limits the access of staff and limits the organization's ability to increase staff, and 2) access to new technology. The laboratory has made great strides with the implementation of new DNA technology. However, examination of sexual assault evidence is not efficient due to our reliance on manual, time-intensive methods of processing cellular material in evidence samples. The automation of this process will significantly reduce sample manipulation time. We propose to automate the cellular material processing and link it to our current automated DNA extraction procedure. Together with three soon-to-be-validated automated preparation processes (quantitation set-up, amplification set-up and capillary electrophoresis instrument sample set-up), the installation of an already funded LIMS system (hardware and software), and the purchase of an expert system for assistance in mixture interpretation, we expect to enhance the scientist's ability to obtain DNA profiles from more evidence in a more efficient and economical manner. The implementation of all three elements (automation, LIMS, and expert system) will decrease case turn-around time and thus increase the number of case requests completed. This increase in case capacity will result in a shortage of proper storage of the amplified DNA typing product (which is retained in the laboratory). Implementation of a long-term room temperature storage system will alleviate the future need for frozen storage and valuable laboratory space.

FY10 Recipient Name: City of New York, Office of Chief Medical Examiner
Award Number: 2010-DN-BX-K181
Award Amount: $62,334
Abstract: An essential component in identifying human remains is documenting the decedent's visible characteristics, such as eye, hair and skin color. However, if a decedent is decomposed or only skeletal remains are found, this critical, visibly identifying information is lost. It is presently not possible to use genetic information to reveal these visible characteristics. The objectives of this project are to design and validate an assay to predict eye and skin color based on DNA to assist in the identification of missing persons and human remains. This new assay will increase the amount of information available for the identification of unknown decedents.

Genetic differences that account for broad variations in individuals' visible traits can be utilized to identify molecular markers, which then in turn can be used to confirm or predict such traits. The variety of phenotypes is caused by multiple polymorphisms in genes of which some are involved in the pigmentation process. The simplest kind of polymorphism is the single nucleotide polymorphism (SNP), and assessing those can reveal the visible characteristics (eye, hair and skin color) of unidentified decedents. Since there are thousands of SNPs, it is challenging to find those few which are directly responsible for a person's eye, hair and skin color.

Association studies, including genome-wide SNP-scans, pointed to a few genes relevant for eye, hair, and skin pigmentation. Recent studies identified candidate-SNPs that correlate highly significantly with the blue and brown eye color, and more SNPs were found to correlate with the light skin coloration of East Asians and Europeans and the darker complexion of African-Americans. Validation of these SNPs on over 600 samples from individuals of various populations identified seven SNPs that can be used to describe the eye and skin color based on DNA. This project proposes to integrate these SNPs into a forensic kit that is easy, fast and inexpensive, and which has potential for upgrading. The multiplex-SNP-assay, which involves a multiplex PCR, a multiplex primer extension reaction, and a multicolor capillary electrophoresis for separation and detection, will be the method of choice. Since this assay fits the criteria, and important for forensic applications, it can be applied on degraded DNA as such as from decomposed human remains. Furthermore, development and validation will be extremely cost-efficient, since all required equipment, including the software, is already available in-house.

The utilization of this multiplex-SNP-assay to predict pigment-related features will greatly enhance current efforts of collecting data from human remains to facilitate identification. This assay may be incorporated into the multidisciplinary effort of the Office of Chief Medical Examiner DNA Missing Persons Group and Forensic Anthropology Unit's effort to reduce the number of unidentified human remains in New York City and New York State – a project funded by the National Institute of Justice, *Using DNA Technology to Identify the Missing*.