FINAL REPORT

Grant No. 96-IJ-CX-0061

"Develop and Implement DNA Technology in the Regional Forensic Science Center"

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ABSTRACT.

Both Restriction Fragment Length Polymorphism (RFLP) and Short Tandem Repeat Polymerase Chain Reaction (STR PCR) DNA testing were developed and implemented at the Sedgwick County Regional Forensic Science Center in Kansas. The major activities of this project entailed the development and validation of both types of DNA testing, laboratory modifications, and the establishment of a CODIS Local Network. The STR PCR DNA instrumentation includes three Perkin Elmer 2400 thermal cyclers with a temperature verification system, Hitachi FMBIO and a remote DNA analysis station, and four electrophoresis workstations. The FMBIO was chosen because of prospects of high throughput, flexibility for use with multiple analysts and different systems, ease of interpretation, simple procedures, and low maintenance. The ventilation system of the PCR lab was specifically designed to prevent contamination of PCR amplified products by exhausting the lab from 150 to 450 CFM. The CODIS local network includes a server, four client work stations, one scanning workstation and a LaserJet printer which reside on a token-ring Novel NetWare network.

INTRODUCTION.

Grant # 96-IJ-CX-0061 was issued on November 1996 to Sedgwick County, Kansas which is the most populous county in Kansas. The project entailed the development and implementation of both Restriction Fragment Length Polymorphism (RFLP) and Short Tandem Repeat Polymerase Chain Reaction (STR PCR) DNA testing as well as the installation of a CODIS local network. The project was completed in April of 1998.

Prior to this project, Sedgwick County law enforcement rarely used DNA analysis as a component of their investigations. In fact, local law enforcement in some cases would not have considered biological evidence as helpful to their investigation, because DNA analysis was either costly and/or time consuming.

By expanding the awareness of DNA testing to law enforcement through training, the manner in which law enforcement collects and uses biological evidence has been revolutionalized in our community.

For example, collection of oral standards from victims/suspects/eliminations in anticipation of possible DNA testing is now becoming a routine component of their investigations. Part of the stimulus for this change has been the sensitivity of STR PCR DNA testing on such items as a cellular phone carrying strap, the hammer of a firearm, the tip of a latex glove, pop can, drinking glasses, cigarette butts, the shaft of a claw hammer, the nose piece of sunglasses that previously were super-glue fumed, hair roots, and tissue paper presumably used by an offender to wipe "sweat" from his brow.

Prosecutors and defense attorneys now recognize the significance of DNA evidence in their cases either in confirming a match or providing an exclusion. Since the enactment of this grant, both RFLP and STR PCR have been accepted in Sedgwick County District Court.

Further, the prospects of using STR PCR and RFLP technology to provide investigative leads through effective utilization of local, state, and national DNA databases holds great promise. Presently, the Kansas convicted offender database is composed almost exclusively of RFLP profiles. The major project objectives addressed by the Sedgwick County Regional Forensic Science Center are summarized below:

- Development of PCR technology;
- Development of RFLP technology;
- Application of PCR and RFLP technology to develop county and statewide DNA databases for participation in CODIS;
- Enhancement of computer services to allow searching of the local DNA database;
- Participation in development and/or validation of protocols and procedures for existing or new methods of DNA testing; and
- Development of internships with local universities and colleges to instruct students in medical technology, administration of justice and other programs in the methods of DNA testing.

The focus of the management approach was in four primary areas: development and validation of DNA testing, facility laboratory modifications/equipment and supplies, training of DNA analysts, and evaluation of the DNA program.

DEVELOPMENT AND VALIDATION OF DNA TESTING.

Validation and Implementation. In order to efficiently and effectively serve law enforcement, both RFLP and STR PCR DNA analysis would need to be developed. Both types of testing offers significant advantages and disadvantages. STR PCR DNA analysis provides rapid profiling amenable to degraded and minute

samples, however can be costly (2 to 3 times as expensive as RFLP). RFLP provides a lower expense and similar discrimination, yet requires more sample and a slightly increased analysis time. Another consideration was the ability to participate now and in the future with DNA databases, which contain both types of profiles. Key to this endeavor is the possibility to assist the Kansas Bureau of Investigation DNA laboratory with the DNA profiling of convicted offenders. Currently, the Kansas database is primarily composed of RFLP Profiles. However, STR PCR profiles will eventually be included to enhance the database.

Based on previous studies and current literature which serves as a foundation for the scientific validity of forensic DNA testing, it was possible to foreshorten the validation of both RFLP and STR PCR testing. The internal validation of DNA testing described in TWGDAM guidelines was used as the basis for development and implementation of those procedures. We also decided to utilize available population data bases for statistical purposes rather than developing our own.

RFLP validation testing of protocols modified from those obtained from FBI and the Albuquerque Police Department Criminalistics Laboratory began in late 1996. These protocols were approved for casework analysis by February of 1997 and further modified by August of 1997. The ribbon cutting ceremony opening the DNA lab was held on January 29, 1997 (Exhibit 1).

STR PCR validation began in early 1997 shortly after selecting the Hitachi FMBIO instrumentation and associated genetic systems to be developed. The FMBIO instrument was selected because of the prospects for high throughput, flexibility enabling multiple analysts to use the instrument with different genetic systems, ease of interpretation as the results are demonstratively similar to RFLP technology, simple operating procedures, and low maintenance.

Initial validation began with the CTTv and Amelogenin genetic systems, because these systems had received considerable attention by the scientific community and other forensic science laboratories including the FBI. Validation studies involving CTTv were presented at the International DNA typing symposium in September of 1997 and an abstract was published in the Proceedings from the Eight International Symposium on Human Identification (Exhibit 2). Continuous development of this PCR technology followed with the development of other forensic kits, such as FFFL and PowerPlex.

Protocols for casework were approved with CTTv and Amelogenin by August of 1997. PowerPlex, approved for casework in November of 1997, was chosen as the preferred genetic system because of higher sensitivity and discrimination than CTTv. The FFFL genetic system was not developed further. Additional STR PCR systems including the remaining CODIS core loci may be evaluated in the future.

External proficiency testing was initiated for each type of DNA testing in late 1996 with tests received from Collaborative Testing Service and others prepared by members of the Southwestern Working Group on DNA Analysis Methods. In accordance with TWGDAM and DNA Advisory Board recommendations, each analyst processing casework has been proficiency tested twice a year during the project. The proficiency program has since been expanded to include all four analysts with testing intervals at approximately 180 days.

In addition to external proficiency testing, an internal positive control is used to monitor quality control and quality assurance of the extraction and analytical procedures conducted by an analyst. The expected DNA type of the internal positive control is unknown to the analyst, and serves as an internal proficiency sample.

Casework. Initially, low caseload enabled further development of STR PCR DNA typing and facilitated ongoing training of new analysts. Over the course of the project, one analyst was qualified for casework for ten months, and two analysts were qualified for six months. DNA casework was accepted for RFLP typing in February of 1997 and STR PCR typing in August of 1997. A total of 90 case investigations have been conducted or were in the process of being examined during the grant by RFLP, STR PCR or both types of DNA analysis (Exhibit 3). Several cases were associated with ongoing investigations, which remain open to generate CODIS profiles or future investigative leads.

Examples of Selected Cases.

A homicide with no pivotal leads prior to DNA testing. Foreign profiles had been developed from samples collected at autopsy and from scene evidence. Standards from 15 individuals were collected for purposes of exclusion. One suspect was identified providing additional leads and culminating in a guilty verdict of second degree murder.

A 1994 homicide with no significant leads. A pair of sunglasses was found at the scene of a murder which had been super-glue fumed for latent prints. A foreign profile was generated from a swabbing of the nose and ear piece that matched one of two suspects. The case is pending a jury trial.

A homicide with DNA testing to confirm a hair match. A hair was determined by another laboratory to be consistent microscopically with a suspect hair standard. The hair was submitted for DNA analysis and was confirmed to match the victim, not the suspect. The case resulted in a hung jury, and has not been retried.

A sexual assault with limited body and scene evidence. A portion of a latex glove-tip was recovered at the scene that had been powdered for fingerprints from which a DNA profile had been detected. Five

standards were collected for exclusion. The victim and one of the suspects could not be excluded from the glove-tip. The suspect plead guilty.

Four of several suspected serial burglary cases with biological evidence. The burglary scene evidence consisted of blood drops, pop can, cigarette butts, and paper toweling presumed to have been used to wipe sweat. DNA profiles were detected from all items from which the suspect could not be excluded resulting in a guilty verdict of 31 counts of burglary.

Future of DNA Technologies. According to an informal survey, several other forensic laboratories are phasing out RFLP technology in favor of STR PCR. Our lab has chosen to continue the RFLP program, because it remains an economical, highly discriminatory, and "sound" technology. In addition, many DNA databases are composed of RFLP profiles, including the Kansas Database.

With thirteen STR core loci for CODIS, our lab will be required to develop and evaluate at least one additional genetic system. STR PCR DNA profiling of convicted offenders may be possible in the near future to assist the Kansas Bureau of Investigation DNA laboratory with their back log of data basing. In addition to STR PCR DNA analyses, the FMBIO may be utilized to further develop other types of systems, including mitochondrial DNA and sequencing for purposes of identification.

FACILITY LAB MODIFICATIONS/EQUIPMENT AND SUPPLIES.

Laboratory Modifications. Laboratory modifications were made to accommodate both types of DNA testing, to provide work space for 3 to 4 analysts, and to address contamination issues. In addition, lab space was modified to establish a local CODIS network and to enhance work flow at DNA image analysis workstations.

The improvements included casework, shelving, and cabinets to accommodate space for analytical analyses in a PCR lab, an RFLP/reagent preparation lab, and CODIS image analysis lab. Bench areas in the PCR and RFLP lab (Exhibit 4) were established for cleaning, reagent preparation/storage, and analytical procedures, including access to deionized water and type 1 water.

Special consideration was given to the ventilation of the PCR lab in order to deter contamination of PCR amplified products. Features of the ventilation include a fume hood connected to an existing Phoenix Fume System with a 100 CFM face velocity, a 150 CFM room exhaust connected to the Phoenix Fume System (non-return air), and a variable exhaust fan capable of adjusting the exhaust to approximately 450 CFM. The laboratory modifications were completed by May of 1997.

Equipment and Supplies. Lab Equipment and associated supplies were acquired to validate DNA testing and to enhance work flow of three to four analysts. Most of the general lab equipment purchased included centrifuges, micro-pipettors, heating dry block incubators, rotating water baths, and electrophoresis apparati.

Instruments for PCR analysis were chosen after careful consideration such that the possible simultaneous activities of at least three analysts perhaps analyzing different genetic systems and quality control could be accommodated. The PCR instruments selected included three Perkin Elmer 2400 thermal cyclers with a temperature verification system, an FMBIO and a remote DNA analysis station, and four electrophoresis workstations. Most of the major equipment purchases were completed by March of 1997.

A local CODIS Network was assembled that consisted of a CODIS server, 4 DNA analysis workstations, a DNA analysis workstation with a digital scanner, and a LaserJet printer. The CODIS server has a Pentium Pro processor 150 MHZ, 64 MB RAM, 3.5" disk drive, 8 x CD ROM, and a 9.1 GB RAID hard drive. Each of the work stations has a Pentium processor 133 MHZ, 32 MB RAM, 3.5" disk drive, 8 x CD ROM, and 1.2 GB hard drive. This network is attached to a token-ring Novel NetWare environment. Two backup systems were chosen for this network including a DAT tape backup system and an external CD writer. CODIS was installed on this network in June of 1997

TRAINING OF DNA ANALYSTS.

The basic training program at the Regional Forensic Science Center is composed of procedural and literature review, observation, practical testing with training samples, internal proficiency testing, and other workshops/training courses (Exhibit 5). An integral component of the training program is the attendance of workshops or other training courses. Over the course of the project, three analysts attended training on "DNA Typing with STRs" by the Promega Corporation at Madison, Wisconsin; two analysts attended training on the use of CODIS by the FBI at Vienna, Virginia; and two analysts attended a training workshop on "Presenting DNA Statistics in Court" at Scottsdale, Arizona.

After an external audit of the DNA program, a recommendation was made for an analyst to complete a formal course in genetics, which was completed by the analyst at a local university by May of 1998.

The Regional Forensic Science Center hosted the Kansas Working Group Meeting in November of 1996. The Hitachi FMBIO and Perkin Elmer CE 310 were demonstrated by the manufacturers at the meeting. Part of the decision to purchase the FMBIO was facilitated by information learned at the demonstration. The laboratory conducted training workshops in early 1998 for local law enforcement and prosecuting attorneys entitled "DNA for DA's" and "DNA in Criminal Investigations. The syllabi of these courses are included in Exhibit 6.

Internship programs involving medical student rotations, a high school mentorship program, and a graduate internship in forensic science have been initiated during the project. The programs involved a several day introduction to DNA testing as well as some hands-on training/analysis, where possible. The

primary goals of these internship programs are to familiarize the student with current DNA technology as it relates to identification and to discuss career opportunities in forensic science and DNA technology.

EVALUATION.

Validation and development of DNA testing began in late 1996 by testing procedures with known profiles and controls. Monitoring analyst performance also began in late 1996 with external proficiencies and internal positive controls. In addition to proficiency testing and the internal validation of RFLP, the RFLP DNA testing procedure was evaluated with a National Institute of Standards Testing DNA kit prior to accepting casework in 1997.

An external audit was conducted in October of 1997 by John Krebsbach from the Albuquerque Police Department Criminalistics Laboratory. The results of that audit are included in this report (Exhibit 7) . Many of the suggestions that Mr. Krebsbach made have been incorporated into our program, and deficiencies in analyst training program have been addressed.

MAJOR PROGRAM SETBACKS.

One of the major setbacks in this project was associated with personnel and its attachment to our local match. Recruitment for the two newly created DNA positions described in the proposal was delayed until the grant award was received. The manager position remained open for at least eight months until a qualified individual was hired. During the course of the project, one position was open at least twelve months. Our expectation was less difficulty in filling these positions.

Another major setback was the turnover of new employees for which training funds were expended. Although training was accomplished for the DNA community, the lab was hindered in accomplishing the objectives of the project and expending our local match funds with loss of employees. As a result of turnover only one employee who received grant funded training was retained. A suggestion might be to require an employee to serve in the laboratory a year or two beyond the end of the project, perhaps in a binding contract.

The laboratory modifications proved to be another setback. Architectural design, engineer assessment, contractor delays, and coordination of the project required two months longer than expected. A realistic time line for laboratory modifications would have been approximately eight months.

CONCLUSIONS.

Even though there were significant setbacks in the collection of local match funds, most of the objectives of the project had been fulfilled by late 1997 to early 1998. A summary of the achievements of the project includes:

- Both STR PCR and RFLP DNA analysis have been implemented in Sedgwick County.
- DNA was either the most probative evidence or a significant lead in several cases including homicides, sexual assaults, property crimes, and cases of identification of unknown persons.
- A CODIS Local Network and the early stages of development of the local DNA database have been established.
- Internship/Training Programs have been provided to law enforcement officers, attorneys, and university students.

Without the support of the National Institute of Justice, Sedgwick County could not have developed both RFLP and STR PCR DNA analysis and a CODIS local database of this magnitude within this time frame. Since the availability of local DNA testing, the impact of this federally assisted DNA program has spread swiftly throughout south central Kansas assisting multiple law enforcement agencies in their investigations as well as educating the general public. The DNA laboratory has further served our community by identifying the remains of multiple fatalities in a grain elevator explosion. We plan to promote the DNA program through expansion of the CODIS database, introduction of new technologies and genetic systems, and continuation of our law enforcement training programs.

Exhibit 1. Article taken from the Wichita Eagle describing the "new" availability of DNA testing and the ribbon cutting ceremony opening the DNA lab at the Sedgwick County Regional Forensic Science Center.

DNA labs, testing open at forensic center

■ The wait for test results is shorter, now that authorities no longer need to send evidence to labs in Topeka.

By Lori Lessner
The Wichita Eagle

DNA testing came to Wichita for the first time Wednesday, meaning quicker test results and more efficient crime scene investigations.

Police officers no longer need to send evidence to Kansas Bureau of Investigation labs in Topeka and wait several weeks for the results to come back.

The labs were officially recognized Wednesday in a ribbon-cutting ceremony attended by county commissioners, Police Chief Mike Watson and Sheriff Mike Hill.

The technology at the two labs is so advanced that in a case involving a woman raped by more than one man, for example, tests on any blood, semen and saliva recovered will show exactly how many raped her.

The center will be linked to a computer database on which forensic scientists in Wichita can call up DNA evidence recovered by police at crimes in other states to see whether it matches DNA evidence at a local crime scene.

This way forensic scientists would be able to tell all the places a serial rapist has hit, for example.

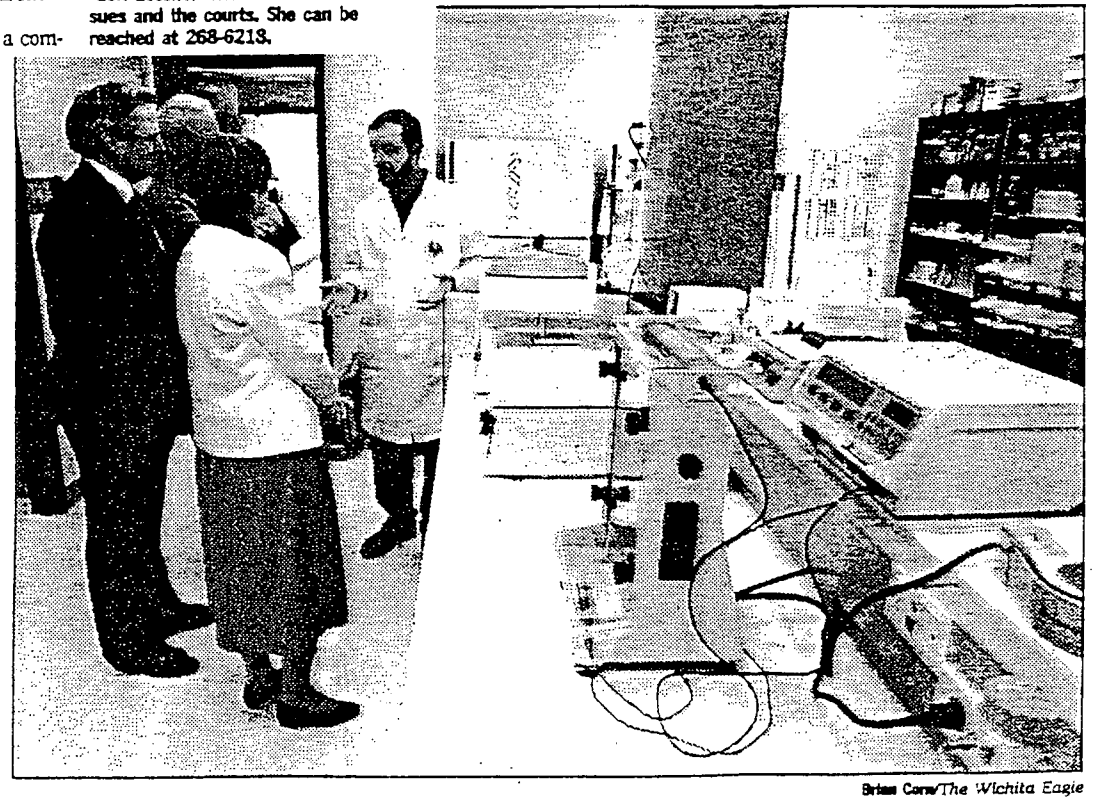
DNA also can be used like fingerprints to help identify a missing person. Parents can use a cotton swab to brush the inside of their child's mouth and then store that cotton swab. Should the child turn up lost or missing, the labs can use the DNA on the cotton swab to see if it matches a person found dead or suffering from amnesia.

The DNA labs were paid for with a $325,000 federal grant awarded to the center when President Bill Clinton's crime bill passed in 1995, said Corrie May, Sedgwick County medical examiner.

The labs will be used at no charge to law enforcement agencies within Sedgwick County.

Lori Lessner writes about crime issues and the courts. She can be reached at 268-6218.

Jan. 31, 1997
A Friday feature of The Wichita Eagle



Brian Corr/*The Wichita Eagle*

Finding the evidence: DNA analyst Douglas Smart, right, explains the new Sedgwick County DNA lab to local officials. The lab, which cost several hundred thousand dollars, was paid for with: **a)** vehicle taxes; **b)** court fees and fines; **c)** Koch Crime Commission funds; **d)** federal grant.

Exhibit 2. Abstract entitled "Validation of the CTTv fluorescent STR multiplex system and the Amelogenin System" (Wallis, 1998) that was published in the Proceedings from the Eighth International Symposium on Human Identification. The abstract summarized the validation studies involving CTTv and Amelogenin systems and their applicability to casework.

PROCEEDINGS

from the

Eighth International Symposium

on

HUMAN IDENTIFICATION

1997

ISBN 1-882274-59-8

Validation of the CTTv Fluorescent STR Multiplex System and the Amelogenin System

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Validation studies were performed to determine the reproducibility, sensitivity, and specificity of the multiplex CTTv and Amelogenin systems, and to evaluate their applicability to forensic casework samples. Additionally, an optimal laboratory protocol was generated and compared to the protocol recommended by the Promega Corporation.

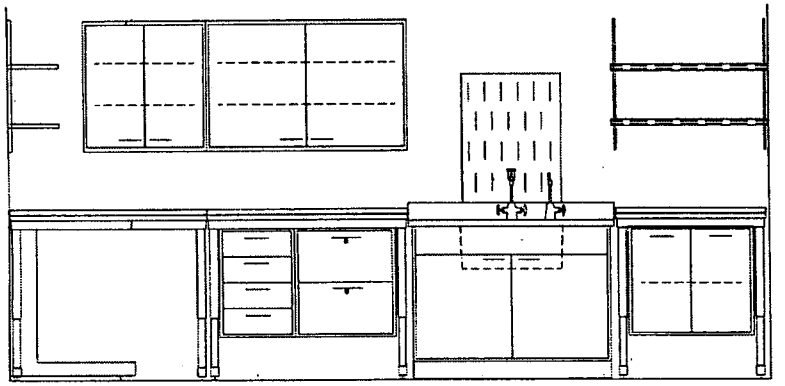
The multiplex contains the four STR loci CSF1PO, TPOX, TH01, vWA, and the sex-identification system Amelogenin. The *GenePrint*™ CTTv (fluorescein-labeled) fluorescent STR kit and *GenePrint*™ Sex Determination System-Amelogenin (fluorescein-labeled), both made by Promega Corporation, were utilized in these studies. The DNA was electrophoresed on the model SA-32 and bands were detected and analyzed using the Hitachi FMBIO® II.

The following areas were examined for validation: 1) inter- and intra-gel reproducibility of results; 2) specificity of results from body fluids other than blood; 3) human specificity; 4) determination of sensitivity of detection and sensitivity of extraction; 5) analysis of mixed stains; 6) inter- and intra-gel accuracy and precision of allelic ladders; and 7) the typing of biological samples from stimulated forensic conditions.

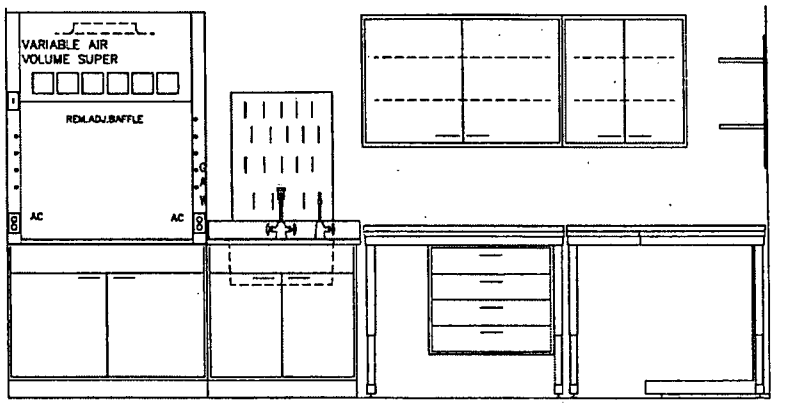
The optimal laboratory protocol generated was found to vary little from Promega's recommended protocol. Furthermore, results of the studies indicate that STR typing using the multiplex system CTTv and the Amelogenin System is reliable, and these systems are applicable to forensic casework.

Exhibit 3. Number of DNA case investigations conducted at the Sedgwick County Regional Forensic Science Center from February of 1997 through April of 1998.

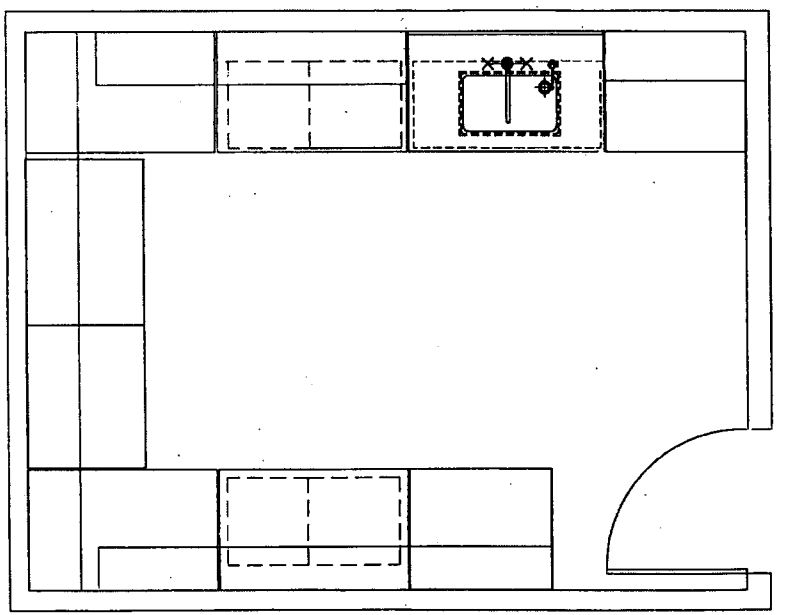
Case types	Number of RFLP cases	Number of PCR cases
Homicide	4	7
Rape/Sexual assault	7	24
Property	1	7
Suspicious death	1	2
Aggravated battery	0	1
Other	1	2
Ongoing investigations (open cases)	22	14
Total	36	57



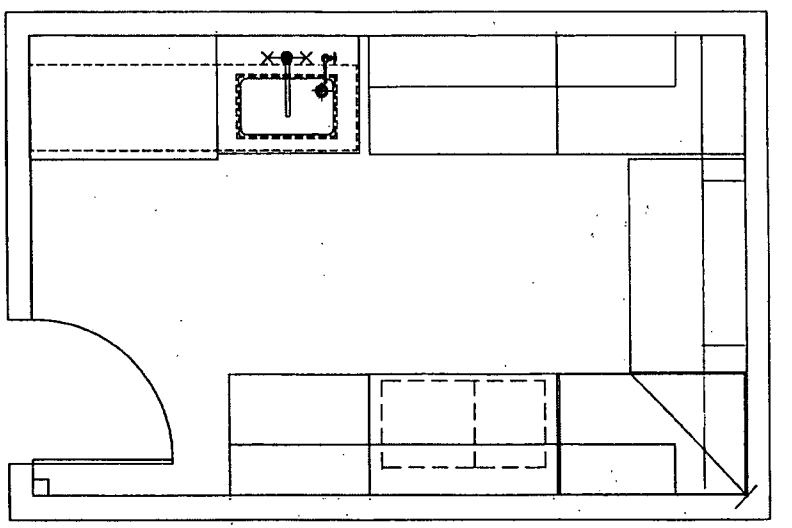
Vertical Elevation RFLP Lab



Vertical Elevation PCR Lab



RFLP Floor Plan



PCR Floor Plan

Exhibit 4. The basic floor plans of the casework, cabinets, shelving, and fume hood in the RFLP and PCR labs at the Sedgwick County Regional Forensic Science Center that were modified in 1997 as a result of NIJ grant # 96-IJ-CX-0061.

Exhibit 5. The main components of DNA analyst training that are used at the Sedgwick County Regional Forensic Science Center to monitor the status of new analyst skills.

Forensic DNA Analyst Training

- Meets DNA analyst qualification requirements and at least six months training in forensic DNA testing.
- Formal course work in Fundamentals of Forensic DNA Analysis, Molecular Biology or related course, Genetics, Biochemistry, and Statistics
- Completion of Forensic Biology Body Fluid Examination Training.
- Successful completion of a proficiency test or mock case.

DNA Extraction and Quantitation

- Review all DNA analysis procedures and selected readings.
- Completion of procedures/manipulations from sample through DNA extraction and quantitation by observation and practical experience.

RFLP DNA Analysis

- Completion of procedures/manipulations required for restriction digest, electrophoresis, and transfer by observation and practical experience.
- Completion of procedures/manipulations required for hybridization, autoluminography, and interpretation by observation and practical experience.
- Training samples include: blood (25), saliva (5), and differential/sperm (10).

PCR DNA Analysis

- Completion of procedures/manipulations required for amplification and electrophoresis by observation and practical experience.
- Completion of procedures/manipulations required for detection, image analysis, and interpretation by observation and practical experience.
- Training samples include: blood (25), saliva (5), hair (5), and differential/sperm (10).

Exhibit 6. Samples of syllabi used for training of law enforcement officers and prosecuting attorneys entitled "DNA for DA's" and "DNA in Criminal Investigations".

DNA for DA's

January 30, 1998

Introduction

Quality Assurance Expectations and Perceptions

Introduction to DNA Testing, Typing and Future Technologies

Laboratory Exercises-15 minutes per station

- Body Fluid Screening
- PCR Typing
- RFLP Typing

Moot Court

DNA in Criminal Investigations

March 19/20, 1998

Welcome

Physical Evidence Division and the Role of Biology Section

Basic Introduction to DNA Technology and Biology Casework

The Database as an Investigative Tool

Case Studies at Florida Department of Law Enforcement

Workshops-45 minutes per station

- Biological Evidence: Collection and Preservation
- Addressing the Forensic Question: Implications of the Evidence
- Comparison of DNA Technologies: Yesterday, Today, and Tomorrow

ChiPS Program in Florida

(Invited Speaker was David Coffman from the Florida Department of Law Enforcement.)

Exhibit 7. Results of the external audit of the Sedgwick County Regional Forensic Science Center DNA laboratory conducted on October 7-8, 1997 by John Krebsbach, Albuquerque Police Department Biology Section Manager.

DNA LABORATORY INSPECTION REPORT

SEDGWICK COUNTY REGIONAL FORENSIC SCIENCE CENTER

Wichita, Kansas

Inspected October 7-8, 1997

Submitted by;

John Krebsbach

Reported November 5, 1997

SUMMARY

The comments and views in this report should be taken as suggestions and by no means are they meant to be construed as required or mandatory. They are intended solely as a guide and may not be applicable or appropriate in all laboratories. An annual quality assurance audit of forensic testing programs is recommended by the American Society of Crime Laboratory Directors, Laboratory Accreditation Board (ASCLD/LAB) as well as by the Technical Working Group on DNA Analysis Methods (TWGDAM). Accordingly, Forrest Davis, Chief of Physical Evidence of the Sedgwick County Regional Forensic Science Center (SCRFSC), directed that an audit be conducted of the DNA program for this facility.

Mr. Forrest Davis acted as the facilitator.

The audits comprised the following activities:

1.) Site inspection.
2.) Review of documentation, proficiency and case files.
3.) Interviews with the examiners.

This audit was conducted following a check-list based on TWGDAM guidelines as of April 1992, which was designed by Mark Nelson, as well as with the most recent updated modifications from TWGDAM and with ASCLD/LAB criteria in mind. The few deficiencies noted are commented on in this accompanying report, along with other observations and recommendations.

This inspector wishes to thank the SCRFSC staff for their assistance and hospitality during the course of this audit. Should you need additional information or clarification please contact me at your convenience.
Thank you.

John Krebsbach

1. QA PROGRAM PLANNING AND ORGANIZATION

This DNA program is a well managed facility with a new, relatively young, analytical staff. Case load is currently managed by the supervisor as others members of the staff complete training. Currently the QA program is essentially complete but has not been collated into a single document of information and/or a directory of resources regarding the quality assurance program. Once the available pieces are put together into a single source or reference it can be approved as an all inclusive, well documented program.

Specific reference to the goals and objectives of the lab QA program as well as the lab organizational structure to include responsibilities and the levels of authority, should also be clearly defined in the final QA documentation.

2. PERSONNEL

Case work analysts are currently completing their required experience and training requirements. Additional in-house and outside education, training and research is also ongoing. Once completed this staff should be well trained and prepared for the rigors of actual forensic casework. The official training program is however poorly documented and lacks specific structure. There are no signatures, dates or other documentation to indicate that the required training activities were actually performed and approved. Documentation showing that an analyst had actually performed each phase of training was not evident. A simple check list of the training areas could be made documenting the analysts in-house training, and retained as a part of their training or section personnel records.

Specific suggestions of additional training are that Sally take a formal academic course in biochemistry and that Casey take a course in genetics.

3. DOCUMENTATION

Documents are well written and organized with the following small suggestions/exceptions;

a.) insure that all forms have spaces for analyst name/initials and the date,
b.) develop a short proficiency documenting record, (one page or so) listing each analyst and the combined units proficiency history separately,
c.) insure that proficiencies are documented as thoroughly and completely as casework,
d.) casework review was poorly followed up and defined, a redefining of what is meant by a technical vs. supervisor vs. administrative review etc. might be in order,
e.) references to population databases and the procedures followed for statistical calculations need formalized,
f.) a system for pipette calibration and documentation should be developed
g.) validation results are not summarized,
h.) training and qualification records should be formalized and incorporated into QA documentation.

4. VALIDATION

Validation of CTTv and amelogenin seems to be complete however a short page of references and statements of the results of the validation studies though possibly duplicative, would be appropriate. Validation of RFLP was not clearly documented.

5. EQUIPMENT, MATERIALS, AND FACILITIES

The facilities are clean and well maintained. Specific concerns would be the incomplete documentation of reagent prep, particularly that of critical reagents, and the archiving of manufacturers certifications.

If its use is to be continued, Adenovirus should be checked more rigorously than currently practiced.

Pipette calibration - see above.

6. EVIDENCE HANDLING PROCEDURES

No suggestions.

7. ANALYTICAL PROCEDURES

The preparation of reagents, standards and controls does not always follow the methods as documented. At some stages the detail is extreme and at others almost non-existent. As previously discussed at my exit briefing, a more middle of the road system of detailing these procedures may be appropriate.

Documented in-house QC testing of Hae III against a known DNA sample is highly suggested.

8. Casework Documentation, Interpretation, Report Writing and Review

The actual formula used for statistical evaluation needs to become a part of the appropriate SOP or manual. Though well understood by forensic analysts it is not to most attorneys.

Expansion of the QA book to document requirements as listed in Crime Lab Digest Vol. 22, No. 2, page 33, section 8.3 should be done to be complete.

Documentation of the required use of the "standard template" for the casework reviews and the requirement of a review by a second "qualified" individual should be listed in the reporting guidelines of the QA manual.

9. Proficiency Testing

All proficiencies performed need to be well documented and performed as if casework.

This laboratory does not currently have a system for the implementation of blind proficiencies but intends to develop one if possible.

10. Audits

No suggestions.

11. Safety

Adequate safety procedures and manuals are present in the laboratory with the following two exceptions:

1.) There is no documented system for the handling of ethidium bromide waste .
2.) The procedure for handling "sharps" is not documented so as to include the DNA section. It should be added to the set of documents pertaining to DNA or re-written to include all section as a laboratory wide policy.

12. General Considerations

The overall laboratory security is very strong.

Have both the peer reviewer and the supervisor initial on the final draft of the case report.

For being a fairly new lab with brand new from school people, you're doing a good job. In reality, just a few housekeeping, documentation things and you're in good shape. The report I prepared for Arizona DPS, Tuscon was exactly twice this long!