

DNA: Training Program

Introduction

The competence of a DNA analyst is fundamental to the goal of providing a quality work product. This training program is an integral part of ensuring competence and has been developed using the *SWGDM Training Guidelines*.

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Intent of training program

The intent of the DNA training program is to:

- develop the knowledge, skills, and abilities of employees necessary to perform DNA analysis
- prepare the employee to be qualified to analyze casework

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Training flexibility

The training program is meant to act as a guide for training forensic DNA analysts and is therefore flexible. A trainee may proceed with the training program at his or her own rate depending on prior experience.

Extent of training

All DNA analysts shall have completed the necessary course work to meet current *FBI Quality Assurance Standards for Forensic DNA Testing Laboratory guidelines*.

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The extent of the training required for each trainee will depend on factors such as:

- whether the employee is new to the discipline
- whether the employee has previous forensic human DNA laboratory experience

It is the responsibility of the Technical Lead to determine the extent of training required.

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Technical lead responsibilities

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The DNA Technical Lead has responsibility for the training program. The Technical Lead may delegate aspects of the training program (such as administrative functions, training file review, CODIS, mixture interpretation, and mentoring roles) but must maintain oversight of the program and approve each individual's training.

The Technical Lead will:

- review and document completion of a trainee's required education
 - document the review of educational records such as transcripts, syllabi, and letters from instructors
 - review and document prior experience, if applicable
 - review training records
 - monitor the progress of the trainee and assess any need for additional training/courses
 - approve the completion of training
 - approve the successful completion of a competency test
 - document the date of qualification for casework
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Supervision

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The trainee will work under close supervision of the DNA Technical Lead, the Biology Unit Supervisor, or an experienced analyst. The trainee is responsible for completing all training requirements and maintaining training records.

Prior to assignment of casework, the trainee must successfully complete competency testing in the various procedures. Refer to *Assuring Quality, AQR: Competency Testing Program* in the *Quality Manual* for required components of competency testing.

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Training records

Training records will be maintained by the trainee and reviewed by the Technical Lead. The trainee will complete all training requirements and document the course of training by maintaining binders or records that contain:

- training sets and exercises
- CODIS training
- mixture interpretation exercises
- statistical calculation exercises
- mock cases

A summary of completed training will be given to the laboratory's Professional Development Coordinator.

Competency test records will be maintained by the laboratory's Quality Manager.

Training topics

The following topics will be covered during training:

- General training
 - *Administrative Manual*
 - *Safety Manual*
 - *Quality Manual*
 - DNA-specific training
 - review of literature/training materials
 - extraction of DNA
 - concentration of DNA
 - quantitation of extracted DNA
 - amplification and typing of quantitated samples
 - interpretation guidelines
 - statistical guidelines
 - statistical calculations
 - mock cases
 - report writing
 - courtroom testimony
 - CODIS software and data entry
 - Paternity/kinship testing and *POPSTATS* Software
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Literature review

The trainee will review:

- assigned publications listed in the *References* section of this manual, including guidelines set forth by:
 - the *National Research Council's Evaluation of Forensic Evidence* (NRC II ,1996)
 - the *Scientific Working Group on DNA Analysis Methods* (SWGDM)
 - the *FBI Quality Assurance Standards (QAS) for Forensic DNA Testing Laboratories*
- other reading material as provided by the Technical Lead

Additional training materials may include but are not limited to:

- *PowerPoint* presentations
- video presentations
- manufacturer manuals
- validation summaries

The trainee will also meet as a member of the peer group to review scientific publications. A binder will be used to maintain copies of the literature to be reviewed. Trainees will sign a sheet to demonstrate that they have reviewed each publication. The binder will be stored in the Biology Unit conference room.

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Extraction of DNA

The trainee may perform extractions on the following types of samples and other additional samples as assigned by the Technical Lead using both manual and robotic extraction protocols. The number of samples may be adjusted as appropriate based on the level of previous experience.

Samples Type	Number of Samples*
bloodstains	5
saliva	3
tissue	3
hairs, pulled	3
hairs, telogen	2
vaginal/semen mixture	3
oral/semen mixture	3
rectal/semen mixture	3
cigarette butt	1
mixture study	3 sets
mock cases	2 cases
competency test	5-10

* This example contains the minimum number of training samples.

NOTE: A mixture study set is made up of DNA from two donors. The ratio of DNA between the donors is incrementally adjusted across a range of concentrations.

Extractions should include a QC stain, reagent blanks, and substrate controls, if appropriate, mock cases and competency tests. DNA extraction procedures are given in the *Technical Procedures* section of this manual.

Concentration of extracted DNA

Using samples from both manual and robotic extraction protocols, the trainee will concentrate extracted DNA following current procedures.

Quantitation of extracted DNA

The trainee will quantitate all extracted DNA using current procedures.

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Amplification and typing of quantitated samples

The trainee will amplify all of the previously quantitated DNA samples using current amplification methods.

The trainee will type all amplified DNA samples using current procedures.

Interpretation

The trainee will interpret all typed samples using current interpretation guidelines.

The trainee will demonstrate completion of the profile interpretation training by:

- reviewing relevant *PowerPoint* or video training presentations
 - reviewing all interpretation-related validation summaries
 - reviewing the steps for profile interpretation outlined in this manual
 - reviewing all of the documents in the *DNA Typing Results* folder of this manual
 - successfully interpreting at least five mixtures profiles
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Statistics

The trainee will perform statistical interpretation of training profiles as applicable using current statistical guidelines.

The trainee will demonstrate comprehension and completion of statistical training by:

- reviewing *DNA: Reporting DNA Typing Results* and other relevant documents in this manual
 - using STRmixTM software to generate likelihood ratio (LR) results
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Mock casework samples

The trainee will perform DNA typing on samples typically encountered in forensic casework.

The trainee will screen, extract, quantitate, amplify, type, interpret, and report results from a minimum of two mock cases.

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Report writing and review

The trainee will review case files and reports prepared by other qualified analysts.

Using the Biology report template, the trainee will prepare reports reflecting the results found and the conclusions reached based on the analysis of the mock cases.

The trainee will receive training on the elements of technical and administrative review.

Testimony

The trainee shall receive the following training in court testimony:

- key elements for effective testimony
- communication methods employed by expert witnesses
- courtroom process and demeanor
- moot court exercises
- observe other testimony or mock trials, when possible

Documentation of the trainee's moot court testimony should contain an evaluation of the analyst's performance and should be retained by the laboratory.

CODIS

The trainee will be instructed on the eligibility and entry of data into the CODIS software system.

NOTE: CODIS data entry procedures are given in the *CODIS* section of this manual.

Paternity testing

The trainee will review instructional materials and relevant manual sections related to the interpretation of paternity/kinship profiles, statistical guidelines, and report writing for paternity/kinship results.

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**Competency
test**

The trainee will analyze samples and provide a report as part of a competency test.

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The competency test will include a written or oral examination to assess the trainee's knowledge of the subject. Refer to *Assuring Quality, AQR: Competency Testing Program* in the *Quality Manual* for required components of competency testing.

Successful completion of a competency test demonstrates that the trainee has acquired the technical skills and met minimum standards of knowledge necessary to perform DNA analysis. The date of qualification will be documented by the DNA Technical Lead.
