

Laboratory Training Manual

Subject 7: Population Genetics and Statistics

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Subject 7: Population Genetics and Statistics

Purpose

To instruct the trainee to demonstrate competency in applying standard statistical calculations (e.g. as described in the laboratory SOP) for interpretation of forensic DNA data

Objectives

Upon successful completion of these exercises, the trainee will be able to:

- Understand and explain the laboratory's standard operating procedures relative to performing statistical analysis.
- Apply the statistical software programs used by the laboratory

Preparation for Exercises

Trainer Responsibilities

1. Provide trainee with the laboratory's required reading material including all references from the subject module (journals, textbooks, product literature, user manuals, and Internet references including the FBI CODIS website via the CJISWAN network).
2. Ensure trainee is familiar with the resources available (ex NRCII).
3. Discuss with the trainee the laboratory SOPs regarding statistical topics.
4. Demonstrate the use of CODIS Popstats software or any other appropriate program.
5. Discuss laboratory's quality system practices specific to forensic DNA statistical analysis.
6. Assign required samples for statistical analysis, as outlined in the Individual Training Plan.
7. Determine the assessment criteria.
8. Review, verify, and document exercise completion.

Trainee Responsibilities

1. Discuss basic principles of population genetics, population databases, and statistics as they relate to forensic DNA analysis.
2. Observe the use of CODIS Popstats software or any other appropriate program.
3. Perform all statistical calculations using CODIS Popstats software or any other appropriate program on samples assigned by the trainer.
4. Document and submit exercise completion, as required by the trainer.

Literature

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Exercise 1: Statistical Calculations

Purpose

To demonstrate competency in applying standard statistical calculations (e.g. as described in the laboratory SOP) for interpretation of forensic DNA data

Tasks

- Observe the usage of the CODIS Popstats software or any other appropriate program
- Perform statistical calculations on data obtained from previous exercises

Resources

Sample Protocols: [7.01](#), [7.02](#)

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Subject Review

After completion of the laboratory manual exercises and having previously completed the corresponding theory modules, the trainee should be able to answer the following questions:

- What is a population database? How are the samples collected for such a database?
- How is population substructure dealt with in the laboratory's SOP?
- What is the random match probability formula outlined in the laboratory's SOP for heterozygotes? For homozygotes?
- What is the laboratory's policy regarding minimum allele frequency?
- What value of theta is used by the laboratory, if appropriate?
- If a null allele is suspected to be present in the profile, how is it (or is it) incorporated into the statistical calculation?
- What is the laboratory's policy regarding tri-allelic profiles?
- What database is utilized by the laboratory? How many individuals are in it? How was it collected? Analyzed? Published?
- What is the laboratory's SOP regarding mixtures?
- What are the laboratory's policies for applying statistics when there are alleles present below the laboratory's minimum acceptable peak heights?
- What mixture calculations are performed by CODIS Popstats software or any other appropriate program?
- What are the laboratory's policies for applying statistics to paternity or familial cases?

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