



Proficiency testing programs for DNA typing laboratories offered by the College of American Pathologists

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Abstract. The College of American Pathologists (CAP) has several proficiency testing programs targeted to laboratories that perform DNA typing of STR loci. Two well-known programs for parentage testing and forensic labs have been available since the early 1990s and are used by labs worldwide. New proficiency surveys introduced by CAP within the last 2 years may also be of interest to DNA typing labs interested in STR typing for new sources of revenue. Recently added surveys include one for labs monitoring engraftment in bone marrow transplant patients, a second survey for labs that perform phenotyping of convicted offenders for databasing programs, and a survey for labs that perform mitochondrial DNA sequencing. Presented here are brief introductions to the proficiency surveys offered by CAP that are of potential interest to DNA typing labs. © 2003 Elsevier B.V. All rights reserved.

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1. Introduction and discussion

DNA typing of STR loci has application in clinical situations as diverse as identification of suspects in criminal investigations and monitoring engraftment in recipients of bone marrow transplants. Part of any laboratory quality assurance program is participation in proficiency testing, a service provided in most areas of clinical laboratory testing by the College of American Pathologists (CAP). A survey with a long history in the field of identity testing is the parentage testing survey (now known as PAR/PARF), still one of the few formal, graded proficiency tests available worldwide for parentage testing laboratories. The PAR survey provides small aliquots of liquid blood for testing while the PARF

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provides subscribers with the same samples only provided in the form of bloodstains. In both the PAR and PARF surveys, a second alleged father is provided for testing as a buccal swab.

Another survey introduced early in the development of the identity testing field is the forensic identity survey (known as FID). These two programs have been available since the early 1990s, providing typical casework challenges for DNA typing analysts in parentage testing and forensic laboratories. In addition to the laboratory testing component, ungraded paper problems were introduced as part of the parentage testing survey several years to challenge participants with an unusual, yet realistic, case scenario that can be analyzed on paper. These paper challenges have found widespread use among participants as a form of continuing education for staff.

In the past 2 years, CAP has introduced three new surveys of potential interest to DNA typing labs. The DNA/DNAF survey tests proficiency of a lab performing STR typing of samples obtained from convicted felons for entry into an offender database. Similar to the PAR/PARF survey, samples are provided in either liquid form or as bloodstains on filter paper. Subscribers to the DNA/DNAF receive three samples two times a year. Phenotypes are reported to CAP but are not graded. Subscribers can compare their results to those of peers with the Participant Summary which lists the results submitted by all subscribers (Table 1).

Another new survey is known as FIDM and is designed for labs that perform mitochondrial DNA sequencing. The survey consists of samples provided two times annually; reference bloodstains and a hair and/or fingernail representing an evidentiary sample. Subscribers perform their analysis and report polymorphic bases within the mitochondrial DNA recovered from the samples, indicating whether or not any sequences match. The FIDM survey is also not yet graded.

One additional survey of possible interest to forensic DNA typing laboratories is the Engraftment Monitoring survey (ME) which, although designed primarily for labs providing support for bone marrow transplantation programs, can also be useful for forensic labs because challenges consist of blood mixtures from more than one donor. Subscribers report whether or not a sample contains DNA from more than one contributor, moreover subscribers are asked for the relative proportions of DNA from each contributor when mixed samples are provided by CAP. The ME survey is graded by consensus both for the qualitative criteria of whether or not a mixed sample was provided as well as the relative proportion of DNA from each contributor in mixed samples.

Table 1
Number of subscribers for CAP surveys for identity testing laboratories

Survey	Competency	No. of subscribers ^a	Graded	Grading
PAR/PARF	Parentage testing	140	Yes	Mean \pm 3S.D.
DNA/DNAF	Convicted offender	103	No	n/a
FID	Forensic STR typing	143	No	n/a
FIDM	Mitochondrial DNA seq.	19	No	n/a
ME	Bone marrow Tx engraftment	49	Yes	Mean \pm 3S.D.

^a Number of subscribers for the most recent mailing for 2003.

As indicated above, some surveys are graded by the College. The PAR/PARF, and ME surveys are graded using a consensus approach which has been described previously [1,2]. Briefly, a mean and standard deviation (S.D.) of all responses for an analyte are calculated. An acceptable range of responses is then defined by the mean response ± 3 S.D. Any outliers are removed from the responses (and are identified on individual reports as unacceptable) and a new mean and S.D. are calculated from the remaining responses. A new acceptable range is then produced consisting of the mean ± 3 S.D. from remaining responses. Additional outliers, if present, are then identified as unacceptable responses on individual performance reports.

The FID, DNA/DNAF, and FID-M surveys are not yet formally graded. As stated above, performance of a laboratory can be determined by comparing one's answers with those from other subscribers testing the same loci as published in the Participant Summary Report returned to subscribers by the College.

As the field of identification testing evolves, the College of American Pathologists will respond with modifications to the existing surveys as well as offering new surveys when appropriate. The selection of liquid samples versus dry stains is but one example of a CAP response to the needs of the identity testing community.

References

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