eDNA: networking software tailored for identity testing laboratories

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Abstract

Software (known as eDNA 2.0) has been developed for information management for identity testing labs. The software operates in a browser-based, multiuser environment compatible with intranet or internet accessibility. eDNA 2.0 manages accessioning through reporting in a user-friendly, intuitive manner. Parentage testing and forensic applications are incorporated into eDNA, and a kinship module is under development. Highlights of eDNA 2.0 include (1) accessioning templates that record information in a flexible, annotated way that can be easily tracked, (2) phenotype entry for any number of user-defined STR test batteries, (3) questioned relationships defined using dropdown menus, (4) entry of screening results for body fluids, (5) user-defined methods for dealing with mixed DNA profiles, and (6) capability to examine exclusions for possible sample errors.
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Keywords: Identity testing; Information management; DNA typing

1. Introduction

Often, identity testing laboratories rely on multiple software applications to manage the information associated with casework processing. This is especially true in small laboratories where one software application may manage accessioning information while another performs statistical calculations and still a third is used to prepare final reports. Operating a lab in such an environment is less than optimally efficient and is especially prone to the introduction of transcription errors.

Several software packages have been created for calculations and reporting of DNA typing results. Often, however, such products do not manage information generated by an identity testing lab in a comprehensive way. A software product known as eDNA is described here that provides virtually complete information management for the laboratory

providing parentage testing and/or forensic DNA typing. eDNA software is based upon Microsoft ".net" technology compatible with networking and simultaneous multitasking. Maneuvering in eDNA is accomplished through hyperlinks embedded in program.

Fig. 1. DNA profile screens for an alleged father before and after completion.

Cases are accessioned using templates for identities and relationships of specimens. If a lab performs work for a client repeatedly, a database of clients is listed in a dropdown list to easily designate names and addresses to receive a report. A database of sample types can also be created in eDNA to track the numbers of samples received. Once a case has been accessioned and DNA typing results produced, DNA profiles are entered for each sample using the templates shown in Fig. 1.

In addition to DNA profiles, results from pre-screening of evidentiary samples for blood, semen, saliva, and urine can be entered into eDNA. Up to six alleles can be entered for each STR system to accommodate mixtures.

Once DNA profile results have been entered for a case, the comparisons to be made are defined by the user from dropdown lists. Each comparison comprises a "test result" for the samples that are to be compared. After a comparison has been defined, a "Calculate" link executes the analysis. In parentage cases involving an excluded alleged parent, eDNA has a feature allowing the child and/or known parent to be matched with other samples received during a user-defined time. An example of results in a parentage test appear in the "Summary Matrix" area in the Test Information screen Fig. 2.

The Test Information screen can be printed and serves as a useful document for Supervisory or Director review. An isolated inconsistency is treated as a mutation by eDNA which calculates a PI value based upon user-defined mutation rates (Fig. 2).

Once a case has been analyzed, it moves to the "Work Queue" for review. Supervisors, directors, or other individuals who review casework data can be designated to have a Work Queue. Ultimately, the file will enter the Work Queue of the Director. After Director review, the case moves to the "Print Queue" for final report printing.

Fig. 2. Test information screen.