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Results of the 2005 paternity testing workshop of the English Speaking Working Group of the International Society of Forensic Genetics

C. Hallenberg *, B.T. Simonsen, N. Morling

Department of Forensic Genetics, Institute of Forensic Medicine, University of Copenhagen, Denmark

Abstract. We present the results of the 2005 paternity testing workshop of the English Speaking Working Group of the International Society of Forensic Genetics. Blood samples from an alleged father, two children and a mother were sent to the participating laboratories. The participants were encouraged to treat the case as a paternity case, and also to consider other family relationships. A total of 62 laboratories reported results. The laboratories used a total of 42 autosomal STRs/PCR-investigated VNTRs, 22 Y-chromosomal STRs, 8 X-chromosomal STRs and 8 VNTR systems investigated with RFLP. The rate of typing and reporting errors was 0.3%. The results from a paper challenge showed that some of the rare events were treated differently in the participating laboratories.

Keywords: Paternity testing; DNA profiling; Collaborative exercise; Proficiency testing

1. Introduction

Since 1991, The English Speaking Working Group (ESWG) of the International Society of Forensic Genetics (ISFG) has offered an annual exercise involving genetic analysis of a paternity case [1–4]. The collated results of the exercises include typing results and information about laboratory routines, systems and kits used for paternity testing as well as information about statistical calculations. Since the year 2000, the laboratories have been invited to calculate a paper challenge in addition to the paternity testing.

* Corresponding author. Tel.: +45 35326110; fax: +45 35326120.
E-mail address: charlotte.hallenberg@forensic.ku.dk (C. Hallenberg).

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2. Materials and methods

Blood samples from a mother, two children and an alleged father were sent to the laboratories. The laboratories were encouraged to treat the case as a paternity case, and also to consider other family relationships. In addition, a paper challenge was distributed. The scenario consisted of a woman, a child and a man of East African origin. Results from 15 autosomal and 11 Y-chromosomal STRs and the number of observations of the relevant alleles/haplotypes in a database of Danish people and in a database of Somali people were given. The laboratories were encouraged to treat the case both as a paternity case and as an immigration case. The laboratories submitted results and answered questions concerning laboratory routines into an online database. A total of 62 laboratories reported results.

3. Results

In the paternity testing exercise, approximately 75% of the laboratories concluded that their results were against paternity and 2–3% concluded that the results were in favour of paternity. Almost 20% did not submit a verbal conclusion. Of those who considered other family relationships, all laboratories suggested correctly that the alleged father was related in paternal lineage to the biological father. Results from a total of 42 autosomal STRs/PCR-investigated VNTRs, 22 Y-chromosomal STRs, 8 X-chromosomal STRs and 8 VNTR systems investigated with RFLP were submitted. Of these, results from 23 autosomal STRs, 16 Y-chromosomal STRs, 5 X-chromosomal STRs and 7 VNTR systems investigated with RFLP were submitted by more than one laboratory.

The percentage of typing and reporting errors of the submitted results was 0.3%.

All laboratories used one or more commercially available PCR-investigated STR-typing kits for typing of autosomal systems in routine paternity cases. A total of 44 laboratories used Y-chromosomal STRs for investigation of paternity cases. Of these, 93% used commercially available kits. A total of 15 laboratories used X-chromosomal STRs for investigation in paternity cases. Of these, 40% used commercially available kits.

In the paper challenge, data from a Danish and a Somali database were given and the laboratories were encouraged to treat the case both as a paternity case and as an immigration case. For the paternity case, 25 of 27 laboratories used the Somali database for calculation. For the immigration case, all laboratories used the Somali database. In three autosomal systems, either a maternal or a paternal inconsistency was present. In these three systems, 7–8 different formulas were used for calculation. In the remaining systems, 3–4 different formulas were used.

Among 19 laboratories that all used the same database for calculation, 11 different combined PI-values were submitted. Among 7 laboratories that did not include the Y-STR data in the calculation, 57% concluded that ‘The results are inconclusive’ while 43% concluded that ‘The results are against paternity’. Among laboratories that included Y-STR results in the calculation, only 25% concluded that ‘The results are inconclusive’ while 70% concluded that ‘The results are against paternity’.

4. Discussion

Methods and nomenclature have reached a high degree of standardisation. Of the 42 autosomal STRs/PCR-investigated VNTRs used by the participating laboratories, more than 50% were used by at least 10 laboratories. Contrary to this standardisation, there is still a large variation in routines and formulas used for biostatistic calculations. In the paternity testing exercise, the conclusions ranged from ‘The results are against paternity’

to ‘The results are in favour of paternity’. The different conclusions were not caused by typing errors but by a combination of differences in the number of typed systems and differences in the biostatistic calculations of paternity indices. Also, in the paper challenge, a large variation in calculated PI-values was found.

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