

Identifiler™ system as an inadequate tool for judging motherless paternity cases

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Abstract. Identifiler is one of the most useful multiplex systems for standard paternity testing. But in some cases the mother is unavailable for testing and there can be a problem with obtaining sufficient value of probability of paternity. One hundred and fifty excluding cases and 150 including ones were analysed to check the validity of Identifiler for analysis of standard as well as motherless cases. Power of exclusion and paternity index were analysed for each locus as well as for the entire set of the 15 STR markers. Our researches confirmed the usefulness of Identifiler system for standard paternity testing, and showed that the motherless cases need to be examined more widely. © 2005 Elsevier B.V. All rights reserved.

Keywords: Identifiler; Statistical evaluation; Motherless case; Paternity testing

1. Introduction

Identifiler system containing a panel of 15 STR loci and AMG is the most useful multiplex in paternity determination. However, when the mother is unavailable for testing, the value of probability of paternity can be insufficient [1]. The purpose of this study was to compare the efficiency and evidence value of Identifiler for analyses of standard paternity cases and motherless ones.

2. Materials and methods

DNA was extracted from peripheral blood of 900 individuals from Central Poland population, taking part in paternity testing by means of the salt method by Lahiri and Nurnberger [2] and using Sherlock AX kit (A&A Biotechnology). The samples were

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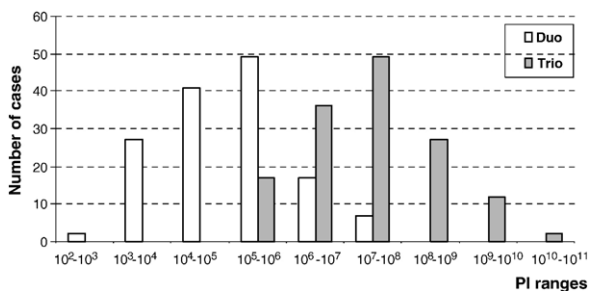


Fig. 1. Comparison of PI values between standard (Trio) and motherless cases (Duo).

profiled using AmpFISTR® Identifiler™ kit. Amplification products were electrophoresed using the ABI Prism™ 377 Sequencer. Paternity index [PI] by Brenner [3] and probability of paternity [W] by Essen-Möller [4] of 150 including cases were computed with support of the population database of Central Poland region [5] and the results were elaborated for standard cases (trios) and for motherless ones (duos). One hundred and fifty excluding cases were analysed to evaluate the power of exclusion [PE] and the results were also elaborated for trios and duos.

3. Results and discussion

Fig. 1 shows comparison of values of total PI between trios (standard cases) and duos (motherless cases) without exclusion of paternity. The minimal value of paternity index obtained from analyses of standard cases was 100,162.62, which signifies $W=99.9991\%$. The mean value of probability of paternity in trio cases was 99.99997%. Among motherless cases, the minimal value of PI that we obtained was 155.56, which signifies $W=99.36\%$, moreover, values of probability of paternity for 50% of motherless cases were lower than 99.999% which is considered, according to Polish Forensic Genetics Commission, not sufficient to ascertain fatherhood status.

Power of exclusion computed for each STR locus was shown in Fig. 2. D2S1338 has the highest PE value, i.e. 80.27% for trios and 66.67% for duos and TPOX has the lowest PE, i.e. 23.81% for

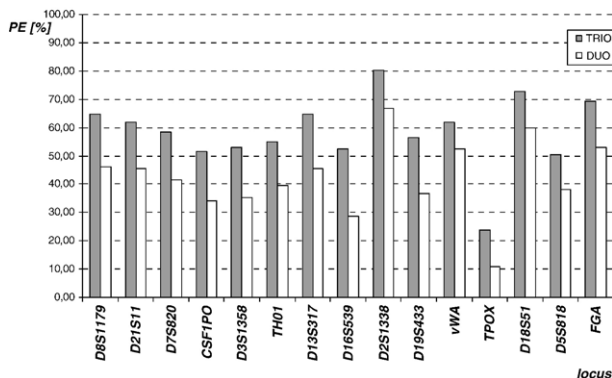


Fig. 2. Power of Exclusion values for each locus of Identifiler computed for 150 standard cases (Trio) and 150 motherless ones (Duo).

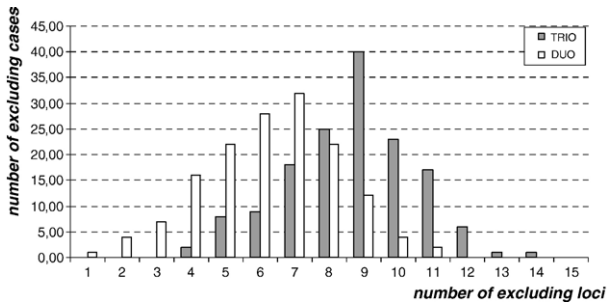


Fig. 3. Comparison of the number of excluding loci of Identifiler between standard cases (Trio) and motherless ones (Duo).

trios and 10.89% for duos (Fig. 2). The minimal number of excluding loci among trio cases was four, which seems to be enough protection against the mutation event (Fig. 3). Among duo cases, however, there were events of exclusion in three, two or even in one locus only, which can cause a misjudgment for there is a possibility of mutation events [6,7].

Taking into consideration all the results, we conclude that Identifiler was adequate for judging standard paternity cases, whereas motherless cases without exclusion need to be examined more widely.

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