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Four highly polymorphic STR-loci as a "screening test" in paternity cases

G. Dorner *, E.M. Dauber, S. Wenda, B. Glock, W.R. Mayr

Division of Blood Group Serology, Medical University of Vienna, Austria

Abstract. A triplex-PCR (SE33, D12S391 and D8S1132), which can be detected simultaneously with a singleplex-PCR (D6S389) in the same electrophoresis run, has been established as a "screening method" for paternity cases.

Keywords: Triplex-PCR; SE33; D12S391; D8S1132; Paternity screening

1. Introduction

The aim was to design a "screening method" for paternity cases by investigation of 4 loci in a single run. We chose 4 highly polymorphic markers with a high chance of paternity exclusion: SE33 (0.905), D12S391 (0.791), D8S1132 (0.708) [1–3] and D6S389 (0.845) [4,5]. The expected cumulative CPE (chance of paternity exclusion) for these 4 loci is 99.9%; the calculated probability to find 3 or more exclusions is 81%.

2. Materials and methods

74 paternity cases (48 non-exclusions, 26 exclusions), already investigated with conventional markers (red cell antigens, red cell enzymes, and protein polymorphisms), 4 VNTR- (D1S80, YNZ, COL2A1, APO-B) and 10 STR-loci (SE33, TH01, vWA, FGA, D12S391, D8S1132, FES/FPS, F13B, CD4, LPL), were included in the study.

PCR and electrophoresis were carried out as described elsewhere [6].

3. Results and discussion

All non-fathers were detected in this paternity screening approach with at least two exclusions; in 21 out of 26 cases (81%), three or more exclusions were found. A single exclusion at the D6S389

* Corresponding author. Klinische Abteilung für Blutgruppenserologie, A-1090 Wien, Währinger Gürtel 18-20, Austria. Tel.: +43 1 40400 5320; fax: +43 1 40400 5321.

E-mail address: gudrun.dorner@meduniwien.ac.at (G. Dorner).

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Table 1
Number of exclusions found within 74 paternity cases

Number of paternity cases	Number of exclusions
1	1[a]
5	2
13	3
8	4

[a] Mutation in D6S389.

locus, which was probably due to a single-step mutation in the paternal germline, was found in a non-exclusion case (Table 1).

The number of exclusions found at the SE33 (24), the D6S389 (22), the D8S1132 (19) and the D12S391 (17) locus met the calculated exclusion chances of the loci. In 66% (31/48) of the non-exclusion cases the CPE was between 99% and 99.9%, in 34% (16/47) the CPE was higher than 99.9%; in 36 of these 47 cases (77%) the probability of paternity was >99.75%, which corresponds to the attribute "paternity practically proven".

In conclusion, this "screening test" for paternity cases is capable to reduce turn around times and investigation costs in the future.

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