

STR typing of 77-year-old umbilical cord in maternity test

M. Hara ^{a,*}, A. Kido ^b, Y. Yamamoto ^{a,c}, A. Takada ^a,
K. Yoshimura ^d, K. Saito ^a

^a Department of Forensic Medicine, Saitama Medical School, Saitama, Japan

^b Department of Legal Medicine, Faculty of Medicine, University of Yamanashi, Yamanashi, Japan

^c Criminal Investigation Laboratory, Saitama Prefectural Police Headquarters, Saitama, Japan

^d Department of Physiology, Saitama Medical School, Saitama, Japan

Abstract. We performed a maternity test using DNA extracted from an umbilical cord that had been preserved for 77 years. We used 15 short tandem repeat (STR) loci, D8S1179, D21S11, D7S820, CFS1PO, D3S1358, TH01, D13S317, D16S539, D2S1338, D19S433, vWA, TPOX, D18S51, D5S818, and FGA, for the DNA analysis. The 15 STR loci were correctly typed from the umbilical cord. The maternity probability was 0.999937, and the exclusion probability was 0.999629. © 2005 Elsevier B.V. All rights reserved.

Keywords: Maternity test; STR; AmpFISTR Identifier; Umbilical cord; Preserved specimen

1. Introduction

In Japan, it is customary to preserve the umbilical cord, which is presented to parents by the maternity clinic, as a sacred material. Umbilical cords are sometimes preserved for a long time and may be available for parentage testing and personal identification [1]. We performed a maternity test using DNA extracted from an umbilical cord that had been preserved for 77 years. The 15 short tandem repeat (STR) loci included in the AmpFISTR Identifier kit were used for the DNA analysis.

2. Materials and methods

DNA was extracted from the umbilical cord preserved for 77 years of the putative mother (deceased) using ISOHAIR (Nippongene) and from the buccal swab of the child,

* Corresponding author. Tel.: +81 492 761178; fax: +81 492 94 9713.

E-mail address: haramasa@saitama-med.ac.jp (M. Hara).

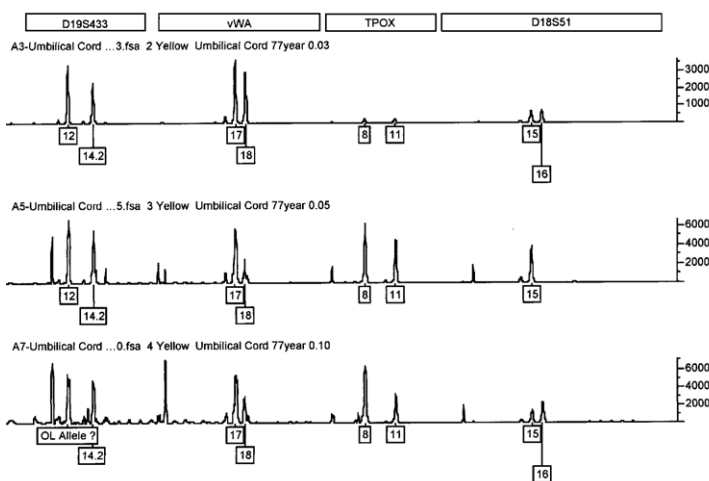


Fig. 1. Electropherograms of STR loci from a 77-year-old umbilical cord amplified using three different primer concentrations. Upper panel: 3% primer; middle panel: 5% primer; lower panel: 10% primer.

who requested the examination, using a DNA Extactor FM kit (Wako). Using the AmpFISTR Identifiler kit (Applied Biosystems, Foster City, CA), the 15 STR loci, D8S1179, D21S11, D7S820, CFS1PO, D3S1358, TH01, D13S317, D16S539, D2S1338, D19S433, vWA, TPOX, D18S51, D5S818, and FGA, as well as Amelogenin locus were analyzed. For amplification of the preserved umbilical cord, the PCR conditions were modified as follows: denaturation at 94 °C for 1 min, annealing at 59 °C for 5 min and extension at 72 °C for 5 min (40 cycles) using 3% primer. The amplified products were separated by denaturing capillary electrophoresis in an ABI PRISM 310 Genetic Analyzer (Applied Biosystems). The results were analyzed by GeneScan Analysis 3.7 (Applied Biosystems) and Genotyper 3.7 software packages (Applied Biosystems).

3. Results and discussion

Fig. 1 shows the electropherograms of four STR loci, D19S433, vWA, TPOX, and D18S51, that were amplified from the preserved umbilical cord using 3%, 5%, and 10% of the original primer. The amplification using 3% primer was suitable for STR typing of the preserved umbilical cord. Table 1 summarizes the results of the STR typing of the preserved umbilical cord and the buccal swab of the child using the original and 3% primer methods. Nine STR loci, D21S11, D7S820, CSF1PO, D13S317, D16S539, D2S1338, TPOX, D18S51, and FGA, of the 15 total were not determined from

Table 1
Results of STR typing from 77-year-old umbilical cord and buccal swab

	D8S1179	D21S11	D7S820	CFS1PO	D3S1358	TH01	D13S317	D16S539	D2S1338	D19S433	vWA	TPOX	D18S51	D5S818	FGA	X/Y
M1	14–14	–	–	–	15–16	9–9	–	–	–	12–14.2	17–18	–	–	11–11	–	X–X
M2	14–14	30–30.2	11–11	12–12	15–16	9–9	8–8	9–10	16–16	12–14.2	17–18	8–11	15–16	11–11	20–26	X–X
C	11–14	29–30	11–12	11–12	16–17	7–9	8–11	9–11	16–20	14.2–14.2	17–17	8–11	15–22	11–13	20–23	X–Y

M1: 77-year-old umbilical cord of mother, original primer method.

M2: 77-year-old umbilical cord of mother, 3% primer method.

C: buccal swab of child, original primer method.

the umbilical cord using the original primer method. With 3% primer method, the 15 STR loci and the Amelogenin locus were determined from the preserved umbilical cord.

A contraction in the mother and child relationship was not observed in the 15 STR loci, which means that the 15 STR loci were correctly typed from the preserved umbilical cord. The maternity probability [2] was 0.999937, and the exclusion probability [3] was 0.999629. STR typing can be used to determine parentage and personal identification based on available preserved umbilical cords.

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