



# Human identification using DNA purified from residues in used toothbrushes

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**Abstract.** This article describes human identification using DNA purified from residues in used toothbrushes. © 2003 Published by Elsevier B.V.

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## 1. Introduction

There are cases of paternity and maternity investigation where there is no available biological material to reconstruct the genetic profile of the alleged father and/or mother. In these cases, exhumation is usually the necessary step in order to determine sibling correlation. Obtaining material from exhumed bodies is not always possible besides being complex technically, bureaucratically and psychologically. In order to find more amenable alternatives, we tested toothbrushes used by subjects as source of DNA.

Our first case was a woman who had been deceased 6 months earlier and whose putative son brought in some of her hairs for analysis. He also brought the woman's last toothbrush (Fig. 1).

## 2. Materials and methods

By using the Salting Out technique and NaOH treatment method, we extracted the DNA from the toothbrush and hair roots, respectively (Fig. 2). The genetic profile was obtained with AmpFLSTR Identifiler PCR Amplification KIT (Applied Biosystems ABI, Foster City, CA).

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MATERNITY TESTING		
STR	Mother	Alleged Son
D8S1179	13/14	14/15
D21S11	29/30	28/29
D7S820	8/11	12
CSF1PO	11/12	10/12
D3S1358	15/17	15
TH01	7/9	9/9,3
D13S317	11/12	10/11
D16S539	9/11	12/14
D2S1338	17/22	19/24
D19S433	13/15	14/16,2
vWA31	16/17	18/19
TPOX	7/10	8
D18S51	16/19	14/16
FGA	20/25	22/25
D5S818	11/12	10/11
Amelogenina	XX	XY

Fig. 1. STRs in alleged mother and child.

To test the reproducibility of toothbrush as a source of genetic material for use in human identification, we sampled toothbrushes used by 33 different individuals while normally collecting their peripheral blood sample. The labelled STR's were fractionated with an ABI Prism 310 Genetic Analyzer (ABI) and the profile analysed with Genotyper (ABI) after image obtention with GeneScan (ABI) (Fig. 3).

### 3. Conclusions

We could observe that in six loci analysed, the alleged mother did not match to those of the putative son. However, the “hair” and “toothbrush” genetic profiles matched indicating that both belonged to the same woman.



Fig. 2. Toothbrushes.

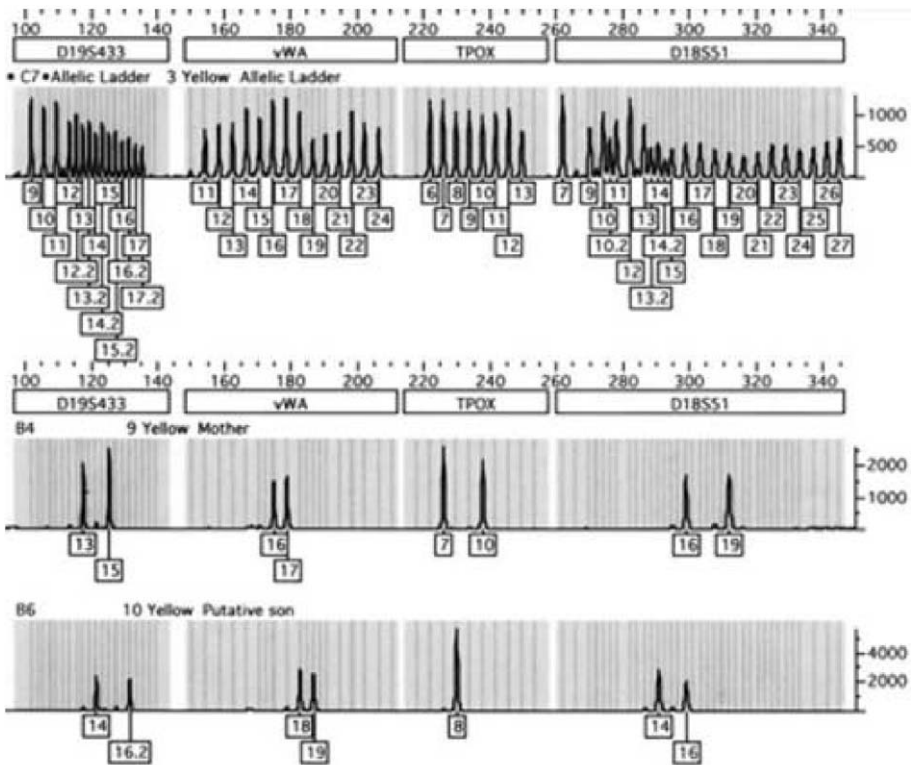


Fig. 3. STRs in ABI.

We were able to obtain 23 STR profiles out of the 33 toothbrushes samples or success rate of about 70% (Fig. 4). Moreover, all 23 STR profiles matched the profiles obtained with the respective blood samples.

In conclusion, used toothbrush is a viable alternative source for obtaining DNA samples. In most cases, there are enough preserved biological material in used toothbrushes to give DNA in quantities and quality good enough for all kinds of DNA work related to human identification.



Fig. 4. Success rate.