CASE REPORT

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Parentage Testing on Blood Crusts from Firearms Projectiles by DNA Typing Settles an Insurance Fraud Case*

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ABSTRACT: We describe a case of a fraudulent insurance claim. The family of an adult white male (DLF) notified the police of their son's disappearance. After a few weeks, a corpse that presented characteristics similar to those of the DLF was found in advanced stages of decay and was identified by the family as being DLF. The family then filed a claim for the life insurance that DLF had taken out just before he disappeared. Suspicions were raised about the identification of the corpse, because it had been done only visually, and because the insurance policy had been taken out just prior to DLF's disappearance. The insurance company requested a postmortem examination for identification. As the corpse had been cremated immediately after identification by the family, the biological material that was encrusted on the two projectiles removed from the body was used for analysis. The blood crusts provided enough genomic DNA for us to carry out PCR base typing of HLA-DQA1, D1S80, HUMCSF1PO, HUMTPOX, HUMTH01, D3S1744, D12S1090, D18S849, and amelogenin. Results from all loci typing from the corpse presumed to be that of DLF were then compared with that of his alleged biological parents, revealing genetic incompatibility.

KEYWORDS: forensic science, parentage testing, polymerase chain reaction, blood crusts, DNA typing, insurance fraud, HLA-DQA1, D1S80, HUMCSF1PO, HUMTPOX, HUMTH01, D3S1744, D12S1090, D18S849, amelogenin, Brazil

Polymerase chain reaction (PCR) procedures permit reliable replication of thousand of copies of a specific DNA sequence in vitro, and have been described and improved in recent years (1–3), allowing the study of small amounts of DNA even when degraded. It is, therefore, extremely useful in the analysis of forensic samples. We report a case concerning the identification of an individual who had been cremated. This identification was possible by analyzing the DNA extracted from blood encrusted on two firearm projectiles that had been removed from the corpse during the postmortem examination.

Case History

Recently, relatives of a young adult white male (DLF) reported his disappearance to the police of the city of São Paulo, Brazil. After a couple of weeks, a corpse in advanced stages of decay and characteristics similar to those of the missing person was found. The corpse was identified by the relatives as being that of DLF. The postmortem examination revealed that the cause of death had been cranial encephalic and thoracic trauma, caused by projectiles from a firearm. The family then filed a claim for the life insurance that DLF had taken out just before his disappearance. The insurance company had doubts about the identification, as it had been done visually. Then, suspicions were raised about the true identity of the corpse and the insurance company asked for an examination of the corpse in order to positively identify it. Exhumation was not possible because the corpse had been cremated immediately after the identification by the family. Other evidence to identify the victim as being the one who had bought the insurance was then sought. The solution was to analyze the biological material (blood crusts) taken from the two projectiles that had been removed from the body. DNA was extracted from blood encrusted on the projectiles, and a DNA study was carried out by PCR technique.

Material and Methods

DNA was extracted from blood crusts (4) found on the two projectiles removed from the corpse during necropsy and from 5 mL of peripheral blood obtained from the biological parents of DLF by the salting–out procedure (5). The locus D1S80 was studied using the D1S80 Forensic DNA Amplification Reagent Kit (Perkin Elmer, Foster City, CA) as recommended by the manufacturer. The amplified fragments were separated by electrophoresis on a polyacrylamide gel (GeneAmp Detection Gel—Perkin Elmer, Foster City, CA) and visualized after silver staining. Allele identification was achieved by comparison of the amplified fragments to the allelic ladder included in the kit. The study of the HLA-DQA1 locus

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TABLE 1—*Genotypes identified in the four DNA samples.*

Locus	PF	PM	P1	P2	Results
HLA-DQA1	1.3, 4	1.1, 4	1.3, 4	1.3, 4	No exclusion
D1S80	18, 27	18, 28	24, 29,	24, 29	Father's and mother's exclusion
HUMCSF1PO	10, 12	11, 14	7, 11	7, 11	Father's exclusion
HUMTPOX	8, 9	9. 9	8, 11	8, 11	Mother's exclusion
Amelogenin	XY	XX	XY	XY	Male
HUMTH01	9, 10	8, 8	7, 9	7, 9	Mother's exclusion
D3S1744	16, 19	17, 20	18, 21	18, 21	Father's and mother's exclusion
D18S849	16, 18	16, 17	15, 16	15, 16	Father's or mother's exclusion
D12S1090	21, 27	13, 27	19, 21	19, 21	Mother's exclusion

NOTE: PF: putative father; PM: putative mother; P1: projectile 1; P2: projectile 2.

and the analysis of the alleles were performed using the Amplitype HLA-DQA1 Forensic DNA Amplification and Typing Kit (Perkin Elmer, Foster City, CA) as recommended by the manufacturer. The amplification and analysis of the D3S1744, D18S849, and D12S1090 loci were assembled using the components of the Multiplex I Kit (Lifecodes Corp., Stanford. CT). The CTT Multiplex Kit (Promega Corp., Madison, WI) was used for the amplification and study of the HUMCSF1PO, HUMTPOX, Amelogenin, and HUMTH01 loci. Both Multiplex kits were used as recommended by the manufacturers. The amplification products obtained from genomic DNA extracted from the blood crusts were compared with those generated from genomic DNA obtained from DLF's alleged biological parents.

Results and Discussion

The data obtained from the study of the nine loci are presented in Table 1. As shown, the genotype identified in the DNA extracted from the blood encrusted on projectile 1 is identical to that on projectile 2, indicating that no contamination occurred during the autopsy process. It is apparent from Table 1 that the questioned bloodstain on the projectiles could not have originated from a biological child of the parents who were tested.

This exclusion was later confirmed when DLF was found alive. It was a fraudulent claim to the insurance company.

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