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Systematic STR DNA Profiling of Chillum Links the Burglar

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Abstract

Crime scene evidence has a crucial role in forensic investigation. Suspect present on the scene of crime link through crime scene evidence. Nowadays DNA profiling is the most advanced technique used in forensic examination to identify the involvement of a suspect in a crime. In this case, only chillum is the evidence collected from the crime scene and represents important evidence for the source of DNA. It was made of clay or earth and used for smoking cannabis and tobacco. Saliva present in the chillum is the source of DNA. DNA was recovered from chillum using doubled swab technique and extraction was done using the organic method (PCI mix). Using PCR-based DNA typing at 15 STR loci, it had been proved that the DNA from the chillum comes from the suspect. The DNA profile of one of the suspects directly link to the crime scene evidence, proves his presence at the scene of the crime.

Keywords: DNA typing; Short tandem repeat (STR); Saliva; Polymerase chain reaction (PCR); Chillum

List of Abbreviations: DNA: Deoxyribonucleic acid, STR: Short Tandem Repeat, PCR: Polymerase Chain Reaction

Introduction

Origin of biological evidence was identified using PCR-based DNA typing is a very important advanced forensic technique [1]. DNA profiling of blood, hair [2], saliva, vaginal swabs etc., [3] by performing STR-based analysis is the important evidence to solve the crime. Saliva is a very important DNA evidence that was recovered and analyzed from different physical evidence, like cigarette butts [1], postage stamps [4,5], envelopes [6], cheese [1], tea cup [7] and other objects [8]. Saliva also can be recovered and analysed from bite marks, sucks, fingerprints, etc. on DNA rich substrates, like human skin [9,10]. Sweet et al. [11] used the 'Double-swab technique' to sample DNA from human skin. During this case study, we present a case where the sole source of DNA was the chillum left on the scene of the crime by the perpetrators, after committing robbery. Police were recovered chillum from the scene of the crime and it was submitted to the laboratory for DNA profiling. Recovery of the DNA was made by using the double swab technique [12]. One swab moistened with forensic buffer was wont to collect the saliva from the surface. A second dry swab was wont to collect the moisture which remained on the surface from the primary swab.

Materials and Methods

The surface of the chillum contacted with lips was swabbed with a wet swab (forensic buffer), then by a second dry swab following the double swab technique [13]. A swab was placed in a minicentrifuge tube for analysis and 300 µL of Lysis buffer (1M Tris HCl, pH 8.6, 0.5M EDTA, 5M NaCl) was added with 25 µL of Proteinase K (10 mg/ml). The sample was incubated overnight at 56°C. Organic extraction of the sample was carried out in Phenol Chloroform: Isoamyl alcohol extraction (25:24:1) (Amerosco, Biotechnology Grade) [14].

Reference Samples

Blood samples of both suspects were received in our laboratory in a DNA kit that contains 4% EDTA solution as a preservative. Organic extraction of blood samples was carried

out in Phenol Chloroform: Isoamyl alcohol extraction (25:24:1) (Amerosco, Biotechnology Grade) [14].

Results and Discussion

Short tandem repeat (STR) profiles produced from the Identifiler kit were the same for the DNA recovered from the chillum and for the DNA recovered from the blood sample of Suspect-1 (Table-1). The autosomal STR based DNA profile was obtained from crime scene evidence i. e. chillum and compared with the DNA profiles obtained from blood samples of suspect-1 and suspect-2. The DNA profile of suspect-1 matched with the DNA profile obtained from the surface of chillum, proving his presence at the scene of the crime.

Table 1: Allele incorporate 15 STR loci and gender-specific Amelogenin locus.

STR LOCUS	Chillum DNA	Suspect-1 DNA	Suspect-2 DNA
D8S1179	11,14	11,14	10,13
D21S11	28,33.2	28,33.2	26,31
D7S820	11,11	11,11	9,12
CSF1PO	12,13	12,13	11,12
D3S1358	15,16	15,16	14,17
THO1	6,6	6,6	7,9
D13S317	11,11	11,11	12,12
D16S539	9,12	9,12	12,13
D2S1338	18,18	18,18	18,23
D19S433	13,14	13,14	13,15.2
vWA	16,17	16,17	14,19
TPOX	8,11	8,11	10,11
D18S51	13,14	13,14	12,15
AMELOGENIN	X,Y	X,Y	X,Y
D5S818	11,12	11,12	12,13
FGA	21,26	21,26	22,24

Conclusion

Chillum recovered from the crime scene is the only evidence that is made up of earth. DNA is successfully recovered from the saliva on the chillum and gets the DNA profile of the burglar. This concludes the involvement of suspect in the crime.

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