THE EFFECT OF DNA ANALYSIS ON CRIME INVESTIGATION

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Jeffreys, an English geneticist created the DNA fingerprint technique in the mid 1980's. The DNA analysis method developed very quickly. It has been a very important tool in forensic identification of Bio-sample. In our laboratory, this technique is progressively replacing the routine test of the Bio-sample. By now, we have already used this technique to identify very small amounts of biological sample, for instance: blood (bloodstain), semen stain, saliva (saliva stain), muscle, bone, tooth, and hair. The DNA analysis technique has displayed high value in our laboratory and is used in more than 2,000 cases which consist of murder, rape, theft, dismemberment, pregnancy by rape, serial crime, etc.

This study introduced some typical cases in which the DNA analysis is used.

Case 1:
Before dawn on May 30, 1999, a murder took place at Shijingshan district of Beijing. In this case eight young women were killed. We collected nearly eighty parts of bloodstains at the scene. These bloodstains were compared with the blood of the eight women by using several STR loci. Here is what we concluded:

1. After the comparison, we can determine the activity of every victim when the murder was occurring, and draw a picture of the blood distribution at the scene. It provided scientific basis for the investigator to recreate the scene.
2. We collected two footprints in blood: one footprint was left by socks and the other by slippers. At the same time, the forensic pathologist confirmed that two simple-edge stab knives killed the eight women. How many murderers in this case? This is the key to investigate and solve this case. By examining the footprint in blood and the slipper left at the scene, we found out that the genotype of the bloodstain on the surface of the slipper is different from the blood stain inside which was a mixture sample of four victims. On the basis of this result, we considered that the inside bloodstain was left by the same murderer who was wearing the socks when committing the murder, and after that wore slippers. So the same suspect left the footprints of the socks and the slippers.
3. Different alleles were detected of the several bloodstains from the eight victims. Through this, we can conclude that the suspect had bled when the murder was occurring, and deduced the genotype of the suspect. It provided the only evidence to identify the suspect.

After this case was solved, it was confirmed that there was only one murderer in this case, and the ninth genotype in the scene was the same as the suspect.

Case 2:
From December 10 to 13, 1998, several sacks filled with dismembered body parts were found in different areas of Beijing. We had not found the head and some guts among these parts. In order to identify, we used DNA method to analyze these dismembered body parts. By using several STR loci, we found that the genotype of all parts were the same, the Pm value is 3.3×10^{-12}. From this, we can conclude that all these dismembered body parts were from one person.

Not so long after that, somebody reported that a man whose name is Shiwei Gu was missing, and they required comparing DNA with the dismembered body. We collected the blood of Shiwei Gu's sister, wife and daughter for use in identification. By using several STR loci and mtDNA sequence analysis, we concluded that the dismembered body was the biological father of Shiwei Gu's daughter; possibility is 0.99995. MtDNA is maternal generation, and comparing the dismembered body's sequence with Shiwei Gu's sister, the bases and the position of variation were found to be the same. It confirmed that the

dismembered body and the missing man were in fact the same person. Because of this, the detection of the case turned for the better and provided the direction for the detection.

Four months later, after investigation, the suspect was found. A bloodstain was found under the drawer of a writing desk at the suspect's home. By using several STR loci and DNA sequence analysis, the genotype of the bloodstain was found to be different from all members of this family, but it was identical with Shiwei Gu's. Its Pm value is 2.28×10^{-14}. We made a conclusion that this place was the first scene.

Case 3:
On September 22, 1998, a woman about 20 years old was killed at Yanqing county of Beijing. Six cigarette butts were found at the scene. The investigation department sent us more than 20 suspect's cigarette butts. Our lab was required to use DNA method to analyze all these samples in order to compare with the six cigarette butts left at the scene. At last we confirmed that the genotype of the six cigarette butts was the same as a suspect, its Pm value is 3.58×10^{-13}. We concluded that this suspect left the cigarette butts at the scene. It proved that DNA analysis is very important in case detection.

The above-mentioned three cases are only a representative of the lot of cases we have undertaken. It indicates that DNA analysis can point out the direction for the detection, and is an important tool, through which we can provide evidence to detect and solve cases rapidly and accurately.