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Pitfalls Discovered during the Murder Investigation of an Arab Female Celebrity (Suzanne Tameem)

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ABSTRACT

As a forensic consultant and DNA fingerprint expert, I was asked to give my expert opinion on the official papers and DNA results included in the forensic investigations of an Arab celebrity murder case called Suzanne Tammeem. I was also requested by the defense attorneys to write an official report on the forensic DNA analysis work of this case to be handed over to the court, based on the court's request. It was a murder case of a well-known female Arab Singer (Libanese in Origin), named Suzanne Tameem, who was murdered in her hotel flat in Dubai, UAE. Biological evidentiary samples were collected and DNA was analyzed and finally led to the conviction of two men. The first was sentenced on the grounds that he was the perpetrator and the second as he was the instigator of the crime. They both were sentenced to death. Afterwards, with the appeal, based on the pitfalls in the DNA report, the death sentence was modified to imprisonment for 25 and 15 years, respectively. This case is well-known and is highlighted by many of the media, press and a lot of criticism as well. Returning to the forensic work in this case, DNA on the blood stains, which were collected from the victim clothes, was found to be belonging to the victim. While DNA on unknown male clothes, which were found near by the crime scene, at the same building, was found to be belonging to the victim and to a man who was arrested later on as a suspect. DNA was analyzed and DNA genotyping result of blood stains, collected from the victim's clothes, was compared with that of the reference control samples of the victim and an exact match was obtained. The DNA genotyping result of blood stains, collected from the unknown male's clothes that were found nearby, was belonging to both of the victim and the suspect revealing a genetic compatibility and led to the identification of the suspect as the killer. Despite the results of the genotyping were compatible with both the female victim and the male suspect, there were a lot of

errors, (I would rather call them pitfalls), in the procedures of this case, from collection of blood samples, throughout storage, DNA analysis and ending by the interpretation of results. These pitfalls have given the defense the weapon to call into the question the credibility of results and claim before the court to acquit the suspect. In my opinion, I think avoiding of such pitfalls in the forensic and criminal investigations can be achieved simply by following the standard protocols during sampling and preservation of forensic samples and also during DNA analysis and interpretation of results.

Keywords: DNA, genotyping, PCR, investigation, pitfalls, results' interpretation

Introduction

For a long time forensic scientists have been interested in using genetic information to match crime scene evidence with suspects in criminal investigations. Until recently the lack of a suitable experimental approach prevented them from achieving this end. However developments in molecular genetics during the last decade have changed the situation (1).

DNA typing techniques are one of the most advanced tools for human identification (2). During the last years, a great number of methods for DNA typing have been introduced to forensic science, with considerable success and also with considerable controversy (3-5). The success and validation of a criminal investigation are very closely related to the process used for obtaining and preserving biological evidence (6).

Genetic markers can be characterized in traces of biological fluids, such as blood, sperm, saliva, nasal secretion, fragmented skeletal remains and old bones (7-11).

Polymerase chain reaction (PCR) procedures permit reliable replication of thousand of copies of a specific DNA sequence, in vitro, and have been improved in the last years, allowing the study of small amounts of DNA even when degraded. These procedured are therefore extremely useful in the analysis of forensic samples. Several loci are especially suitable for PCR analysis (12-13).

This paper describes the use of PCR for genetic characterization of a victim That was killed by a perpetrator that was unknown, who identified later by his genetic profile that was obtained from the clothes he had left near the scene of crime.

Case Summary

Scenario

A forensic expert was requested to attend at a crime scene in a hotel flat, 22nd floor, where a famous Arab female singer was killed. The police officers attended first and secured the scene, later, the forensic expert arrived and carried out their work.

Documentation methods

On his arrival, the forensic expert entered the crime scene (the hotel flat) where he observed a body of a female victim in the third decade. The victim was lying on the ground on her back in the distance between the corridor and the lounge for seating and food and she was lying within a pool of blood, and her head was headed toward the kitchen of the apartment, and her feet towards the bathroom and the living room. The victim was covered by two sheets, the first was covering the face and the second was covering her body. The forensic expert mentioned that the victim was wearing short jeans, which was folded at the knees and a sleeveless t-shirt. The forensic expert

mentioned that there was a dining table on its top there were some blood-stained accessories. After the preliminary examination, the corpse was transferred to the morgue for autopsy and completion of testing.

Procedures

External Examination

External examination showed that the body of a white-skinned Arab girl, length 170 cm, weight 68 kg.

Clothes Examination

1- Sleeveless, Christian Dior brand, T-shirt of multi-colors. It has a tear in the mid-right aspect of the front body of regular edges, with a length of half a cm.

2- Sleeveless T-shirt, with a half-cm longitudinal tear which, coincides in its shape and location with the tear previously described in the piece of clothing No. 1.

3- A pair of blue jeans up to the mid-legs (Bermuda) brand Versace.

4- Black breast holder (Brassiere) and briefs with a sanitary diaper, which is used by women during menstrual cycle, was worn by the victim down the briefs.

5- Hand watch, Chopard brand, soiled with blood.

All clothes items that were worn by the victim were soiled with blood.

Body Examination

1- External examination showed that the body belonged to a white-skinned Arab female, length 170 cm, weight 68 kg.

2- A regular borders wound (the most probably cut type) was found on the left aspect and front of the neck. It was extending from the bottom of the left ear, directing to the front aspect and right side, reaching the highest border of the right clavicle and includes all the neck muscles and all the main arteries, esophagus, trachea below the level of the hyoid bone(see the picture no.1).

3- Two wounds of regular borders lying beside each other, located high up in the chest, opposite the left clavicle, each is 2 cm length, both are deep, each has one round end and the other is acute angled.

4- Two regular wounds over each other on the back of the right arm, the lower one is 2 cm in length, while the upper one is 3.5 cm, each has one round end and the other end is acutely angled.

5- A wound with regular borders, 0.25cm length, located just below the font of the right arm. It looks like exit of the sharp arm that happened during infliction of the wounds described above (point 3).

6- A vertical wound, 0.5 cm in length, located in the right chest just down the right breast; it matches the above-mentioned tears in the T-shirts (points 1 & 2).

7- A bright red-colored vital lesion (bruise), whose size is 0.5 X 0.5 cm, located in the upper lip opposite the upper left incisor; associated with a further little horizontal wound, sized 0.25 cm, opposite the tip of the above-mentioned incisor.

8- A bright red-colored vital lesion (bruise), whose size is 0.5 X 0.5 cm, located opposite the lower left incisor.

9- A violet-colored lesion, 6 x 8 cm in size, located down the back of the right thigh.

10- A green-colored lesion associated with swelling, located down the lateral aspect of the left leg.

11- A superficial wound with regular borders located in the right side of the neck just down the right ear, 0.25 cm in length.

12- Incomplete breaking of the left thumb nail.

The victim was wearing an artificial hair (weg); she had a scar of an old-healed wound between buttocks, probably caused by cosmetic surgical interference.

All the body showed complete rigor mortis; its temperature was the same as that of the surrounding temperature.

Livor mortis was recognized faint in the back of the cadaver; when the body was turned upside down for back examination, some areas of livor mortis were seen in parts of the face and high up in the chest.



Fig. 1. The victim at the scene of crime with a big and deep cut wound extending from the front of the neck to the left.

Suspected unknown clothes items

ON search, police officers found a plastic bag, which was impacted (hidden) on the floor 21st of the same building just below the fire extinguisher and fell down on opening the cover of the fire extinguisher. The plastic bag contained a shirt and pants, they were described as follows:

1- A male T-shirt of pink and beige color, contained blood stains from front and back. Preliminary and confirmatory blood tests were carried out that showed that the stain was human blood. Two blood samples were collected and sent for DNA testing. A sample swab was collected from the T-shirt (sample No. 4) and another sample swab from the T-shirt opening from the front (sample No. 5).

2- A male sports pants, soiled with blood (sample No. 7).

Autopsy

Head: Severe bruising, whose dimensions 5 X 7 cm located opposite the right temporal and parietal areas. Skull bones are intact and no associated fractures.

Brain, meningis: their blood vessels are pale and showed absence of any traumatic or pathological lesions. Brain weighed 1250 gm.

Face and neck: in addition to the above- mentioned injuries in the external examination, no further injuries could be seen. Bones of the face and neck were normal, no fractures; however, esophagus and trachea contained traces of blood.

Chest: chest inspection showed that the two wounds, above- mentioned in the point 2 of body examination), do not exceed the clavicle breadth means, not extending deep to the chest cavity; the above- mentioned wound under point number 5 penetrated the skin only but not deep to the chest cavity.

There were two old wounds in the breasts caused probably by cosmetic surgical interference for enlargement of the breasts as two silicon units were withdrawn one from each breast, each was 500 gm weight. The chest cavity was free from bleeding or bloody exudates, hears weighed 300 gm, right lung 340 gm and left lung 350 gm; all were free from traumatic or pathological injuries.

Abdomen: the abdomen contents looked with normal appearance, free from any traumatic or pathological lesions and the abdominal cavity showed no blood or bloody fluids. Liver weighed 1115 gm, right kidney 110 gm, left kidney 100 gm and spleen 90 gm. The stomach looked normal and contained no food, little secretions. Intestine (small and large) looked normal, contained a little amount of stool material. Uterus is normal, no conception, or foreign bodies, both ovaries showed no lesions.

Laboratory work

Blood samples were sent to the toxicology laboratory for toxicology materials such as alcohol, drugs.

Blood swabs, nail clipping were sent to the biology laboratory for DNA analysis.

NB. At the scene of crime at the story 21, just one level below that where the crime was committed, a white big envelope was found that contained the following items:

1- A black male sport pants, Nike brand, with three pockets on one on each side and one on the back and on its anterior aspect there were several blood spots. Preliminary analysis revealed that is was a human blood. Blood swabs were collected and sent for DNA analysis.

2- A brown colored male T-shirt, medium size, Protest brand, on its anterior aspect there were different blood spots. Blood swabs were collected and sent for DNA analysis.

DNA samples' collection List

Table 1. Describes the list of samples that were collected for DNA analysis.

Site of collection	Sample's number
blood sample from the abdomen of the victim	Sample No. 1
blood sample from the kitchen floor	Sample No. 2
blood sample from an orange plastic bag that was deposited on a dining table in the sitting room.	Sample No. 3
blood samples from the front and back of the male T-shirt that was found on the floor 21st.	Sample No. 4
blood swab from the front of the male T-shirt collar, mentioned in the previous point.	Sample No. 5
blood samples from the bloody wet areas on the front and back of the male sports pants , which was found on the floor 21st.	Sample No. 6
blood samples taken from the blood stains that were found on the threshold of stairs between the stories numbered 21 & 22.	Sample No. 7

Genotyping results of DNA samples

They are summarized in the following two tables (2A & 2B).

Table 2 A. Describes the genotyping results of the reference sample and samples 1-3.

Sample No. 3 Blood from the orange plastic bag on the dining table	Sample No. 2 Blood swab from the kitchen floor	Sample No. 1 Blood from the abdomen of the victim	Reference blood sample of the victim	DNA Marker tested
13, 15	13, 15	13, 15	13, 15	D8S1179
30, 32.2	30, 32.2	30, 32.2	30, 32.2	D21S11
8, 10	8, 10	8, 10	8, 10	D7S820
11, 11	11, 11	11, 11	11, 11	CSF1PO
14, 16	14, 16	14, 16	14, 16	D3S1358
7, 7	7, 7	7, 7	7, 7	THO1
9, 10	9, 10	9, 10	9, 10	D13S317
11, 12	11, 12	11, 12	11, 12	D16539
19, 20	19, 20	19, 20	19, 20	D2S1338
12, 13.2	12, 13.2	12, 13.2	12, 13.2	D19S433
18, 18	18, 18	18, 18	18, 18	VWA
8, 10	8, 10	8, 10	8, 10	TPOX
12, 19	12, 19	12, 19	12, 19	D18S51
10, 12	10, 12	10, 12	10, 12	D5S818
21, 23	21, 23	21, 23	21, 23	FGA
XX	XX	XX	XX	Amelogenin

Table 2 B. Describes the genotyping results of samples 4-7.

Sample No. 7 Blood from the wet areas on the back of male sports pants.	Sample No. 6 Blood from the front aspect of the male T-shirt collar.	Sample No. 5 Blood on the front and back of the male T-shirt.	Sample No. 4 blood on the threshold of stairs bet. stories 21 &22.	DNA Marker tested
13, 15	11, 12, 13, 15	13, 15	13, 15	D8S1179
30, 32.2	29, 30, 32.2	30, 32.2	30, 32.2	D21S11
8, 10	8, 10, 12	8, 10	8, 10	D7S820
11, 11	11, 12, 13	11, 11	11, 11	CSF1PO
14, 16	14, 16, 17, 18	14, 16	14, 16	D3S1358
7, 7	6, 7, 8	7, 7	7, 7	THO1
9, 10	9, 10, 12	9, 10	9, 10	D13S317
11, 12	11, 12	11, 12	11, 12	D16539
19, 20	17,19, 20, 25	19, 20	19, 20	D2S1338
12, 13.2	12,13.2,15,16.2	12, 13.2	12, 13.2	D19S433
18, 18	15, 17, 18	18, 18	18, 18	VWA
8, 10	8, 9, 10, 11	8, 10	8, 10	TPOX
12, 19	12, 14, 19	12, 19	12, 19	D18S51
10, 12	10, 11,12	10, 12	10, 12	D5S818
21, 23	19, 21, 23, 24	21, 23	21, 23	FGA
XX	XY	XX	XX	Amelogenin

Table 3. Displays the perfect match that was discovered on genotyping of the unknown male blood (on a piece of cloth that was found nearby the scene of crime in Dubai) and the blood sample that was collected from the suspect in Egypt and genotyped in Egypt Forensic DNA lab).

Genotyping result of the blood sample that was collected from the suspect in Egypt and genotyped in Egypt Forensic DNA lab.	Genotyping result of the unknown male blood sample that was found on a piece of clothes nearbye the scene of crime in Dubai	DNA Marker tested
11,12	11, 12	D8S1179
29, 32.2	29, 32.2	D21S11
10, 12	10, 12	D7S820
12, 13	12, 13	CSF1PO
17, 18	17, 18	D3S1358
6, 8	6, 8	THO1
9, 12,	9, 12	D13S317
11, 12	11, 12	D16539
17, 25	17, 25	D2S1338
15,16.2	15, 16.2	D19S433
15, 17	15, 17	VWA
9, 11	9, 11	TPOX
14, 19	14,19	D18S51
10, 11	10, 11	D5S818
19, 24	19, 24	FGA
XY	XY	Amelogenin

Discussion

DNA analysis: In the present case, DNA was analyzed by the one of the recent DNA analytical methods that is known as DNA Genotyping. In this case there have been several points that can be considered as either pitfalls and/or errors and just examples of these pitfalls are mentioned such as:

1. The forensic expert in the circumstances had mentioned that the victim was covered by two sheets, the first was covering the face and the second was covering her body. However in the results, she did not mention anything about collection of blood samples from both sheets or any DNA analysis from them.
2. The forensic expert mentioned that the victim was wearing short jeans, which was folded at the knees and a sleeveless t-shirt. She did not mention anything about collecting of such items as evidence or the result of their examination.

3. The forensic expert in the circumstances mentioned that at the scene of crime there was a dining table on its top there were some blood-stained accessories, however, she did not mention anything about collection of any blood samples for DNA analysis or result of DNA analysis of blood samples from such items.
4. Just one story below the scene, the police discovered a plastic bag impacted just below the fire extinguisher box. However, they did not exam the box closely or collect any swabs from the cover or sides of the fire extinguisher box which may potentially bear some fingerprints or any biological evidence suitable for DNA analysis.

Several errors occurred during interpretation of DNA analysis data:

Table 4. Displays the discrepancy between the samples 4, 5 & 7 in table 1 (samples collection list) and table 2B (genotyping results of samples). It is clearly seen that samples are not matching between tow columns and this can easily be realized by noticing the discrepancy of colors.

Sample	DNA samples' description under the DNA samples' collection list (in table 1).	DNA samples' description under the genotyping results of samples (in table 2B).
No. 1	The abdomen of the victim.	The abdomen of the victim.
No. 2	The kitchen floor.	The kitchen floor.
No. 3	The orange plastic bag on the dining table.	The orange plastic bag on the dining table.
No. 4	The front and back of the male T-shirt.	The threshold of stairs between the stories numbered 21 &22.
No. 5	The front and back of the male T-shirt .	The front and back of the male T-shirt.
No. 6	The front and back of the male sports' pants.	The front and back of the male T-shirt .
No. 7	The threshold of stairs between the stories numbered 21 & 22.	The front and back of the male sports' pants.

Conclusions

It is common practice in DNA forensic analysis that DNA laboratories encode information in the sample name or sample identification number in order to allow analysts to track analysis-related information along with the sample name.

The discrepancy between the description or names of DNA samples in both DNA samples collection and samples results can be clearly seen through the discrepancy in colors which should match on both sides of the above table. This discrepancy would refer to the manual entry of data, which is prone to transcription errors. They should have used modern data entry technology which has proved useful and greatly reduced entry errors (14).

It is advisable in such situations to use compatible software for sample tracking, data generation and uploading as using them would help in avoiding mistakes that would lead to questioning of the validity of results (15).

Transcription errors can also be avoided by electronic uploading with setting up centralized database for all data comparison (16).

Finally I would like to say that despite these pitfalls would appear as something trivial however, in this case the these pitfalls have given the defense the weapon to call into the question the credibility of results and claim before the court to acquit the suspect.

In my opinion, I think avoiding of such pitfalls in the forensic and criminal investigations can be achieved simply by following the standard protocols during sampling and preservation of forensic samples and also during DNA analysis and interpretation of results and also abiding by the recommendations of the DNA commission of the international society of forensic genetics (16).

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N.B. Picture number 1 I was provided from the court and it was also distributed to the defense members and also was printed everywhere to many magazines and available on many Arab websites interested in this accident. ↑