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Human Remains detection after Suicide Bombing by STR Analysis

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Abstract

Following suicide bombing, human remains usually collected for DNA identification. Human remains affected due to exposure to excessive heat and bomb solid, sharp pieces. The aim of this work is to study the possibility of DNA analyzing of human remains after suicide bombing. Fifteen human remains were received from a place of suicide bombing in Najaf City south of Iraq. The remains were severely affected and cannot recognize morphologically or as it is human or animal origin. DNA extracted from remains by organic method, then quantified by real time PCR kit then analyzed by Powerplex 21 kit using 3130XL Genetic Analyzer. The results showed that seven remains where analyzed successfully while the other remains failed for analysis for both real time PCR quantification or STR analysis. Four remains belong to two persons. This study showed that suicide bombing affects negatively the most remains for STR analysis.

Key words: Suicide, Bombing, Najaf, Forensic, STR, Human remain detection, DNA analyzing.

Introduction

DNA profiling is the standard method for human identification (1). Short tandem repeats (STR) assays were produced commercially for forensic applications in crimes and mass fatality incidents. Identification of human remains resulted from explosions were performed in forensic laboratories around the world, after September 2011 (2), Australia Embassy explosive in Jakarta 2004 (3), Madrid 2004 (4) and other places in the world. Iraq suffered from thousands of suicide bombing during many years of terrorism. For each explosion there was need for identification of the terrorist and the victims. Human remains usually collected then analyzed using STR technology and sometimes with mtDNA (5,6). Human remains resulted from suicide bombing were then exposed to excessive heat and pressure negatively affects DNA profiling. The aim of this work is to study the possibility of analyzing human remains from suicide bombing scene using STR Analysis.

Materials and Methods

Human DNA remains (14 samples) collected from suicide bomber in Najaf city/ Iraq. Organic method (Sambrook) was used for DNA extraction from samples. Extracted DNA quantified using Quantifiler kit (Applied Biosystem). Powerplex 21 kit (Promega) was used for amplification of STR loci. Amplified products were analyzed by 3130XL genetic analyzer (Applied Biosystem).

Results and Discussion

Human remains were collected from suicide bombing site Figure 1, DNA extracted by organic method then quantified by Quantifiler kit.

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Figure 1: Human remains collected from suicide bomber scene

The amount of DNA extracted showed in table 1

Table 1: The amount of DNA extracted from human remains

Remain	Description	DNA Concentration (µg/ml)	STR profile
1	Piece of flush	169.37	Full profile
2	Tissue from head skin	4.89	Full profile
3	Tissue from head skin	34.72	Full profile
4	Brain tissue	4.74	Full profile
5	Blood buccal swab	11.7	Full profile
6	Blood buccal swab	33.24	Full profile
7	Blood buccal swab	134.84	Full profile
8	Burned tissue	0.73	No profile
9	Burned tissue	No	No profile
10	Fatty tissue	No	No profile
11	Suspected liver tissue	No	No profile
12	Burned tissue	No	No profile
13	Finger	No	No profile
14	Blood buccal swab	No	No profile

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No partial STR profiles were obtained either full figure 2 or no profiles were obtained for our samples.

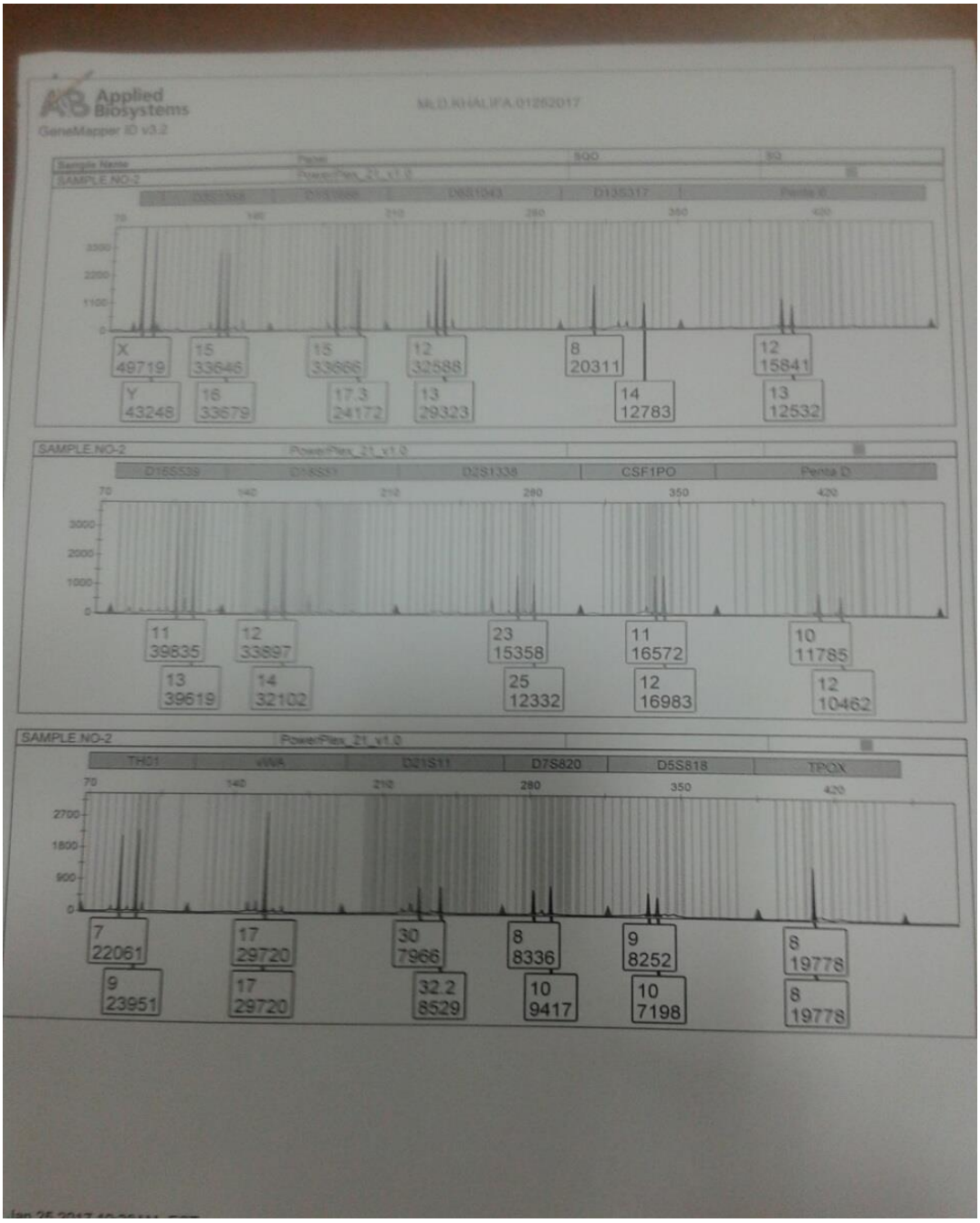

Figure (2): Full STR profile for a human remain using Powerplex 21 kit.

STR analysis showed that seven remains were produced full STR profile while other eight remains not. Samples with no STR profiles they were no DNA amount as performed by real time PCR except one sample has 0.7ng/ml but no STR profile. Two samples were belonging to the same person. Samples with no real time PCR results were eliminates from STR profile. Some samples with no real time PCR results represented as non-human sample due to non IPC amplification. Sample 4 show contamination, this may be during sample collection or sample processing, DNA is also susceptible to derivative processes due to

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environmental variables such as chemical exposure, temperature and biological activity such as bacterial invasion that is cause degradation to biological human DNA(8)

It is important to identify the tissue type in order to use suitable DNA extraction method and to specify the right part of tissue and the right location that produce accurate DNA allele calls (9)

In this study all human remains resulted from suicide bombing in Iraqi Najaf city were analyzed with powerplex 21 kit using standard STR protocol. Some remains failed to produce STR profiles due to the effects of the explosion.

The failure of reserving STR call is due to the extremely high explosion energy and release of heat up to 5227 C0 (10). Also the type of explosive charges with RDX (T4), Tritol (TNT), C-4 or black powder effect differently to the biological evidences, and directly to the one who committed the crime (The terrorist) (11).

Since such mass disaster affects negatively the evidence such as: totally destroy the body, lose features that enable victims and criminal (suicidal) identification to be identified, mostly facial features or fingerprints, corruption evidence relevant to the death circumstances (12).

The use of STRs to analyze a highly degraded DNA samples in real casework was dramatically demonstrated by the identification of human remains from disasters such as our subject in this study. The fired soft tissues will greatly impede research by other experts (such as forensic pathologists) and thus, analysis of burned human remains is a common activity assigned to forensic anthropologists (13).

Conclusions

This study showed that suicide bombing affects negatively the most remains for STR analysis.

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الكشف عن البقايا البشرية بعد التفجير الانتحاري بواسطة تحلل STR

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الملخص

بعد التفجير الانتحاري ، عادة ما يتم جمع الرفات البشرية للتعرف على الحمض النووي. تتأثر البقايا البشرية بسبب تعرضها للحرارة المفرطة والقنابل الصلبة والقطع الحادة. الهدف من هذا البحث هو دراسة إمكانية تحليل الحمض النووي للرفات البشرية بعد التفجير الانتحاري. تم تسلم 15 رفات بشرية من موقع تفجير انتحاري في مدينة النجف جنوب العراق، حيث تأثرت البقايا البشرية بشدة ولا يمكن التعرف عليها شكليًا أو مصدرها من أصل بشري أو حيواني. تم استخلاص الحمض النووي من البقايا بالطريقة العضوية ، ثم تم تحديده كميًا بواسطة مجموعة qPCR ثم تحليله بواسطة مجموعة Powerplex 21 باستخدام محلل وراثي 3130 .XL. أظهرت النتائج أن سبع من بقايا البشرية تم تحليلها بنجاح بينما بقيت العينات الأخرى فشلت في التحليل لكل من تقدير qPCR أو تحليل STR. أربعة بقايا تعود إلى شخصين.أظهرت هذه الدراسة أن التفجيرات الانتحارية تؤثر سلبًا على معظم ما تبقى من تحليل المعاملات المشبوهة.

الكلمات الدالة: انتحار ، تفجير ، النجف ، الطب الشرعي ، كشف بقايا بشرية ، تحليل الحمض النووي.