



Ain Shams University
Faculty of science
Department of Zoology

**GENETIC STUDIES FOR SOLVING SOME CRIME MYSTERIES
AND CIVIL PROBLEMS USING DNA FINGERPRINTING**

A Thesis

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(Molecular genetics)

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بِسْمِ اللَّهِ الرَّحْمَنِ الرَّحِيمِ
وَمَا تَوْفِيقِي إِلَّا بِاللَّهِ
عَلَيْهِ تَوَكَّلْتُ وَإِلَيْهِ
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DEDICATION

***To My dear family, I dedicate this work to
you for your great support during my
fellowship and your faithful and stimulating
advice in order to perfect my work.***

***With all my love to my parents for all their
help and prayers to fulfill my hopes.***

***Yours sincerely,
Ahmed Farouk Abd El Hafez***

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ABSTRACT

Short tandem repeats (STRs) are widespread throughout the human genome and are a rich source of highly polymorphic markers which can be effectively used for individual identification purposes. They can be copied simultaneously by PCR. To gain a better appreciation for how the polymorphism at a particular locus impacts the individual identity, the present study was mainly undertaken to explore the use of 15 STR loci in forensic investigation and paternity testing.

Multiplex STR typing was used to study the 15 STR loci (D8S1179, D21S11, D7S820, CSF1PO, D3S1358, TH01, D13S317, D16S539, D2S1338, D19S433, vWA, TPOX, D18S51, D5S818 and FGA) in addition to a gender identification marker, amelogenin, by capillary electrophoresis on 310 Genetic Analyzer. Three different DNA extraction methods were evaluated to select an ideal extraction method in terms of DNA quality and quantity for forensic purposes.

Abstract

Database of allele frequencies for 15 somatic short tandem repeat loci was constructed from 85 unrelated Egyptian individuals.

Samples from 35 paternity cases (20 trios and 15 duos) of disputed paternity were investigated. The data were analyzed to give information on paternity index, probability of paternity, frequency of number of exclusions and rate of mismatch at each STR locus. The method was also successfully applied to forensic personal identification in theft and murder cases. The results demonstrated that the STR typing is a reliable and robust tool for analyzing the forensic practice as well as for paternity testing.

Different kinds of human tissues (bone, flesh, bloodstain, placenta and fatty tissue) were examined for their DNA degradation following open-air exposure at different intervals. Both bone and bloodstain showed no degradation till 9 months, and full STR profiles were obtained. However, the other tissues showed varying degrees of DNA degradation.

Abstract

The advantages of using multiplex STR analysis over other conventional methods are discussed.

Keywords:

Forensic DNA typing, Paternity testing, Crime mysteries, Short tandem repeats (STRs), Multiplex-PCR.

CONTENTS	Page
I. INTRODUCTION.....	1
II. AIM OF THE WORK.....	4
III.REVIEW OF LITERATURE	5
IV. MATERIALS AND METHODS.....	21
1. Collection of samples.....	21
1.1. Evaluation of different DNA extraction methods.....	21
1.2. Population database.....	21
1.3. Paternity cases.....	21
1.4. Biological evidences from crime scenes (criminal cases).....	21
1.5. Degradation of DNA	23
2. Storage and transport of biological evidences.....	23
3. Extraction of DNA.....	24
• Preparation of a bloodstain	25
3.1. Protocol for isolation of genomic DNA by organic extraction.....	26
a. Materials to be supplied.....	26
b. Procedure.....	26

3.2.	Protocol for isolation of genomic DNA by QIAamp DNA blood Mini kit.....	29
a.	Important notes before starting.....	29
b.	Blood and Body Fluid Spin Protocol.....	31
3.3.	Protocol for isolation of genomic DNA by Biorobot EZ1	34
a.	Things should be done before starting.....	35
b.	Procedure.....	35
4.	DNA Quantification.....	38
5.	Amplification of certain microsatellites via Polymerase Chain Reaction (PCR).....	42
5.1.	Polymerase Chain Reaction (PCR)	42
5.2.	PCR reaction components.....	42
5.2.1.	Denaturing.....	44
5.2.2.	Annealing.....	44
5.3.	Method applied.....	45
5.3.1.	Control used to monitor PCR.....	47
5.3.2.	Amplifying the DNA.....	48
5.3.3.	Loci amplified by the Kit (AmpF ℓ STR Identifiler).....	49
5.3.4.	Nomenclature for DNA markers.....	52

a.	If a marker is apart of a gene or falls within a gene.....	52
b.	DNA markers that fall outside of gene regions	54
6.	Separation and detection of STR amplicons.....	55
	- Running DNA samples.....	56
6.1.	Preparing samples and AmpF ℓ STR Identifier allelic ladder.....	56
6.2.	Components of capillary electrophoresis (CE).....	57
6.3.	Components of the ABI 310 genetic analyzer (Single Capillary) (Applied Biosystems).....	59
7.	Electrophoresis and analysis.....	61
8.	Statistical analysis.....	61
V.	RESULTS	64
•	DNA profiling	64
1.	Evaluation of three different methods for the extraction of DNA from human blood.....	71
2.	Population database.....	77
3.	Paternity cases.....	92
4.	Criminal cases.....	145
4.1.	Theft case	145

4.2. Murder case 1.....	145
4.3. Murder case 2.....	146
5. DNA degradation analysis of different human tissues following open-air exposure	157
5.1. A male human bone	157
5.2. A male human flesh.....	157
5.3. A female human bloodstain.....	158
5.4. A human placenta.....	158
5.5. Human fatty tissue.....	158
5.5.1. A female human fatty tissue	158
5.5.2. A male human fatty tissue	159
VI. DISCUSSION	196
VII. SUMMARY	215
VIII. REFERENCES	223
ARABIC SUMMARY	