Ain Shams University
Faculty of science
Department of Zoology

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

A Thesis

Submitted in partial fulfillment of

The requirements for the degree of

M.Sc. in Zoology

(Molecular genetics)

BY

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بسم الله الرحمن الرحيم

وما توفيقي إلا بالله

عليه توكلت وإليه

أنيب

صدق الله العظيم

هود / آية ٨٨

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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.

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