Proposal Defense

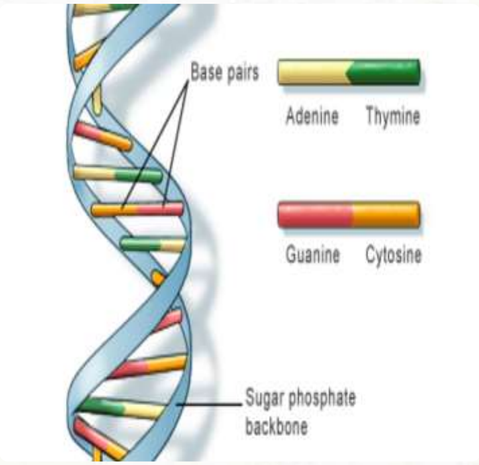
THE IMPACTS OF MODERN DNA TECHNOLOGY IN FORENSIC SCIENCES

Student: Ahmed Anwar Ali Alafeefi
Metric number: GW210013
Program of study: Master of Biology Science
Supervisors: Ts. Dr. Kamarul Rahim Bin Kamarudin

Outline of Contents

01

Introduction



Basic DNA structure

Traditional DNA database

Modern Collection of DNA sample

Collection of Forensic DNA

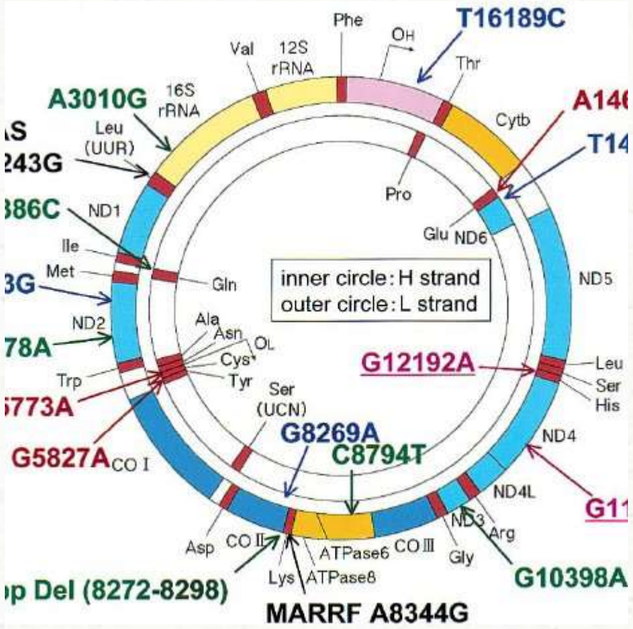
- The biological material used to determine a DNA profile include blood, semen, saliva, urine, feces, hair, teeth, bone, tissue and cells.
- Investigators can collect items used by the criminal from gloves, hats, condoms, mask, weapons, dirty laundry, cigarettes, etc

Use of Modern Technology on Collected DNA

Autopsy can be used to determine the cause of death

- In case of homicide, police need to solve the crime and the perpetrators put to justice

DNA technology can be used to determine the persons responsible for death in homicide cases with a high degree of accuracy



Cont...

- Prints on the skin or DNA collected from accessories used by the criminal can be accurately compared and matched to reference samples.
- Reference samples are collected from arrestees or persons of interest as deemed necessary by a court of law

Challenges in DNA Technology

- A complex challenge noted in DNA profiles is contamination during collection as well as during storage and handling in the laboratories
- Inadequate DNA or the downscaling of DNA could orchestrate false identification when partial profiles are in use

Issue

Modern DNA technology has suffered critical challenges, believed to be technological manipulation to alter results

AI could revolutionise DNA evidence – but right now we can't trust the machines

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DNA evidence often isn't as watertight as many people think. Sensitive techniques developed over the past 20 years mean that police can now detect minute traces of DNA at a crime scene or on a piece of evidence. But traces from a perpetrator are often mixed with those from many other people that have been transferred to the sample site, for example via a handshake. And this problem has led to people being wrongly convicted.

Scientists have developed algorithms to separate this DNA soup and to measure the relative amounts of each person's DNA in a

Author

Karen Richmond
Postdoctoral research fellow, University of Strathclyde

Disclosure statement

Karen Richmond does not work for, consult, own shares in or receive funding from any company or organisation that would benefit from this article, and has disclosed no relevant affiliations beyond their academic appointment.

Source: https://theconversation.com/ai-could-revolutionise-dna-evidence-but-right-now-we-cant-trust-the-machines-129927

Problem Statement

To determine the actual impacts of modern DNA innovation in investigative sciences and trust the forensic Science members depends on their belief on their DNA analysis by using the modern technology in forensic sciences

Research Aims

This research aims to express the interlink between forensic sciences and modern DNA technology, specifically provide a comprehensive conclusion and stance to the impending forensic advancements attributed to DNA technology.

The extent of acceptance and confidence of judicial authorities and the public using the modern DNA technology in forensic sciences.

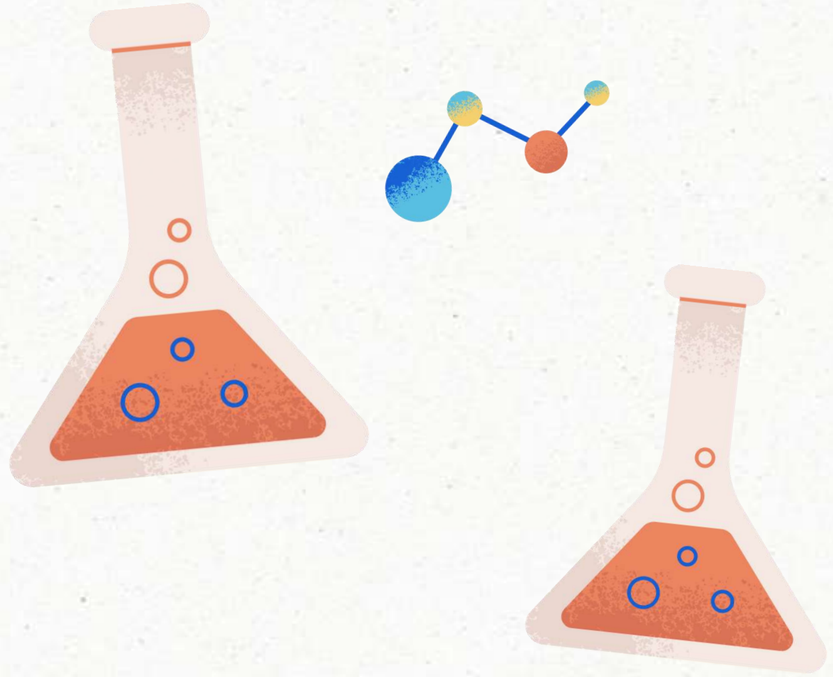
Research Questions

1. How does Modern DNA technology differ from the Traditional DNA testing techniques applied in past forensic studies in the United Arab Emirates?

2. What are the successes of Modern DNA technology in enhancing forensic accuracy and stability in the United Arab Emirates?

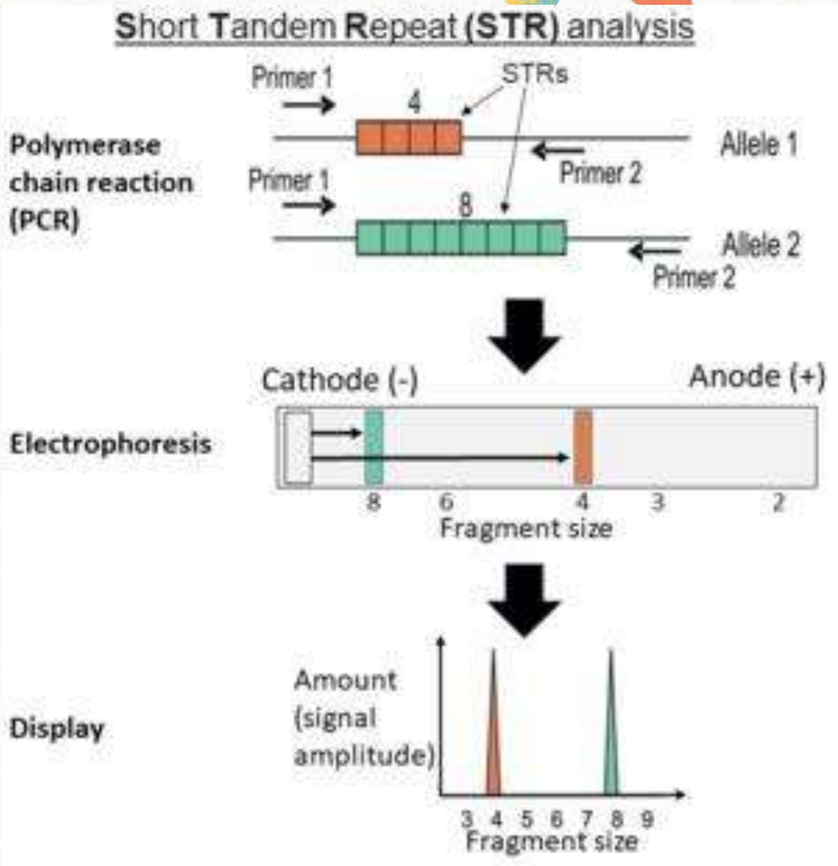
3. Do the modern DNA technology proponents include any technical flaws that have been experienced in testing and validation processes in the United Arab Emirates?

4. How did the technology enhance the safety and well-being of communities in the United Arab Emirates through examining the impact of modern DNA technology in forensic sciences?



Scope of the research

- This research will focus on the role of new DNA technologies in forensic science investigations. Use of DNA in forensic investigation is the potential area. However, concerns on the effectiveness of this technique in solving criminal cases have made it difficult for its large-scale applications.
- This study will address these concerns by reviewing enough evidence to show the efficiency and reliability of new DNA technologies in forensic investigations.
- The research will focus primarily on systematic review of literature related to the research topic.



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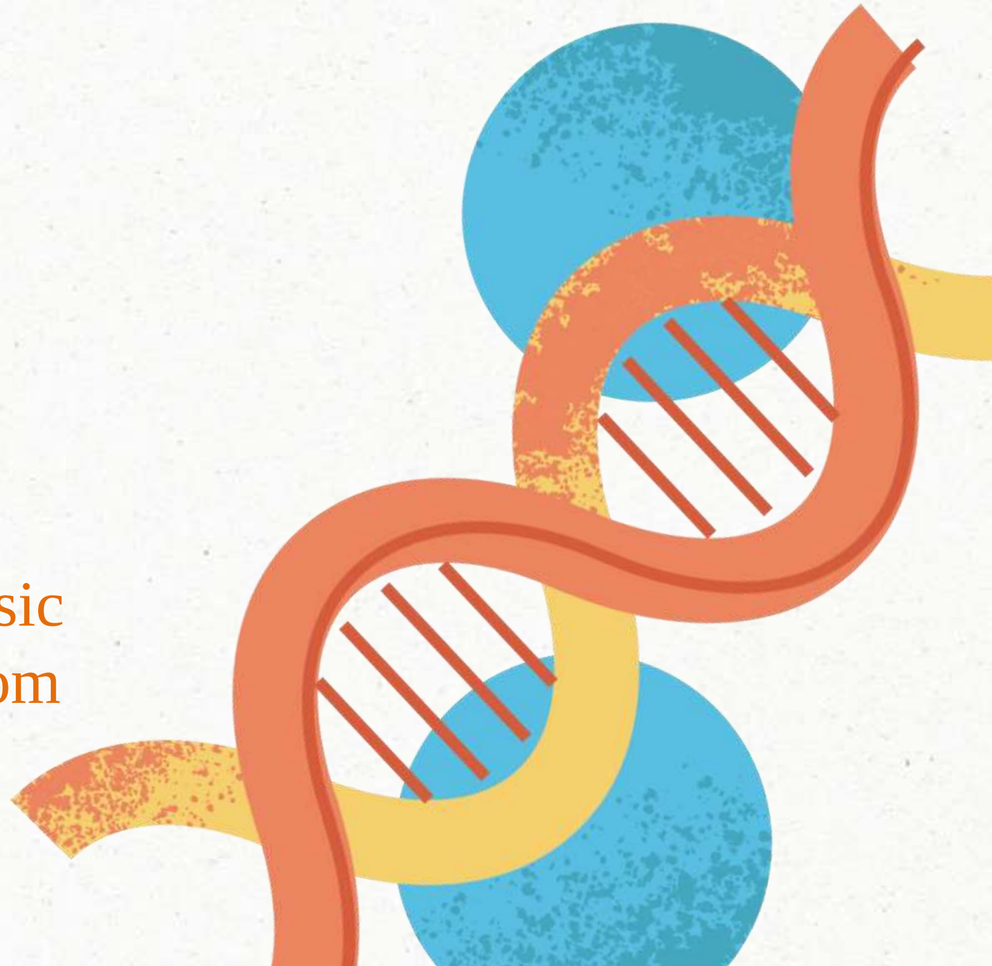
Research Methodology

- A sequential analysis will help compare research from various authors to establish the role of new DNA technologies in forensic investigations
- The systematic review will help identify the author's perspectives on the role of DNA technologies on forensic investigations, based on the evidence they collected from other sources



Search Strategy

- The preferred databases are PubMed, Google Scholar, Science Direct and Mendeley.
- Search strings applicable include role of DNA typing to forensic investigations, perceptions of new DNA technologies on legal investigations and the function of DNA technology on legal science.

Study Selection

- The title and abstracts of identified studies will be screened to determine if they contain relevant information.
- The inclusion criteria entail studies on DNA technology or DNA typing and forensic science or forensic investigations.
- The articles from 2012-2022 were reviewed.

Methodology Conti...

Data extraction and quality assessment

To ensure consistency in comprehension and data extraction, the reviewer created and piloted a list of extraction items prior to the screening procedure. A CASP checklist was utilized to generate scores for each study because the research was varied and mostly descriptive (CASP, 2018).

CASP Checklist

1. Were the objectives of the study clearly stated?
2. Do you need to use a qualitative methodology?
3. Did the research design adequately address the study's objectives?
4. Did the recruitment strategy fit the research's objectives?
5. Did the data collection method address the topic of the study?
6. Has the interaction between participants been properly taken into account?
7. Have moral concerns been taken into account?
8. Was the data analysis thorough enough?
9. Does the conclusion make sense?
10. How worthwhile is the study?

Data Analysis

Data from different articles will be coded to generate themes. Possible themes include new DNA technologies, successful application of DNA technologies/typing on forensic analysis, perceptions of effectiveness of DNA technologies on forensic investigations, challenges or obstacles of DNA technologies in forensic investigations and possible solutions to enhancing adoption of DNA technologies in forensic investigations.

03

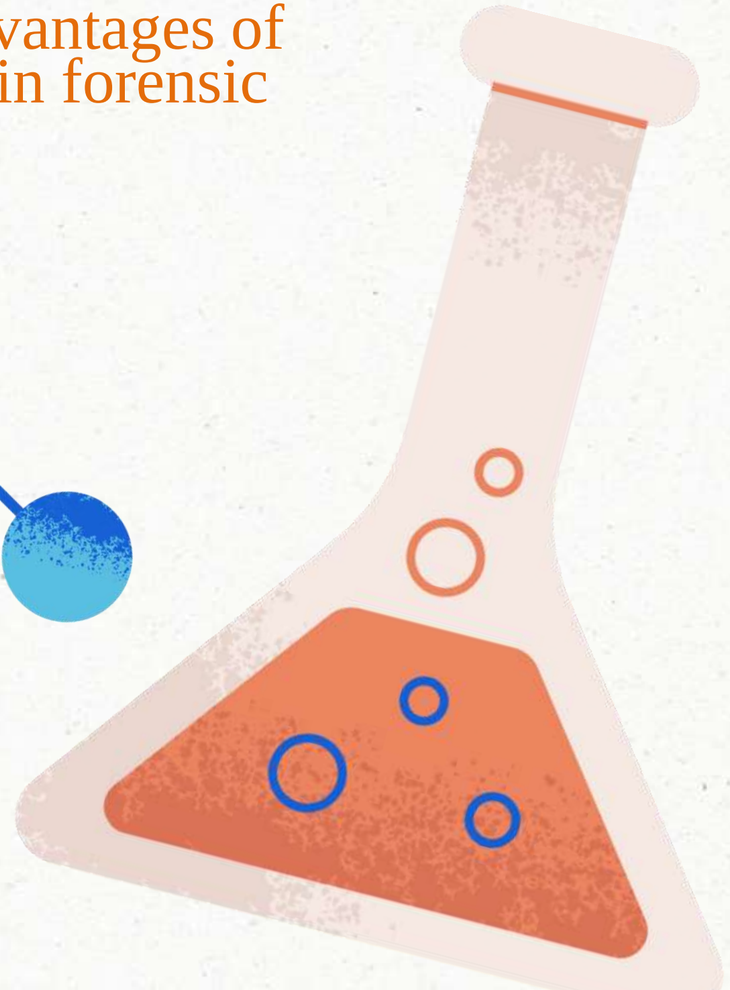
Results

01

Most of the studies reviewed will identify the advantages of DNA technologies in forensic investigations

02

Challenges of DNA technologies used in forensic investigations and potential solutions will be established



Results

- 60 studies from Google Scholar Database (2012-2022)
- The primary critical phrases searched were:

1. Traditional versus modern DNA technologies used in forensics

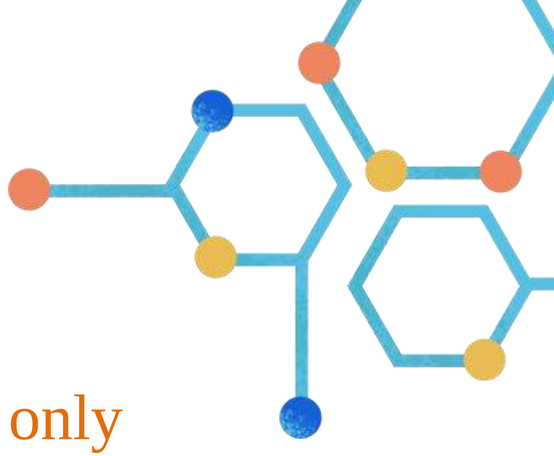
2. New DNA technologies in Forensic science

3. Ethical issues in forensic-related DNA technologies

4. Development of DNA technologies in Forensic science

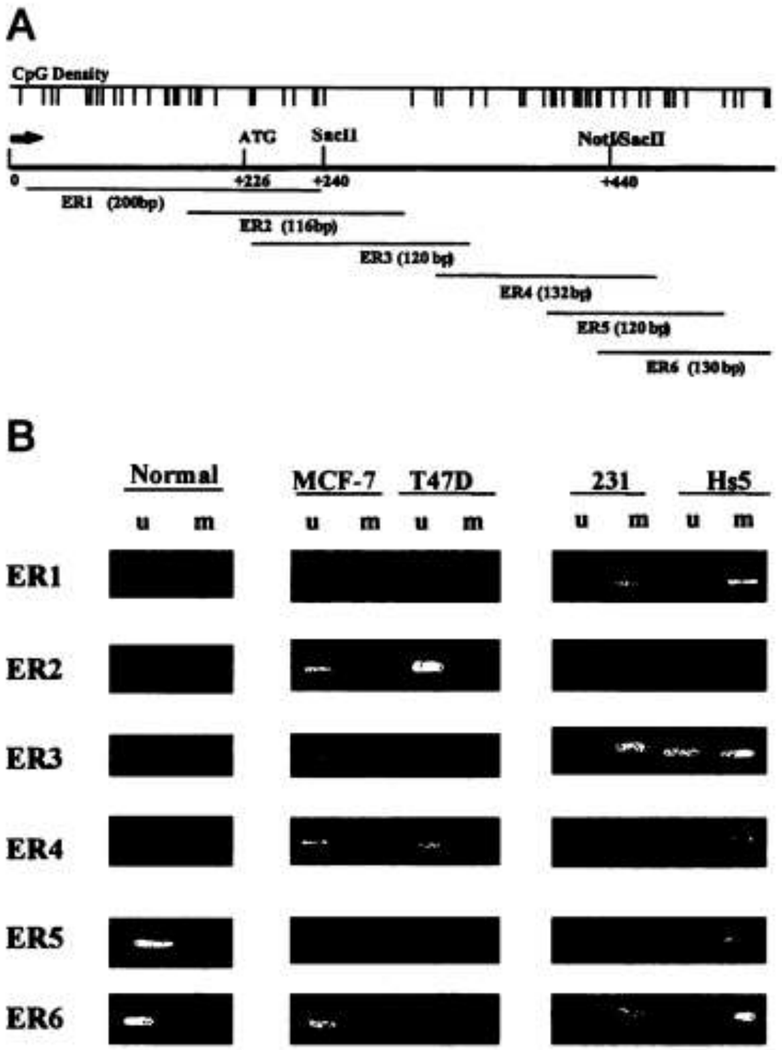
The final publication reviewed were 43.

Theme 1: Differences between Modern DNA Technologies and Traditional Testing Techniques



- There is a global adoption of molecular tools used to enhance not only identification but also individualization of human and non-human genomes during sampling.
- Patel *et al.* (2016) found that small-sized collected evidence provides sufficient molecular material to conduct more than one type of examination.
- 0.6mm microarray sample was enough to succeed in cancer mapping by engaging in methylation-specific PCR, reverse transcriptase conjured with real-time PCR, multi-analyte gene expression, and downstream analyses to differentiate DNA into RNA and vice versa.

Detection of Breast cancer W.R.T MSP & PCR. (Rena, 1995)



Theme 2: New DNA technologies

MPS

- for public purchasing
- For investigation of chromosomal STR Loci
- Heritage identities
- Morphological SNPs

MinION

- Monitor ion tides

Theme 3: Limitations

1. Inadequate copy number

Reduce validity during forensic investigation

2. Degradation of DNA

Reduction of STR sequence

3. Sample mixture

Combination of blood stream reduce likelihood ratio (LR)

Impact of DNA technologies on safety and wellbeing

- Inclusion of more allele location
- Deserted DNA
- Volume of CODIS
- Doubtful procedure of collecting genetic material

Table Gantt Chart for Semester 1 until Semester 3

Year	2021			2022										
Months / Activities	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov
Proposal Writing														
Milestone 1: Completion of Proposal Writing				X										
Search databases for relevant studies based on inclusion/exclusion criteria														
Data extraction and quality assessment														
Data analysis														

Milestone 3: Completion of data analysis on DNA technologies (PowerPoint Defence Session)									X					
Writing Discussion														
Writing Conclusion														
Milestone 4: Completion of discussion and conclusion writing												X		
Report submission														
Milestone: X														

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THANK YOU