



المؤتمر الصحي الدولي الرابع لزيارة الأربعين

The 4th International Congress on Health in Arbaeen

چهارمین گنگره بین المللی سلامت در اربعین

ماطک انامیرین
اربعین مؤتمری صحتی و طب

The Role of Forensic Genetics in Identity Determination (in gatherings)

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Introduction

In recent decades, remarkable advancements in the field of genetics have significantly influenced :

- Various scientific domains
- Technological area, and also
- Forensic medicine.



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Aims

Some incidents can happen such as:

- Disasters
- Crimes
- Other cases related to the forensic medicine



A cinema fire



Building fire and collapse



An incident in a addiction rehab center



A Plane Crashe



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Importance of Identity Determination in Disasters and Incidents

In the event of disasters, accidents, or mass incidents:

A (large) number of people may lose their lives or get injured.

In such scenarios, determining the identity of the victims is vital for

- providing emergency services,
- giving closure to families,
- and facilitating legal proceedings.



Accidental events



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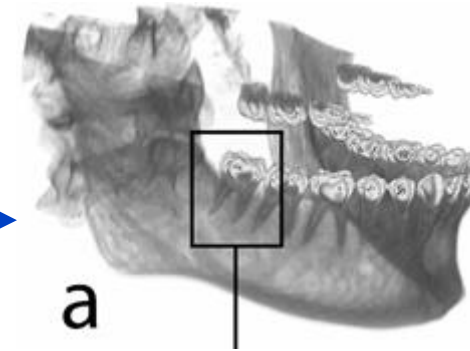
To address these challenges, it is crucial to use Identity Determination analysis:

Some of the tests are:

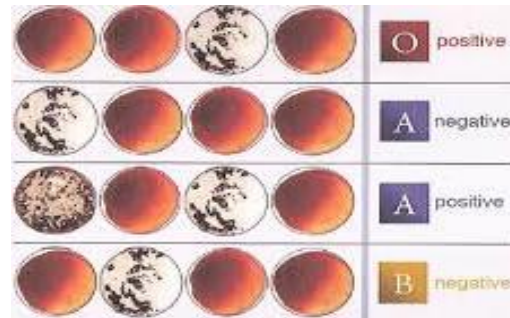
• Facial recognition



• Dental pattern analysis



• Blood group analysis



• Genetic analysis





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Genetic Identity Determination

One of the most important methods related to the genetic identity, is DNA analysis, which involves comparing the DNA of missing persons or unidentified bodies with DNA samples from known individuals. This is especially effective when bodies are badly damaged or burned. By interpreting the results and comparing the genetic profiles obtained from DNA tests, the identities of individuals can be confirmed.

Methods Advantages :

- High accuracy,
- Ability to identify individuals





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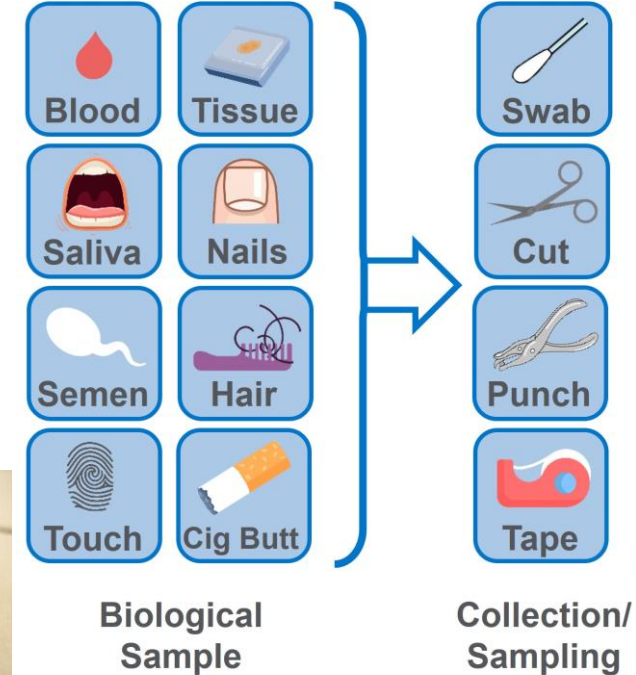
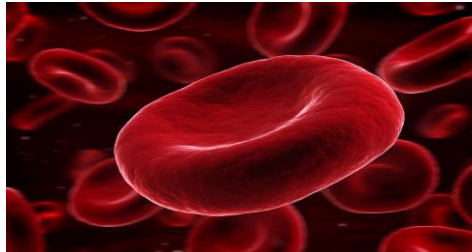
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Types of Genetic Samples Used

Various genetic samples can be used for identity determination, specially including

- teeth,
- bone,
- blood,



Blood is most commonly used due to its accessibility and the ability to perform quick tests. However, in cases where bodies are severely damaged, **bone** and **dental samples** might be the only viable options.



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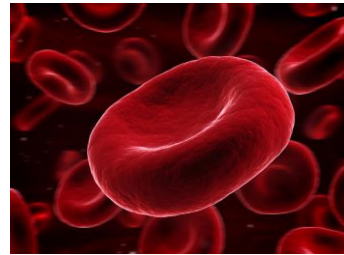
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Challenges and Limitations

The process of genetic identity determination faces several challenges.

One major challenge is the damage to samples caused by disasters, which can affect the accuracy of tests. Additionally, the need for advanced equipment and specialized experts poses further limitations.



A DNA blood sampling



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New Forensic Technologies

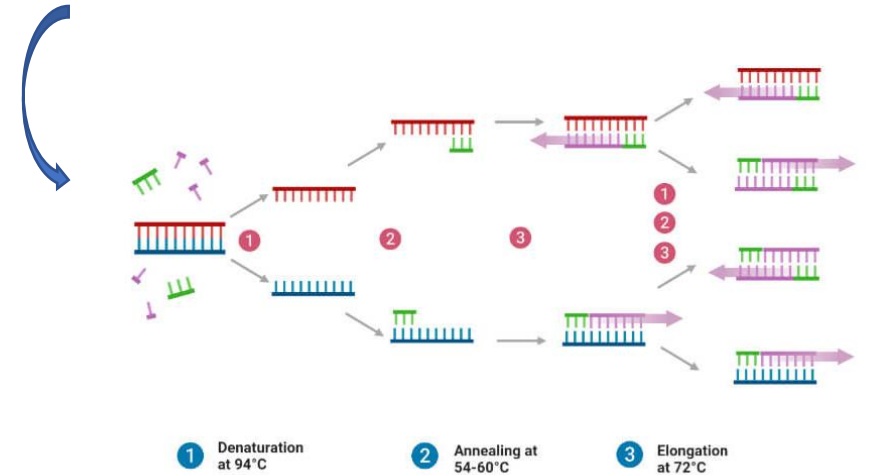
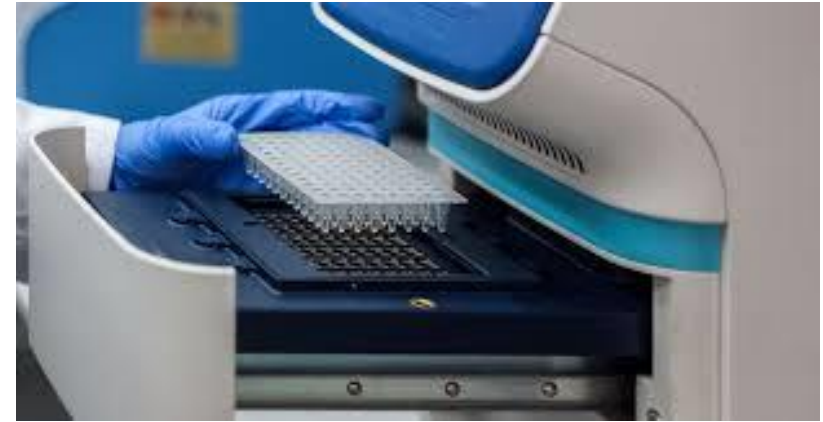
New technologies in forensic genetics, such as Short Tandem Repeat (STR) analysis, have revolutionized genetic analysis. The STR method begins with DNA extraction from the sample, followed by amplification using Polymerase Chain Reaction (PCR), a technique pioneered by Kary Mullis in 1983. This process involves several key steps:

Denaturation:

DNA strands, which serve as templates, are separated into two single strands using heat.

Annealing: Primers attach to the single-stranded DNA at specific sites, flanking the target sequence.

Extension: Using a DNA polymerase enzyme, the primers are extended to form a new strand of DNA by adding complementary nucleotides.





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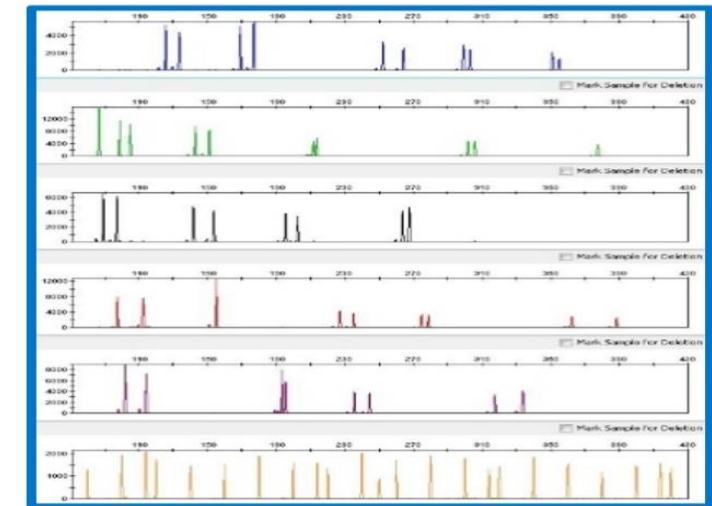
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After amplification, the DNA fragments are identified through electrophoresis using fluorescent dyes or laser detectors.

The advantages of the STR method include:

1. The ability to perform tests with small amounts of DNA
2. Ease of testing
3. Faster results (1 to 3 days)
4. Automation capability



capillary electrophoresis

investigations



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Special Applications of Forensic Genetics

Beyond individual identity determination, forensic genetics plays a crucial role in the investigation and analysis of mass gatherings. For instance, in identifying victims of disasters, DNA analysis is a key tool for identifying missing persons. In large events such as religious gatherings, genetic analysis can provide important information about the identity and affiliations of individuals, aiding criminal and judicial investigations.



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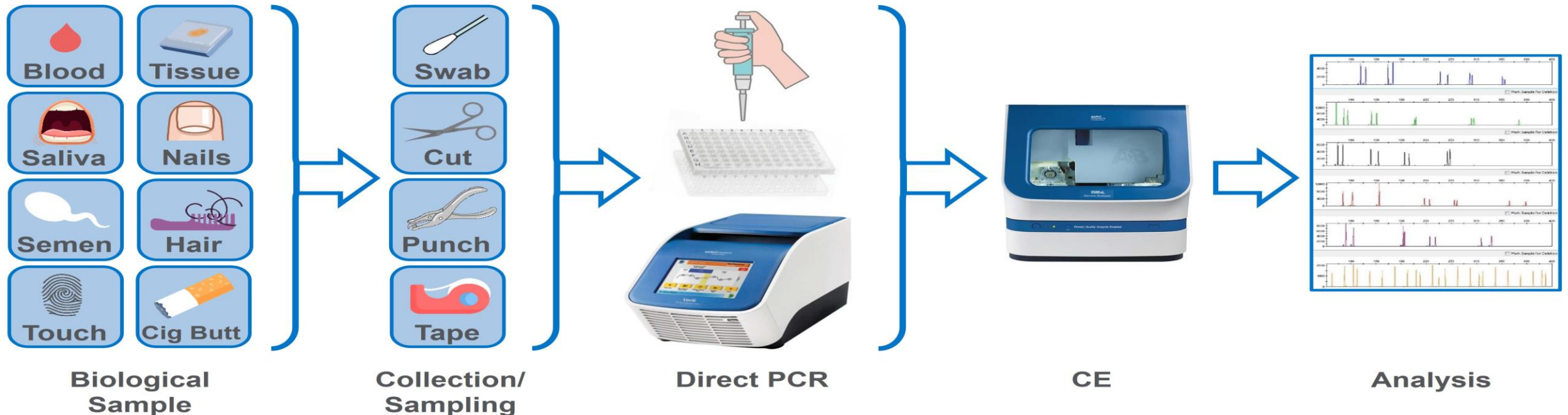
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Conclusion

Determining victims' identities in disasters is vital for emergency services, family relief, and legal proceedings. New technologies like STR analysis enhance this process, enabling rapid identification within days. Forensic genetics also plays a significant role in analyzing mass incidents, providing critical insights for criminal and judicial investigations.





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