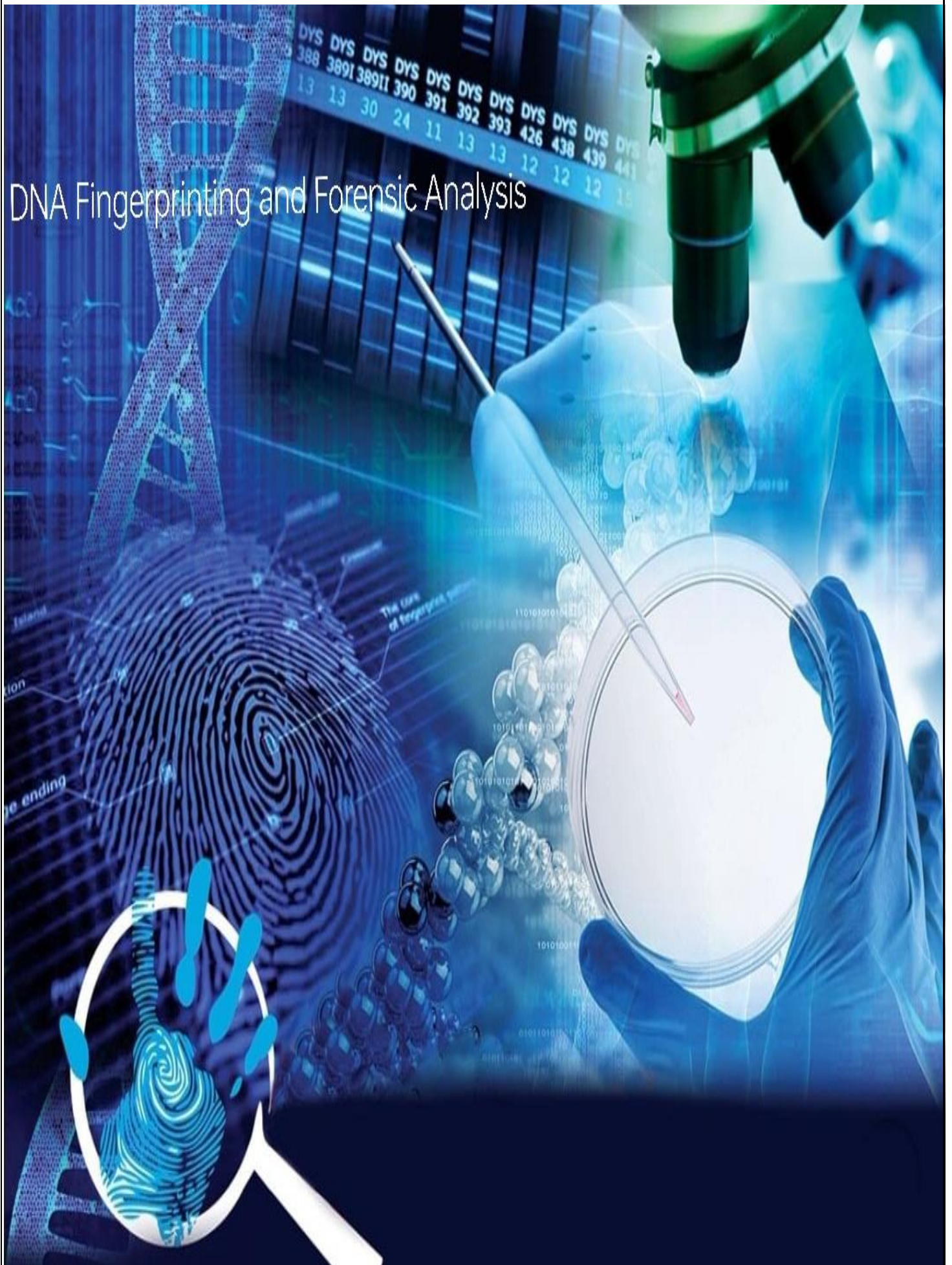


DNA Fingerprinting and Forensic Analysis



- **Forensic science**: application of science to criminal and law

- **historically speaking**

Relied on photography and fingerprint for identification of suspect's in criminal investing, but in 1985 a new method for identification of suspect's or criminal was introduce.

- This method the led of dusting DNA and called **DNA fingerprinting**.

*Unique signature found in each person's genetic makeup.

- 0.1% of DNA different from person to person but, this 0.1% could be utilize differentiate.

- the two main types of forensic DNA testing

Relies using restriction enzymes :

1-**RFIP** (restriction fragment length polymorphism)

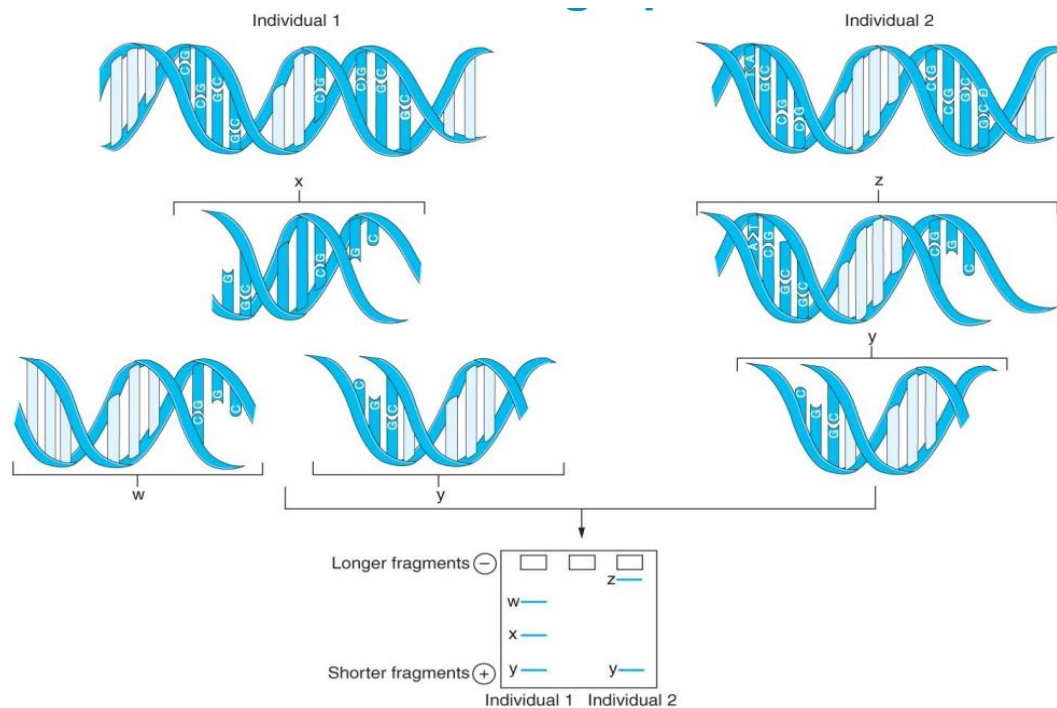
-Requires large amount DNA .

- DNA can't be degraded .

2-**PCR**(polymerase chain reaction)

- Requires much less DNA
- DNA can be partially degraded
- Extremely sensitive to contaminating DNA

*1&2 just compare

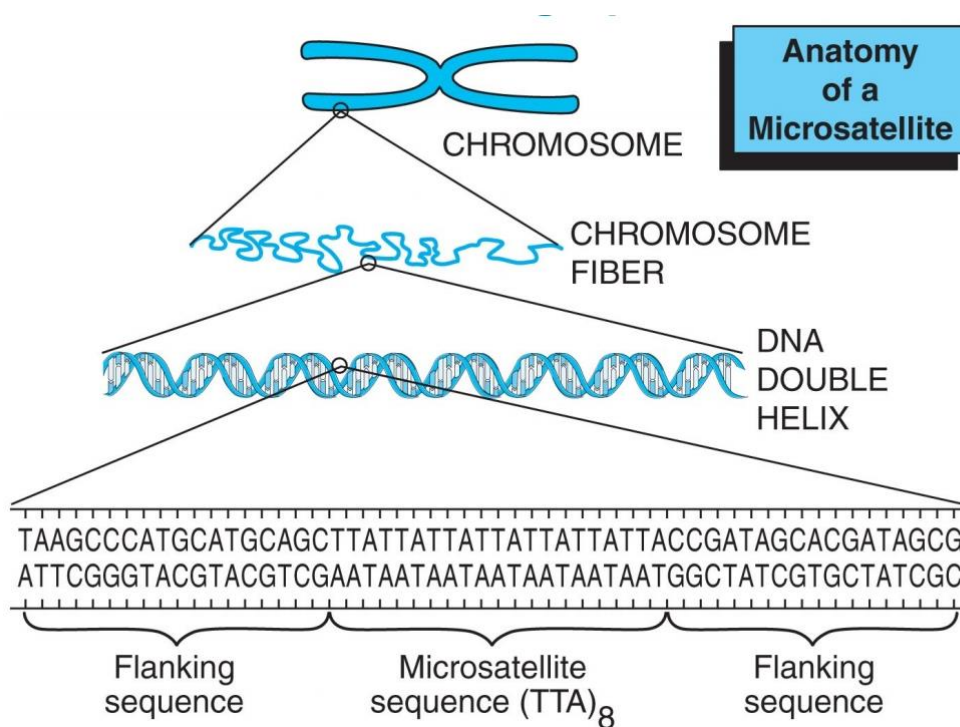


- we have same restriction enzymes but, When happen degraded for DNA It does not produce the same pieces and we get different bands.

- northern strategy that realize genetic differentiate is (VNTR's)

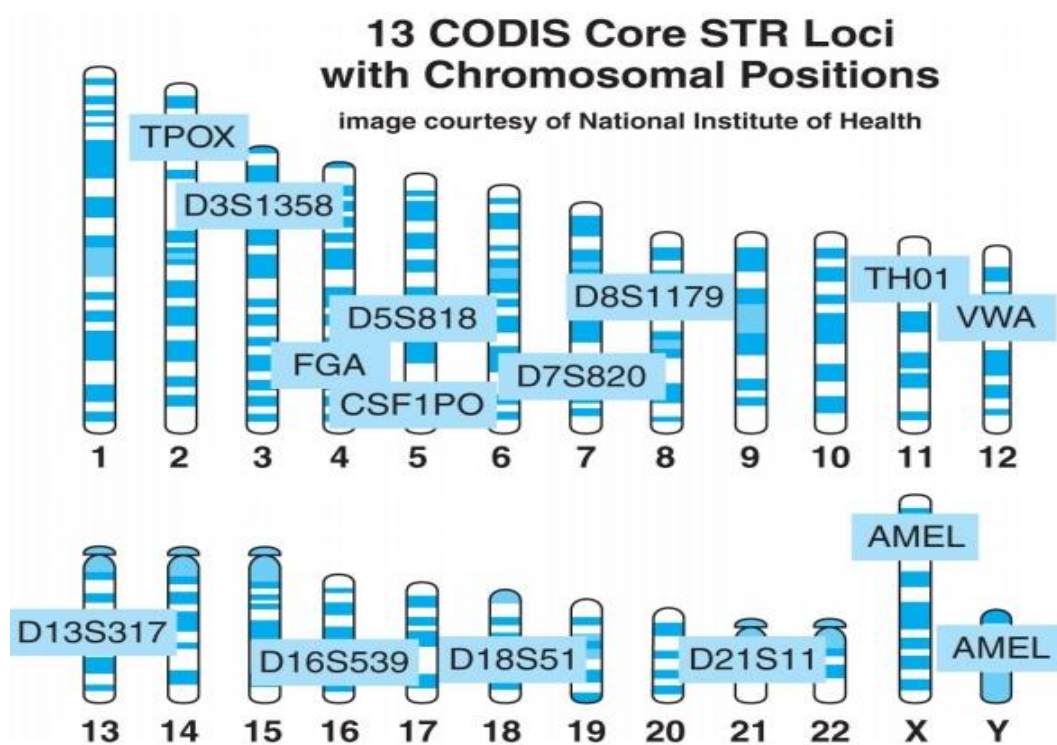
A- Mini satellite (10-60 nt)
(5-50 times)

B- Micro satellite (short tandem repeat) STR
Repeated sequence (1-6 nt)
And inherited from mother and father
(5-50 times)



Flanking is important to design the primer .

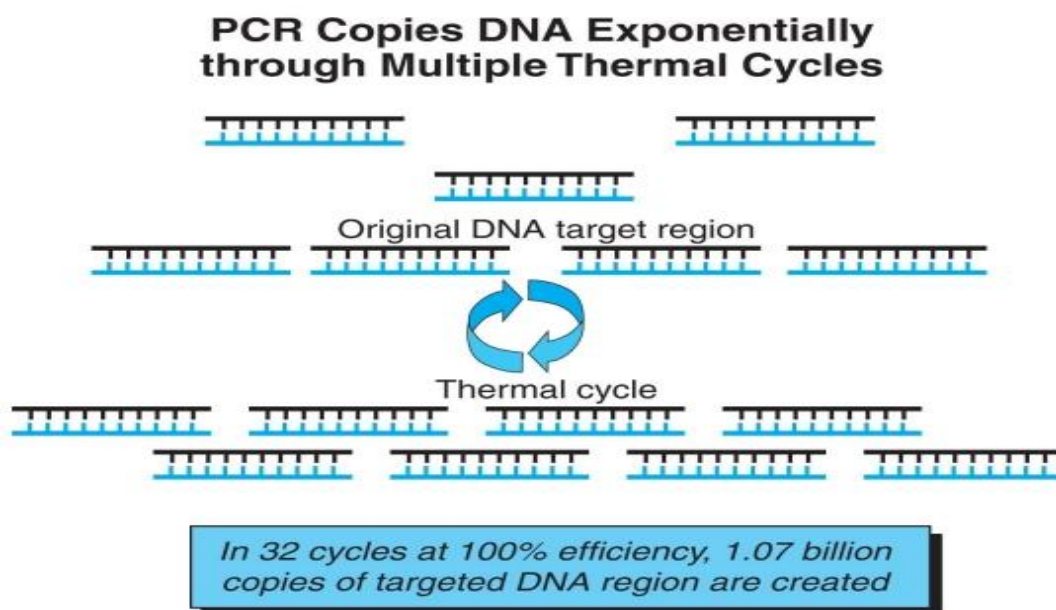
People differ in number (TTA) ,and number of repetitions of the allele inherited from the mother differs from the allele inherited from the father



- DNA primers for the flanking regions of CODIS sites results in DNA amplification at specific STR sites.

*The major challenge in forensic DNA analysis is contamination because this criminal investigation .

يعني لا نريد ورود الخطأ في هذا التحليل .



Collection requires scrupulous attention to detail:

- Wear disposable gloves; change them frequently
- Use disposable instruments
- Avoid talking, sneezing, and coughing
- Avoid touching any item that might contain DNA (face, nose, or mouth)
- Air-dry evidence before packaging; mold can contaminate a sample

***Evidence**: the Specimen that might contain the DNA to be tested in order to determined who committed the crime.

Enemies of Evidence

- Sunlight and high temperature
- Bacteria
- Moisture

DNA fingerprinting is a comparative process:

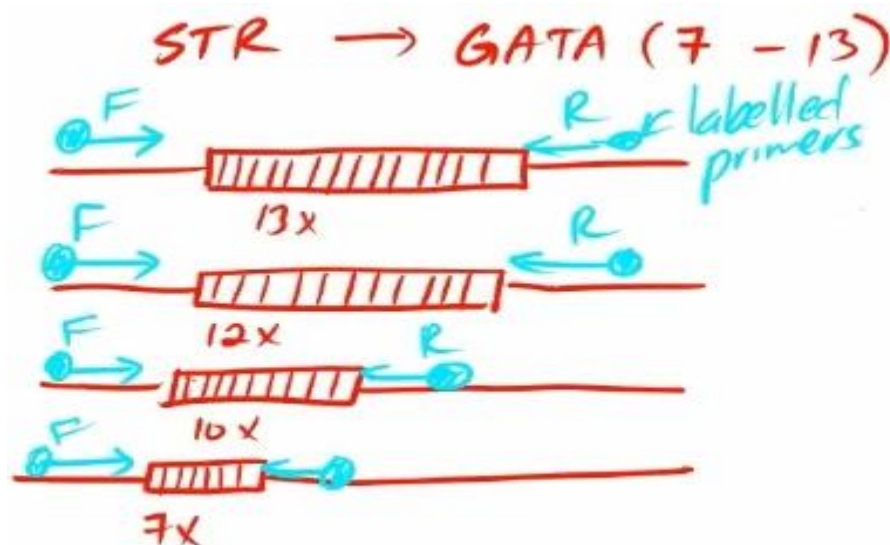
- Samples from crime scene must be compared to suspect DNA

- Best sample from suspect DNA is fresh, whole blood

Leukocytes .

- DNA has been retrieved and analyzed from samples a decade old, using PCR

- *Inlays capillary electrophoresis amplified by PCR





Labelled primer (same primer)

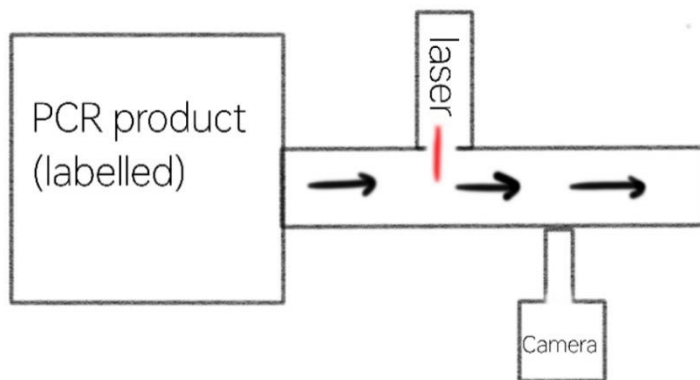


Band outside STR sequence.

*Same primer and forward on different STR sequence .

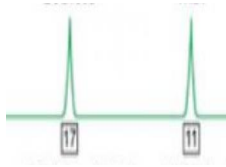
- The amplify PCR product could be separated and detected by capillary electrophoresis

*The beat is different STR .

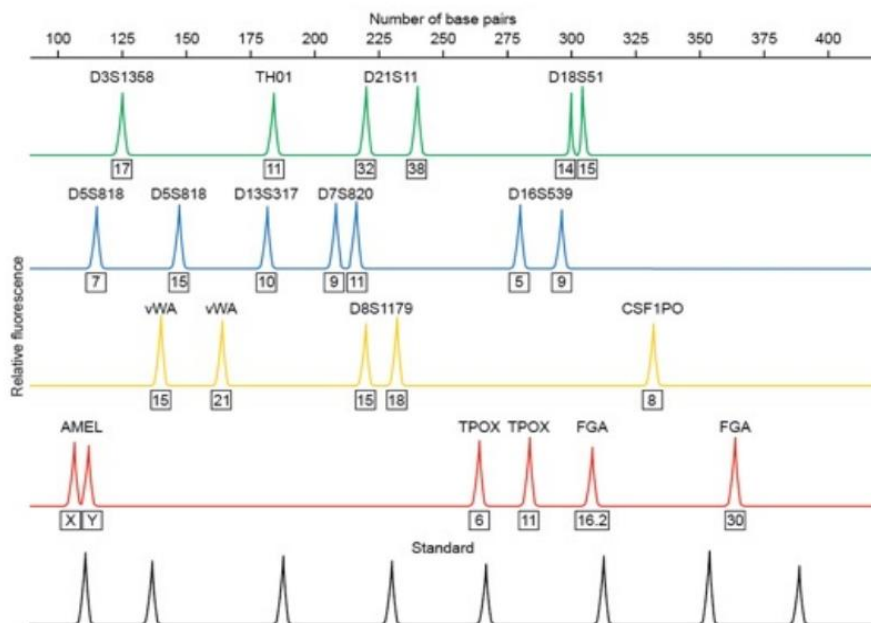


*and in top is fragments size (PCR product length) .

*The smallest DNA fragment will arrive the first.



STR profile (one sample)



The number under the beat is repeat and the alleles is identical in (17x, 17x) but , When the spacing's are different (32x,38x) .

*PCR → capillary electrophoresis → genes scan

- Paternity testing

Evidence collected from a crime scene is compared with evidence collected from a known source.

Tests are based on exclusion:

- Testing continues only until a difference is found
- If no difference is found after a statistically acceptable amount of testing, the probability of a match is high

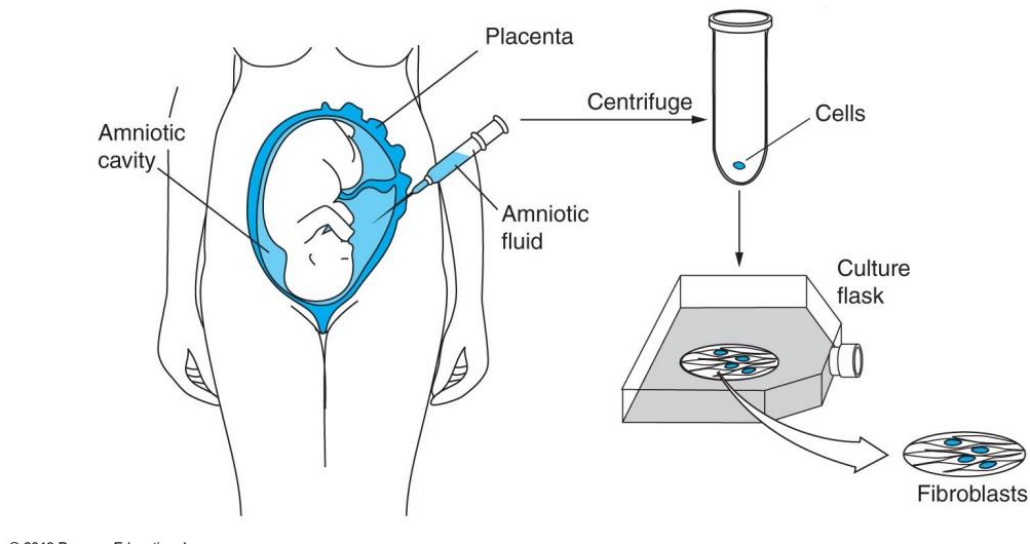
- South Asian Tsunami

- December 2004
- Lost over 225,000 lives

mtDNA, Y-STR's

- Within 3 months, 800 victims had been identified

It is possible to draw fetal cells from the amniotic fluid and test for paternity.



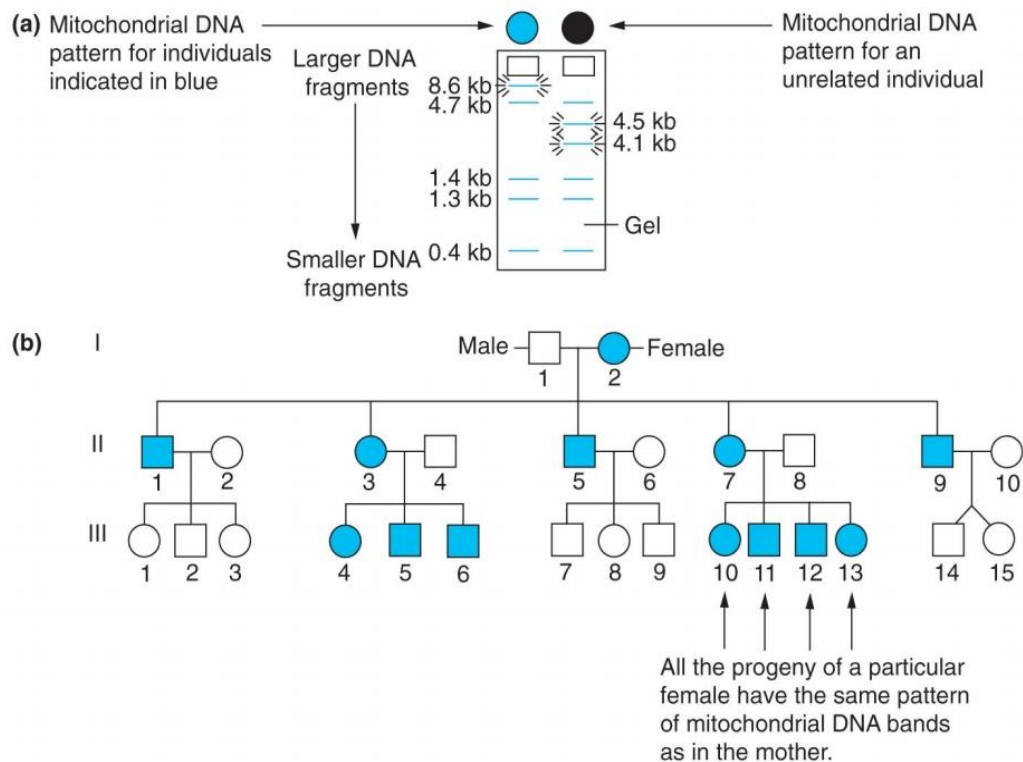
Mitochondria DNA

*Using in RFIP or STR analysis.

*spical if no good DNA sample to be tested because some older sample not have nucleotide cellular material (hair , bones and teeth)

*And mitochondria DNA inherited from mother only

*Mitochondria DNA use in Forensic DNA testing.



- all children have a mitochondria RFLP from mother, the girls was born just have RFLP but, the boys don't have.

- Y- chromosome analysis

*Using For tracking relationships .

*Useful for tracing relationships among males or analyzing biological evidence involving multiple male contributors.

- Non human DNA

Ginseng

This herbal products and this two type of ginseng

1- Grow in north America

Calms nervous

More rater and experience

2- Grow in Asia

Boosts energy drinks

DNA tagging to fight fraud

Add some DNA sequence in their product and later on their product could be authenticated by extracting DNA from their product and sequencing DNA and determining

The DNA sequence matches the DNA sequence they add

Ex.

Some of fat in olive oil and cheese use short oligonucleotides

يعني يحاولوا يقلدوا النسخة الاصلية بطعم الاكل بمنتجات ارخص

*Football in 2003 super bowl

*2000 Sydney summer Olympics

- [Regenerate](#)

Using stem cell to treat a genetic disease

- The idea is if someone is suffering genetic disease.

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