

**DNA**

**ANALYSIS**

**Blood**



**Semen**



**Urine**



**Hair**



**Tissue**



**Teeth**

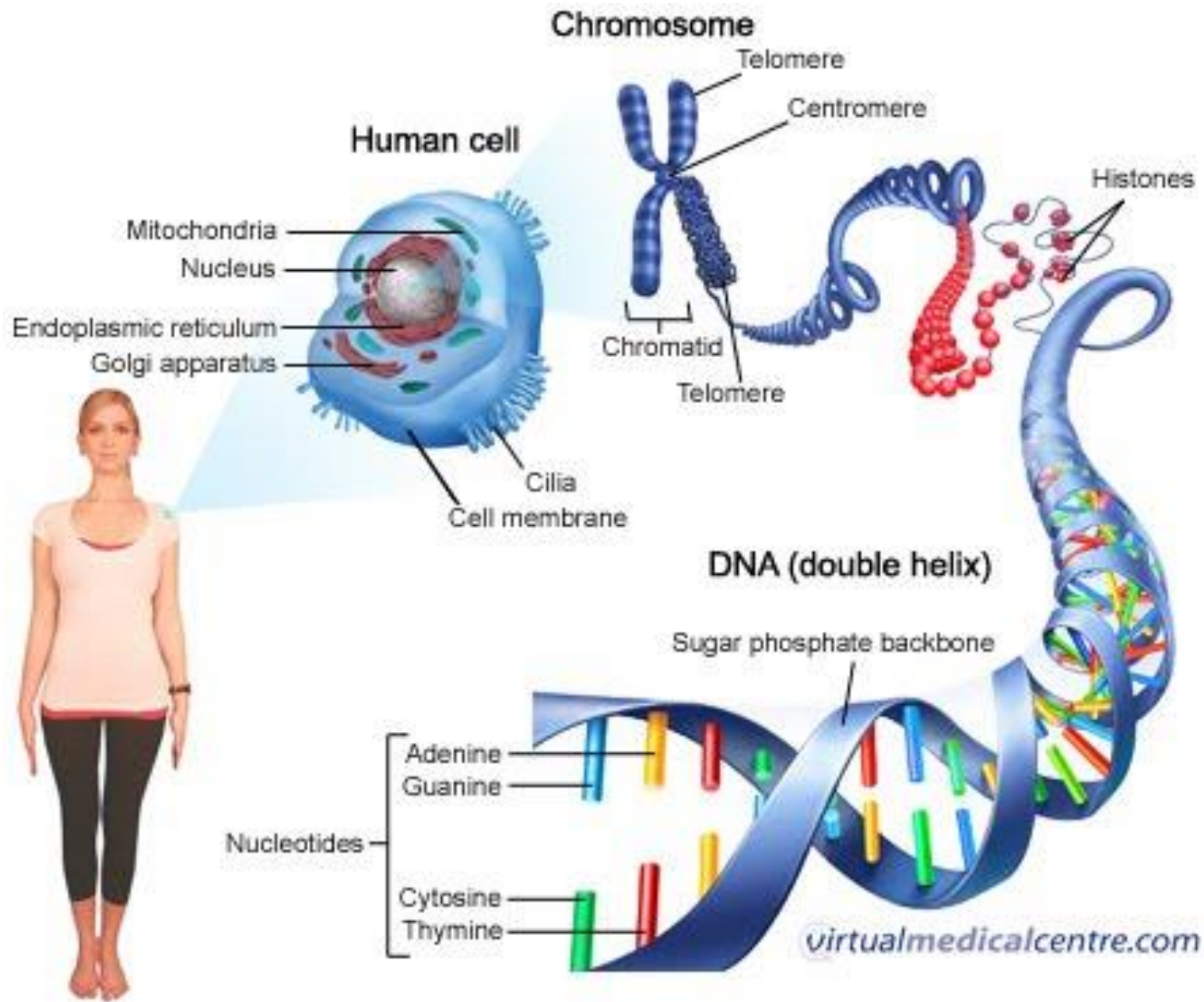


**Saliva**



**Bone**





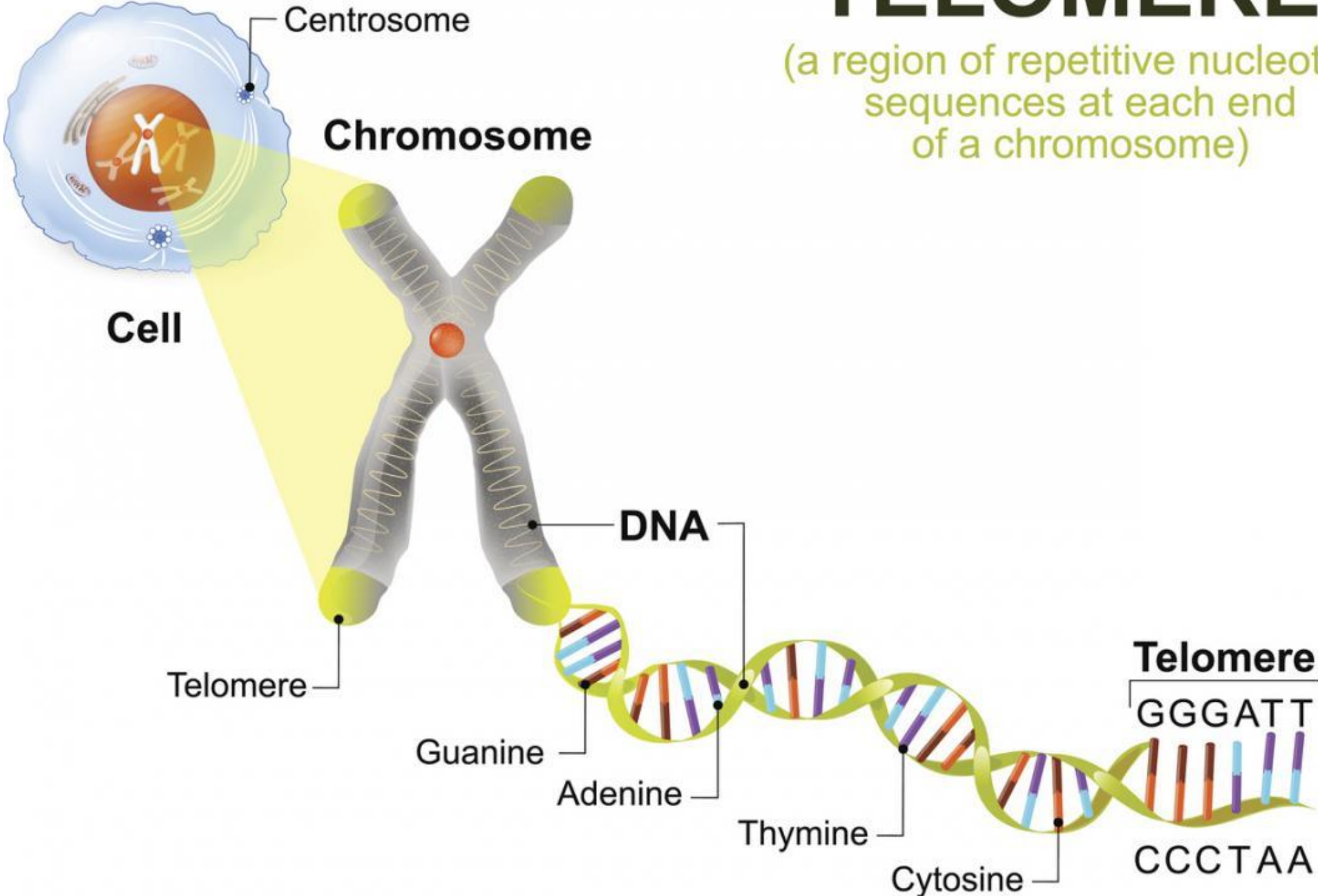
**DNA (short for deoxyribonucleic acid) is the molecule that contains the genetic code of organisms.**

**This includes animals, plants and bacteria.**

**DNA is in each cell in the organism and tells cells what proteins to make**

# TELOMERE

(a region of repetitive nucleotide sequences at each end of a chromosome)



**DNA contains the genetic material and is in the cell's nucleus**

**Chromosomes are long DNA strands wrapped around proteins**

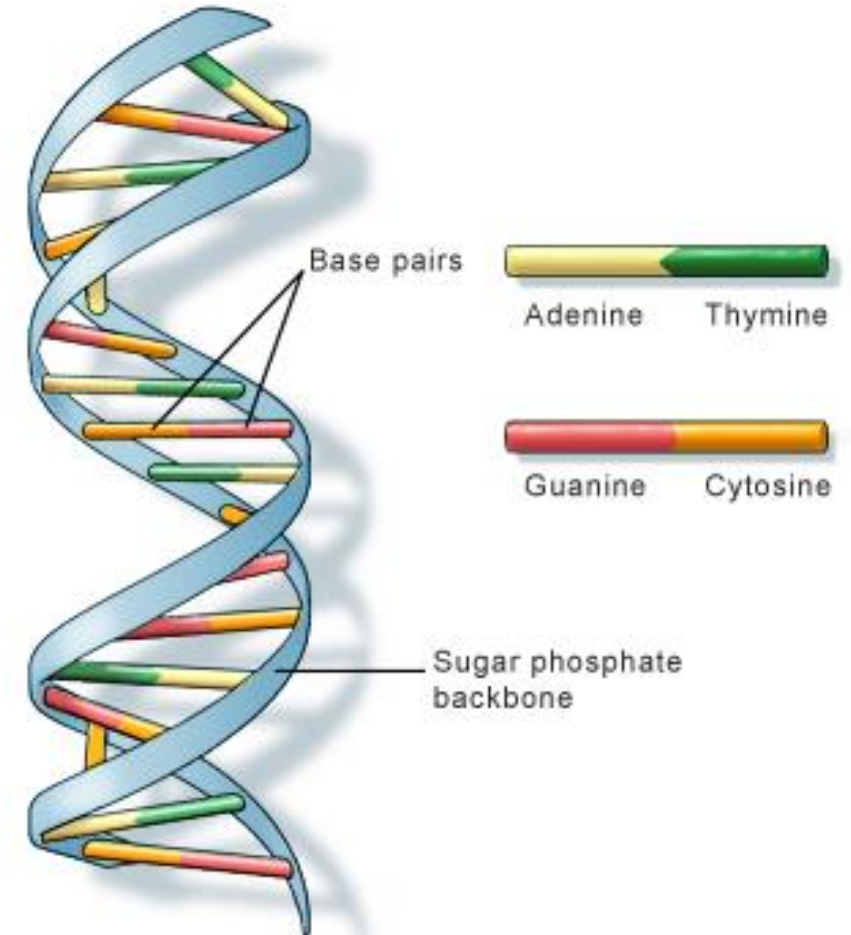
**DNA is composed of nucleotide units which has deoxyribose sugar, phosphate, and nitrogenous base.**

### ***Nitrogenous Bases***

**-pairs of molecules that form the rungs of the DNA "ladder"**

- **A binds with T**
- **C binds with G**

**These base pairs forms a unique sequence in each individual**



U.S. National Library of Medicine

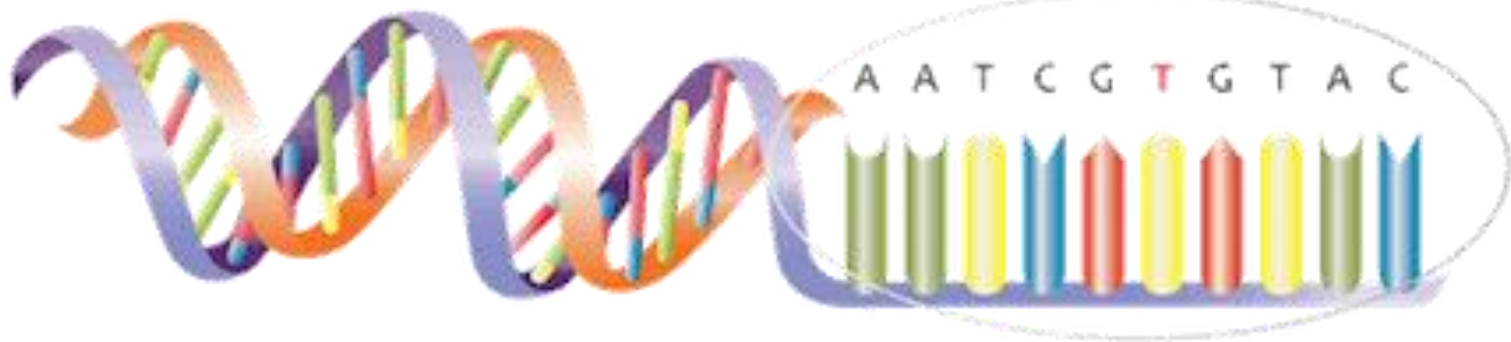
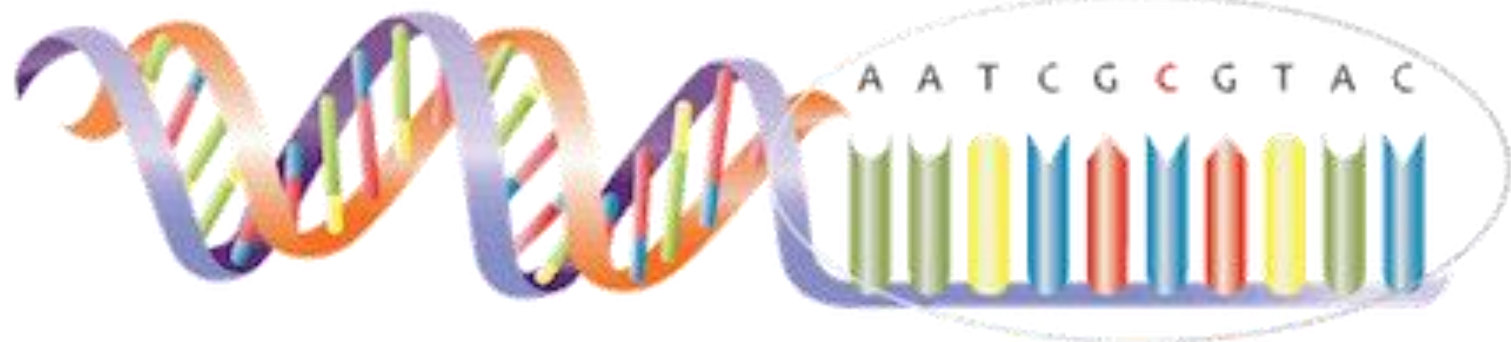


**Did you know????**

**Each human cell contains 23 pairs of chromosomes which is three billion DNA base pairs long.**

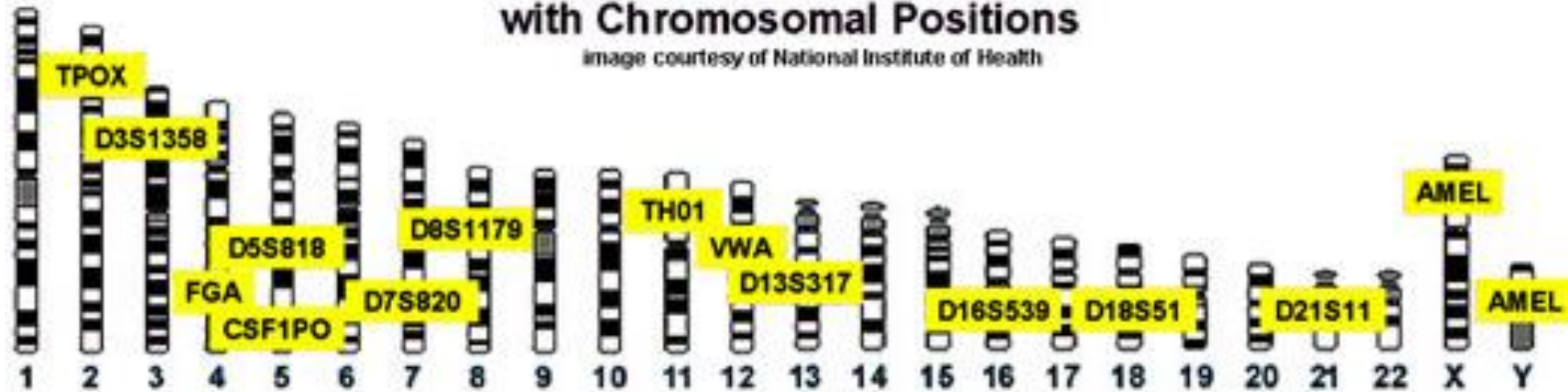
**We cannot look at the entire sequence, it would take too long so we only look at 13 places.**





## 13 CODIS Core STR Loci with Chromosomal Positions

image courtesy of National Institute of Health



**Combined DNA Index System - database of DNA obtained from crime scenes and violent offenders.**

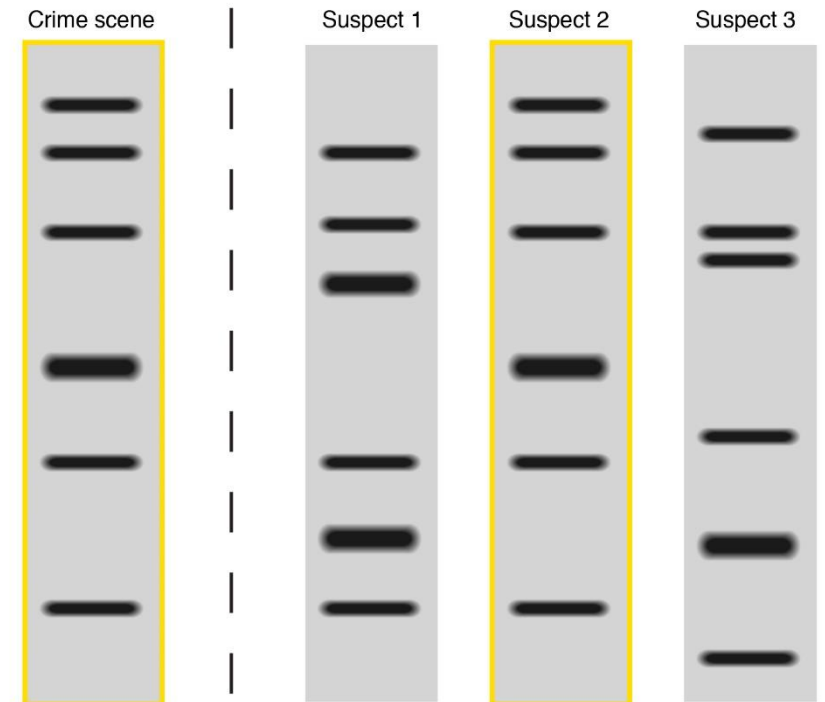
**CODIS examines 13 loci or markers that are uniformly distributed across the human genome.**

**13 loci are chosen so they reveal no medical or health information, hence, they are also called “anonymous” marker.**

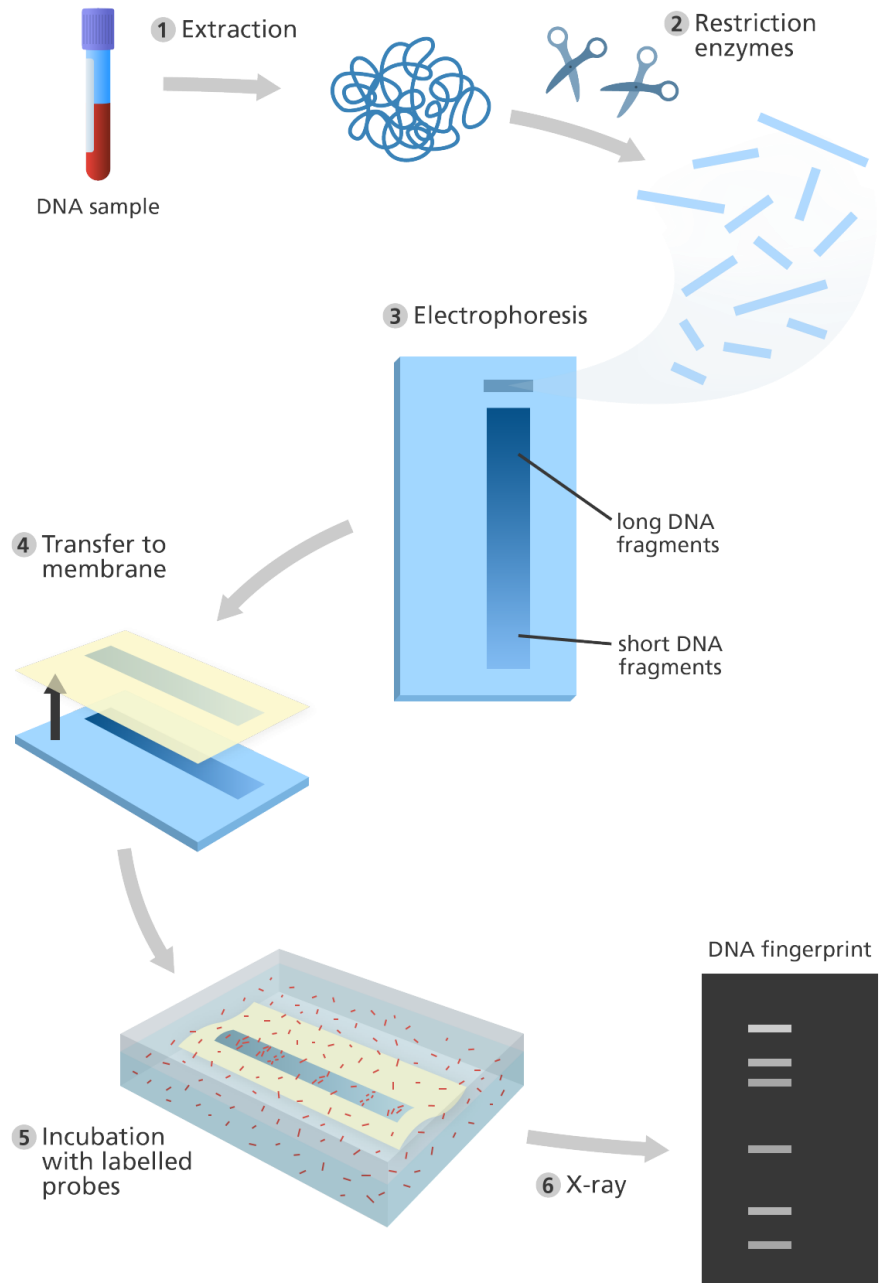


# DNA FINGERPRINTING

- DNA fingerprinting is a laboratory technique used to establish a link between biological evidence and a suspect in a criminal investigation. A DNA sample taken from a crime scene is compared with a DNA sample from a suspect
- DNA fingerprinting is an *Individual* evidence.
- If found in trace amounts, Polymerase chain reaction (PCR) technique can generate multiple copies of DNA evidence.





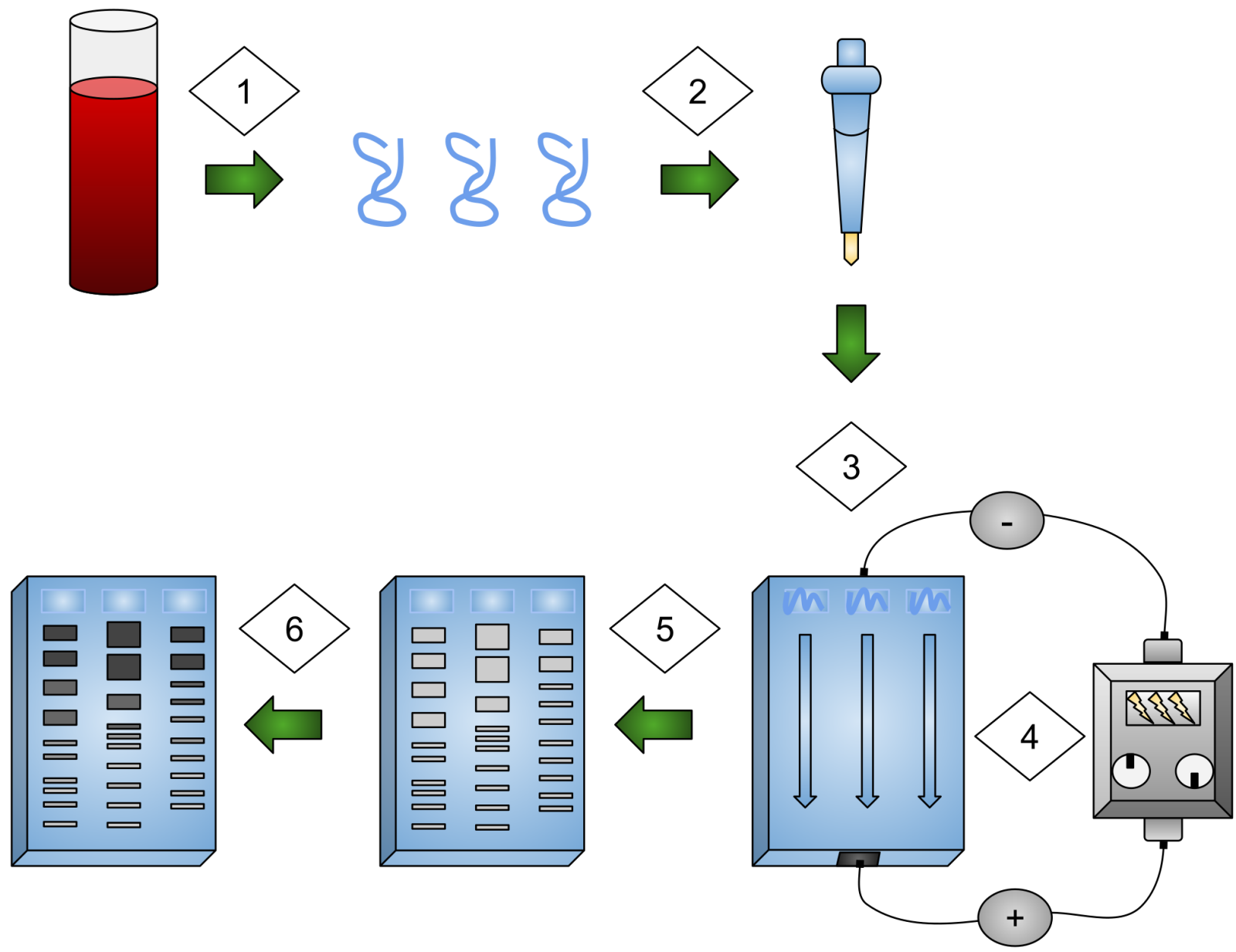


# ELECTROPHORESIS

is a laboratory technique used to separate DNA, RNA, or protein molecules based on their size and electrical charge.

An electric current is used to move molecules to be separated through a gel.

Pores in the gel work like a sieve, allowing smaller molecules to move faster than larger molecules.



# LIMITATIONS

**Several factors can affect the DNA left at a crime scene, such as environmental factors (e.g., heat, sunlight, moisture, bacteria, and mold).**

**Therefore, not all DNA evidence will result in a usable DNA profile.**

**DNA testing cannot identify when the suspect was at the crime scene or for how long.**



# COLLECTING

# DNA

1. Use **disposable gloves** and collection instruments
2. Avoid physical **contact**, talking, sneezing, and coughing in the evidence area
3. Air-dry evidence and put it into **new paper bags** or envelopes (dry or freeze the evidence)
4. Keep evidence **cool and dry** during transportation and storage



# DNA EXTRACTION

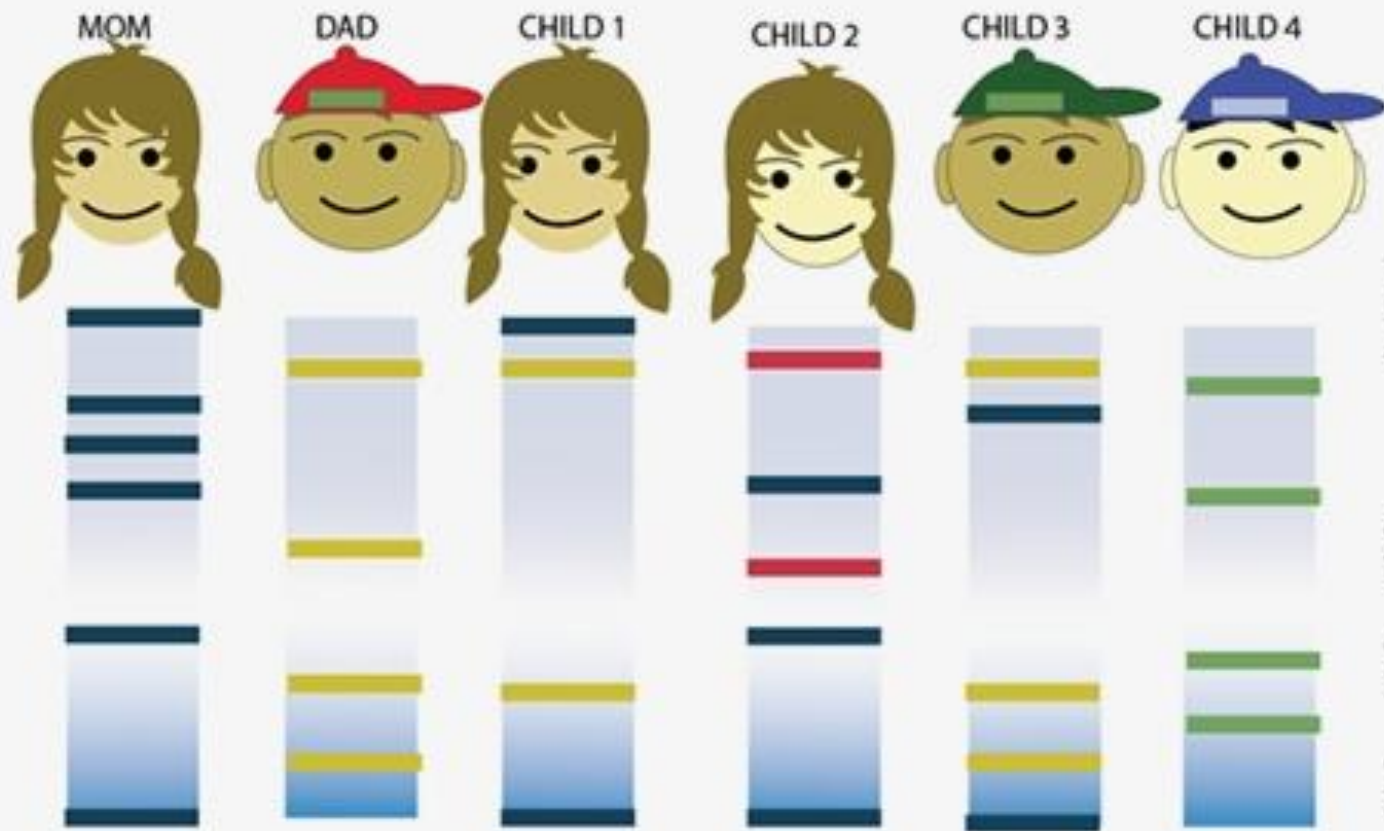
1. **Collect/Harvest cells (chew the sides of your mouth to collect cheek cell)**
2. **Add soap/salt solution to break open the cell membrane.**
3. **Add protease (enzyme to digest the protein)**
4. **Add ethanol (DNA water soluble so to make it visible, alcohol is added).**
5. **Run PCR if only trace amount found.**



# **DNA FINGERPRINTING** can

- match crime scene DNA with a suspect**
- determine maternity, paternity, or match to another relative**
- eliminate a suspect**
- free a falsely imprisoned individual**
- identify human remains**

# DNA FINGERPRINTING



When a child is born, they inherit 23 chromosomes from the mother and 23 chromosomes from the father.

Child 1 and 3 are the children of both Mom and Dad.

Child 2 is the child of Mom, but not Dad.

Child 4 is not the child of Mom or Dad.



Mother



Child



'Dad' 1



'Dad' 2



'Dad' 3







Mother



Child



'Dad' 1



'Dad' 2



'Dad' 3



# WHODUNNIT?



Victim



Crime Scene



Suspect 1



Suspect 2



Suspect 3

