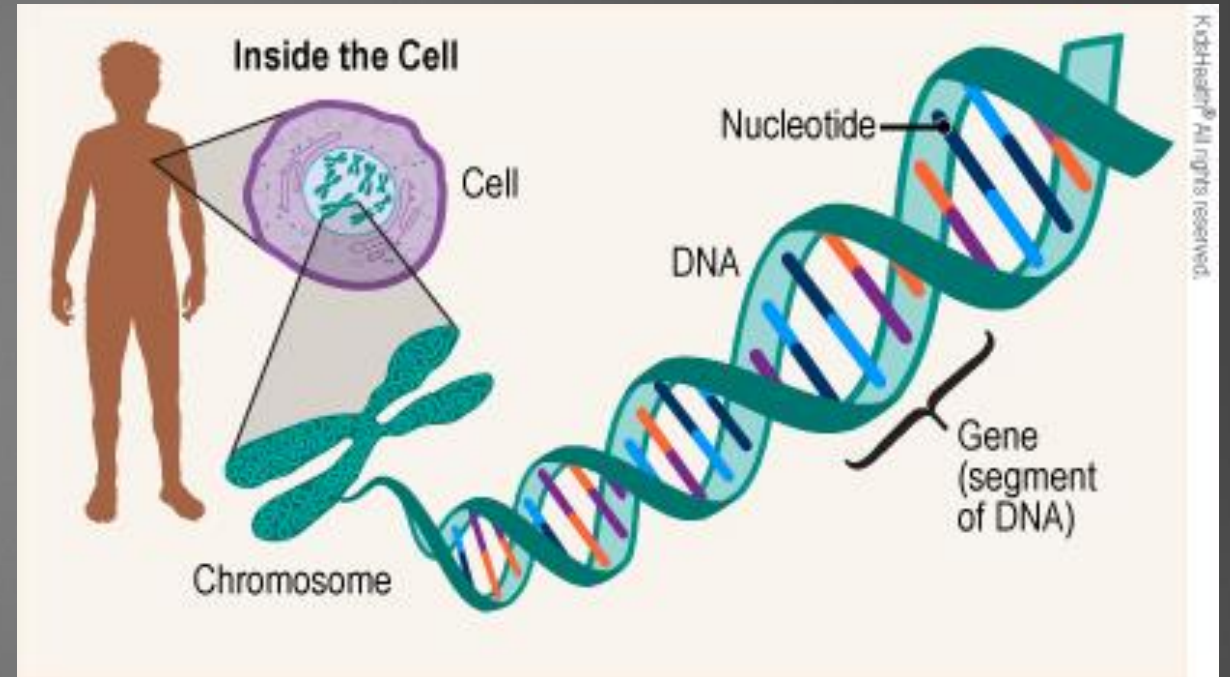


Evidence collection and preservation for DNA samples

GARGI DESHMUKH
SCIENTIST IN-CHARGE
GENOME FOUNDATION

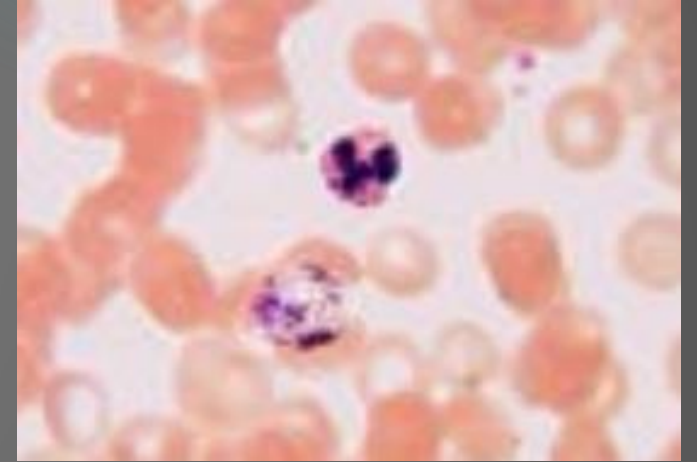
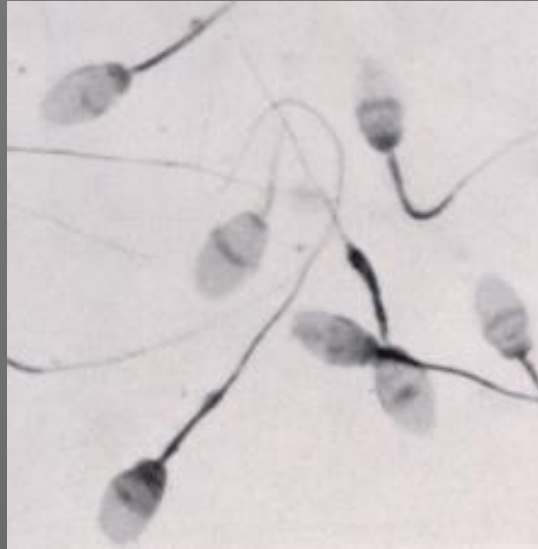
What is DNA?

- ▶ DNA = Deoxyribonucleic acid.
- ▶ Contains genetic information for cell growth, division and function.
- ▶ Hereditary material in humans and almost all other organisms.
- ▶ 50% inherited from each parent.



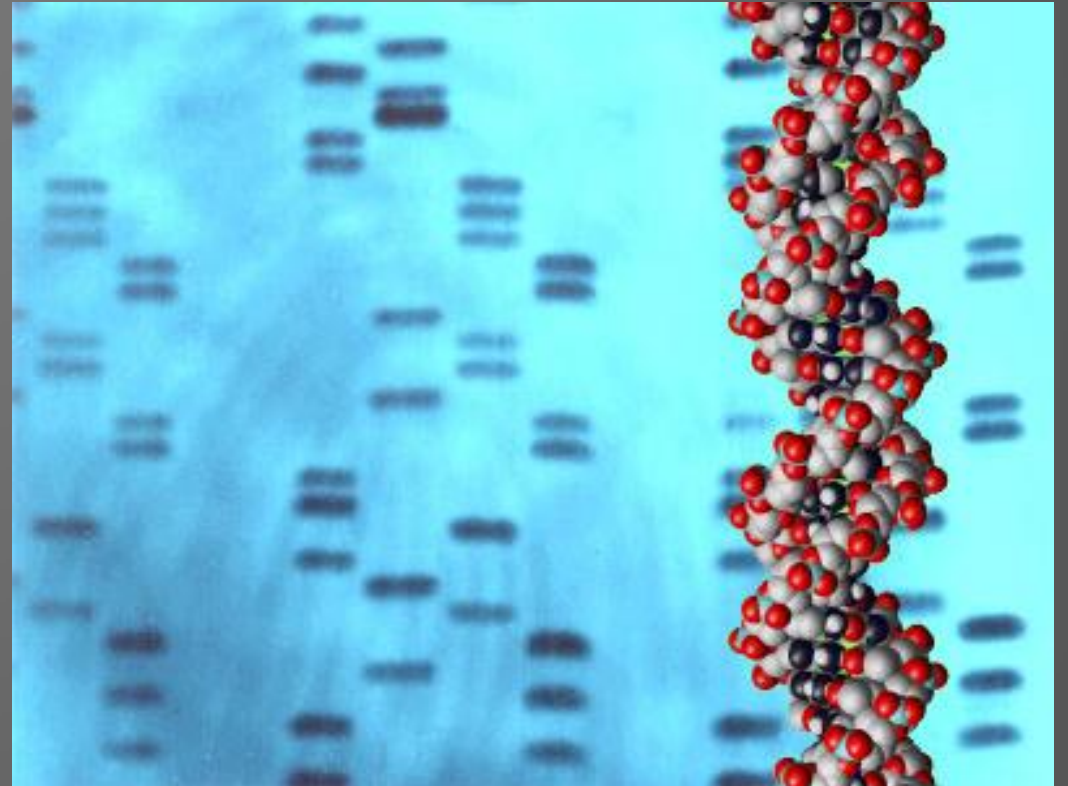
Where is DNA found?

- ▶ All types of cells in our body contain a copy of the same DNA.
- ▶ The important cells for forensic testing are:



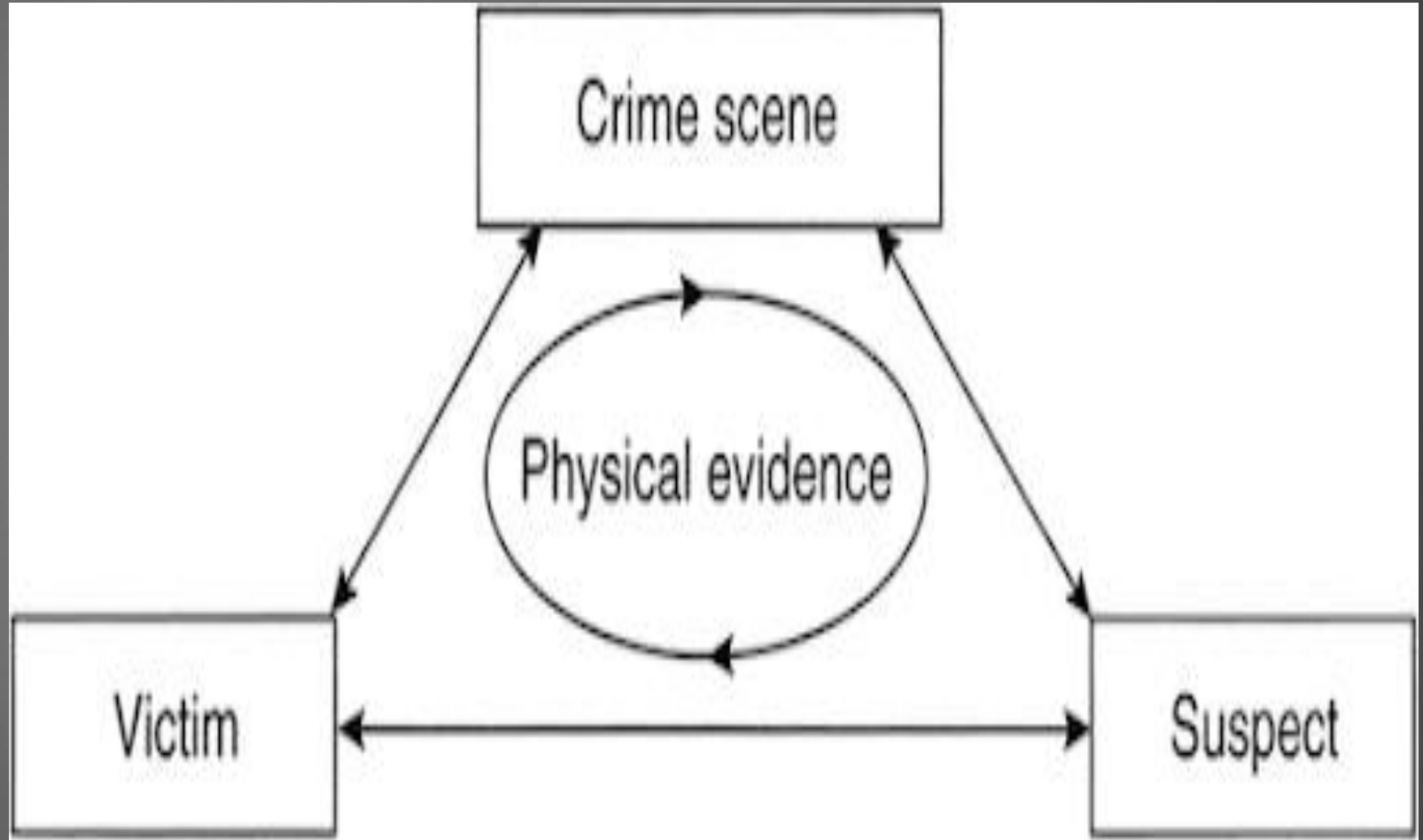
What is DNA Evidence?

- ▶ DNA is a complex molecule that contains the instructions for building and maintaining the bodies of humans and other organisms.
- ▶ If someone leaves blood, semen or other biological material at a crime scene, scientists can use it as DNA evidence and create a DNA profile, or genetic fingerprint of that person.



Locard's Exchange Principle

- When a person encounters an object or another person, a **cross-transfer** of physical evidence can occur.



Types of DNA Evidence



Saliva



Bone



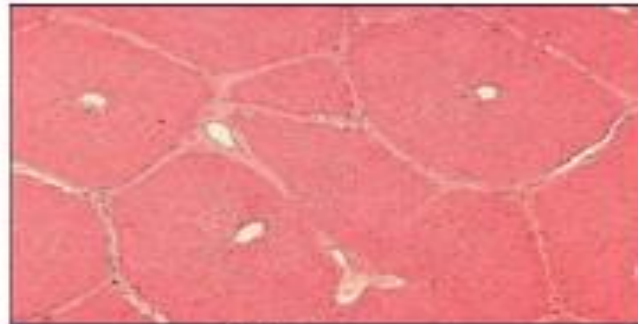
Blood on fabric



Tooth



Blood



Tissue



Hair



Semen

Chain of Custody

- ▶ Chain of custody refers to the documented and unbroken transfer of evidence from the time it is collected until it is presented in court.
- ▶ Ensures the integrity and reliability of the evidence, preventing tampering, loss, or contamination. Essential for the evidence to be admissible in court.
- ▶ Every person who handles the evidence must record their involvement. This includes the time, date, and purpose of the transfer.
- ▶ Each piece of evidence should have a unique identifier (e.g., barcodes, evidence numbers) that links it to detailed documentation.



Chain of Custody (contd.)

- ▶ Evidence must be handled in a way that maintains its integrity. This includes proper packaging, sealing, and labeling to prevent contamination or tampering.
- ▶ When transferring evidence (e.g., from a crime scene to a lab), ensure that both the person releasing and the person receiving the evidence sign the chain of custody form.
- ▶ **Preservation of Chain of Custody: Any break or gap in the chain of custody could lead to the evidence being challenged in court, potentially leading to it being deemed inadmissible.**

Sources of DNA at a Crime Scene

- ▶ Specimen Collection- Could be a licked envelope, dirty laundry, a cigarette butt, saliva
 - ▶ Special precautions in handling specimens: gloves, disposable instruments, avoid talking and sneezing, avoid touching sample with your skin, air-dry the evidence before packaging so mold does not grow
 - ▶ **Ideal sample: 1 mL of fresh, whole blood (white blood cells) treated with EDTA**
 - ▶ **Enemies of evidence: sunlight, high temperatures, bacteria, moisture**

Do's & Don'ts

▶ **Avoid Contamination of DNA Evidence:**

- ▶ Use disposable gloves and disposable instruments for handling each sample.
- ▶ Avoid touching the area where you believe DNA may exist.
- ▶ Avoid talking, sneezing, and coughing over evidence.
- ▶ Avoid touching your face, nose, and mouth when collecting and packaging evidence.
- ▶ Air-dry evidence thoroughly before packaging as moisture destroys DNA.
- ▶ If wet evidence cannot be dried, it may be frozen.
- ▶ Put evidence into new paper bags or envelopes.
- ▶ Keep samples at room temperature and out of sun

Conservative Nature Of Forensic DNA Typing

- ▶ DNA fingerprinting is a comparative process
 - ▶ Looking for alignment of bands or dots in the fingerprint
 - ▶ All 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

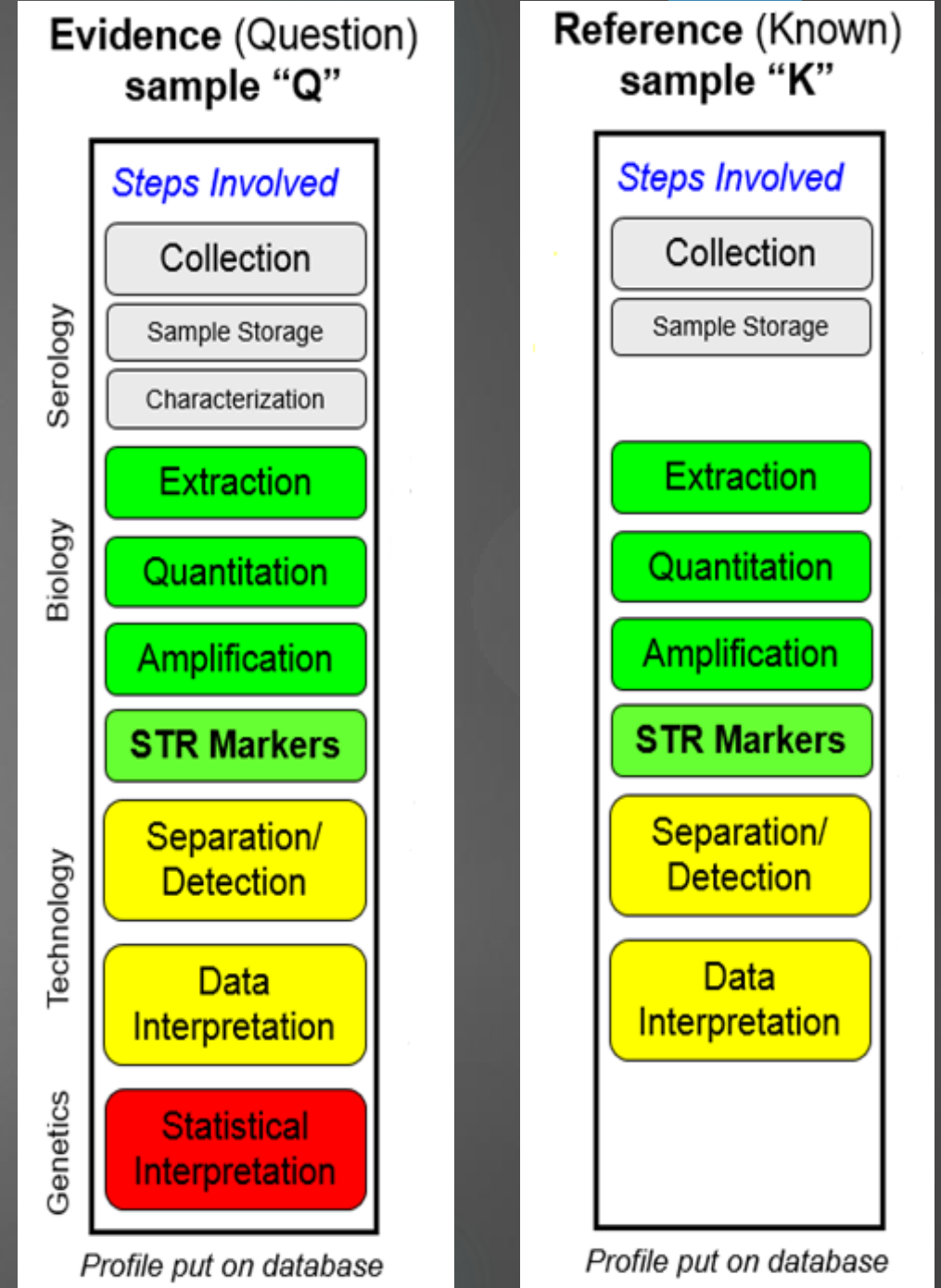
DNA Testing Requires A Reference Sample

- ▶ A DNA profile by itself is fairly useless because it has no context...
- ▶ DNA analysis for identity only works by comparison – **you need a reference sample**



Evidential & Referral Sample Values

- ▶ Serology – Characterization of the evidence type
- ▶ Biology – DNA extraction, quantification, amplification and profiling
- ▶ Technology – Capillary Electrophoresis, Fluorescence capture/visualization, Data interpretation
- ▶ Genetics – Population genetics, allelic frequency, likelihood ratios



*Thank
you*

