Unit 1: DNA Evidence

DNA contains genetic information. DNA is found on chromosomes located in the nucleus of our cells. DNA is biological, circumstantial, and individual evidence

* Made up of base pairs: (think of a bar code)
	+ A – T adenine pairs with thymine
	+ C – G cytosine pairs with guanine
* The order of the base pairs determines the genetic code

Human DNA

* 50% of a person’s DNA comes from each parent
	+ 23 pairs (46 chromosomes) in nucleus of most cells
	+ 1 chromosome in each pair is inherited from mother and other from the father
* Every person has a different DNA sequence expect identical twins.
* Types of Human DNA
	+ NUCLEAR DNA: found in chromosomes
		- Used for DNA Fingerprinting
		- Unique to individual
	+ MITOCHONDRIAL DNA: Found in mitochondria
		- Inherited from mother
		- Not unique
		- Example: bone, hair shaft
		- More stable over time/conditions\*
		- Can get more DNA if sample is limited
		- Can get DNA from a highly degraded source
* How is DNA used?
	+ Identify a victim
	+ Link or exclude suspect to crime scene/evidence
	+ Link multiple crime scenes
	+ Establish Maternity/Paternity
* What Factors Affect DNA evidence?
	+ Heat, sunlight, moisture, bacteria, and mold (this was a major issue in the O.J. Simpson Case)
	+ 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.
* What is CODIS?
	+ Electronic database of DNA profiles that can identify suspects.
	+ DNA profiles from individuals convicted of certain crimes, such as rape, murder, and child abuse, are entered into CODIS and help identify possible suspects when no prior suspect existed.

2 Main Types of DNA Testing

* RFLP: analyzes variable lengths of DNA cut by restriction enzymes.
	+ RFLP: Restriction Fragment Length Polymorphism.
	+ requires large amounts of DNA and no degradation.
	+ Restriction enzymes: cut DNA at specific base sequences resulting in variable lengths of DNA

 

* + Gel electrophoresis: Method of separating molecules of DNA within an electric field based on the size and charge of DNA fragments
	+ More probes taken, the better the match probability will be.
	+ Denim blue jeans actually interfere with the restriction enzymes!
* PCR: (Polymerase Chain Reactions) specific sequences of DNA that have high variability (differences) are copied millions of times
	+ Less DNA needed and can be partially degraded
* Newest type of DNA testing: STR
	+ STR: Evaluates specific short repeating regions (loci) within nuclear DNA
	+ FBI uses 13 standard specific STR regions for CODIS