Basic Medical Science

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Fsc Technician 1

Genetic Code

- **Overview**
  The genetic code is a set of rules translating DNA/RNA information into proteins.
  Converts genetic instructions into amino acid sequences of proteins.

Codons

- Composed of three-nucleotide units called codons.
  Each codon specifies one amino acid or acts as a start/stop signal.
  64 possible codons for 20 amino acids + 3 stop codons.

Characteristics of Genetic Code

- **Degeneracy**: Most amino acids are encoded by multiple codons.
  Example: Leucine = UUA, UUG, CUU, CUC, CUA, CUG.
  Start Codon: AUG (methionine) begins translation.
  Stop Codons: UAA, UAG, UGA end translation.
  Universal: Nearly identical across organisms (bacteria to humans).

Translation

- mRNA information is translated into proteins.
  Ribosomes (rRNA + proteins) decode mRNA.
  tRNA carries amino acids and matches codons via anticodons.
  Ribosome links amino acids → forms a polypeptide chain.

Wobble Hypothesis

- The wobble hypothesis explains flexibility in codon-anticodon pairing.
  The 3rd base of the codon (wobble position) is less strict in pairing rules.
  This flexibility allows a single tRNA to recognize more than one codon.
  Multiple codons coding for the same amino acid can be read by fewer tRNAs.

Chromosome

- **Overview**
  Structures found in the nucleus of eukaryotic cells
  Carry genetic information in the form of DNA

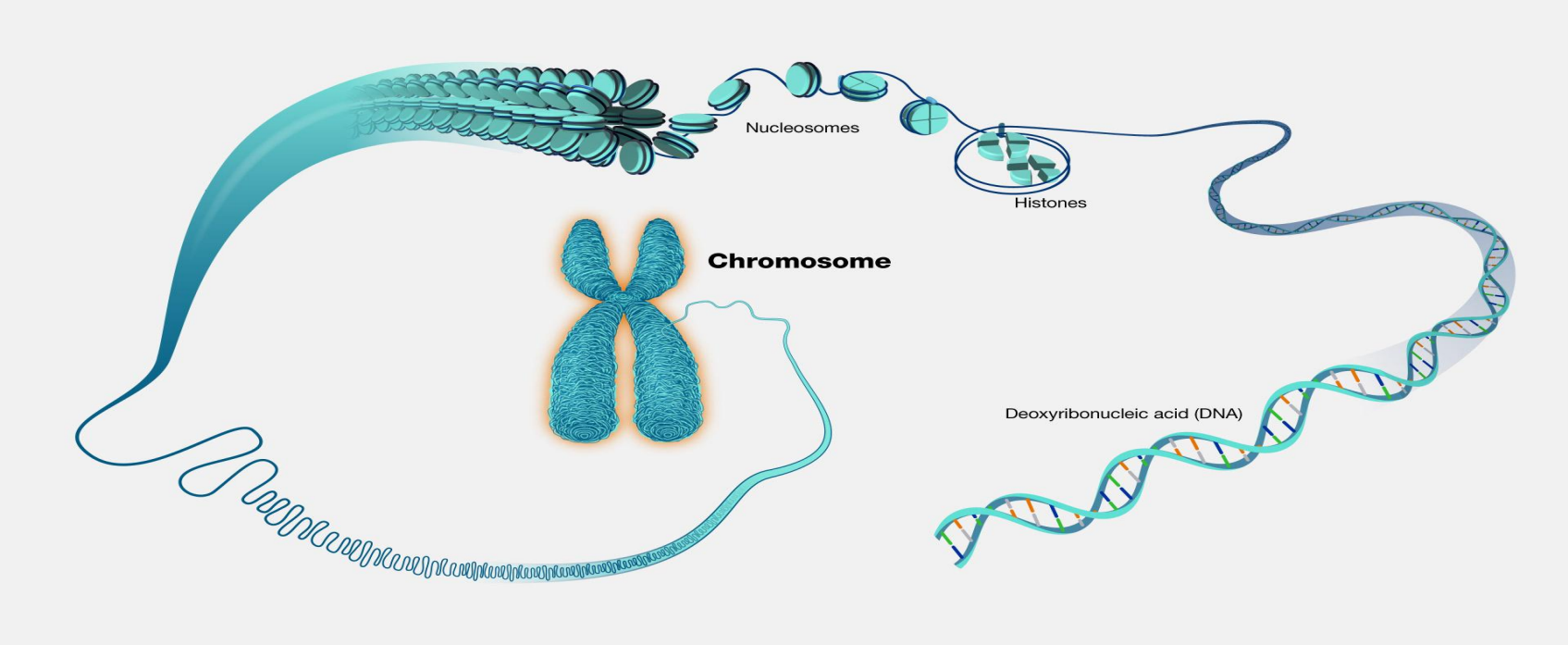
Structure

- **DNA Molecules**: Long DNA molecules with genetic instructions for growth, development, and functioning
  Proteins: DNA wound around histone proteins forming chromatin
  Centromere: Attachment site for microtubules during cell division; helps classify chromosomes
  Telomeres: Repetitive DNA sequences at chromosome ends; protect genetic information during replication

Components

- **Chromosome**: Structure carrying genetic information
  Chromatin: DNA-protein complex packaging DNA inside the nucleus
  DNA Helix: Double helix structure of DNA

Chromosome

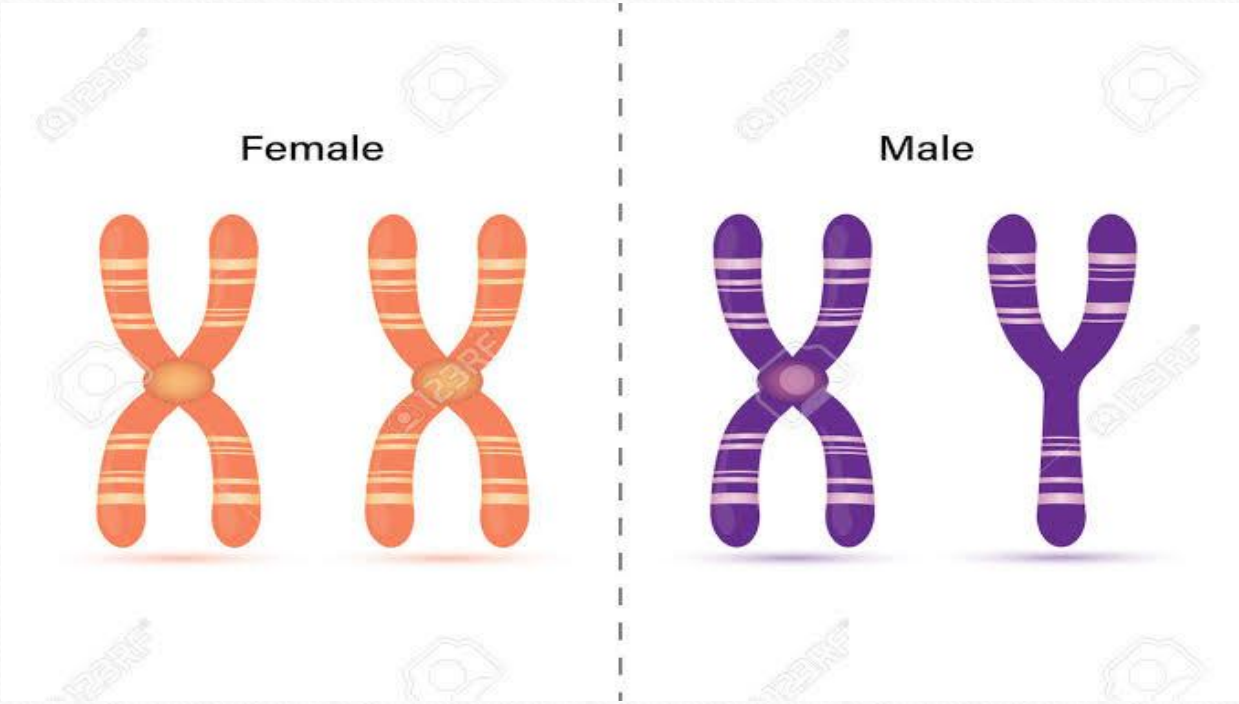

Nucleosomes
Histones
Chromosome
Deoxyribonucleic acid (DNA)

Types of Chromosomes

- **Autosomes**:
  Not involved in sex determination
  Humans: 22 pairs

  Sex Chromosomes:
  Determine sex
  Female: XX, Male: XY

Sex Chromosomes



Chromosome Numbers

- Varies among species
  Humans: 46 total (22 pairs autosomes + 1 pair sex chromosomes)
  Characteristic for each species
  Maintained through meiosis and fertilization

Chromosome Organization

- Usually present as chromatin (less condensed form)
  Chromatin regulates gene expression and cellular processes
  Condenses into visible chromosomes before cell division for accurate segregation

Functions

- Carry genetic information for inheritance
  Ensure complete genetic material distribution during cell division
  Support DNA replication, transcription, and repair

Any Question


thank you