

Biology

DNA

DNA Replication

- Topoisomerase: Unwinds DNA to be broken in half
- Helicase: Breaks H-Bonds between bases to make two strands
- DNA-Primase: Places RNA primer for DNA-Polymerase
- DNA Polymerase: Builds DNA in 5' to 3' direction
- DNA Ligase: Combines Okazaki fragments and replaces RNA primer w/ DNA

Transcription

Process

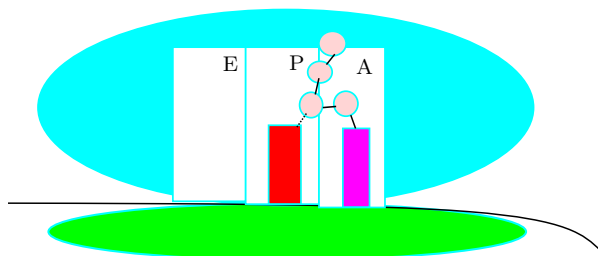
- Template Strand vs Coding strand: Template strand will be used by the RNA polymerase to create a copy of the coding strand
- RNA Polymerase: Attaches to promoter and creates RNA strand in 5' to 3' direction
- Terminator Region: Signals RNA Polymerase to stop; in prokaryotes the RNA forming a hair pin loop is common

Post Transcription Modification

- 5' Modified Guanine Cap
- 3' Poly-A tail
- Introns spliced out and exons merged together

Translation

- Ribosome sizes: Eukaryotic: 40, 60, 80; Prokaryotic: 30, 50, 70
- Single Amino acid mass is 110 Daltons



Skeletal System

Osteoblast: Forms bone

Osteocyte: Mature Bone Cell

Osteoclast: Breaks down bone

Osteon: Fundamental structural unit of compact bone

Endocrine System

Glands

Hypothalamus: Control center

Pituitary Gland: Master gland relays center for the hypothalamus getting information from the hypothalamus

Thyroid: Regulates bodies metabolism

Parathyroid: Regulates blood calcium level

Adrenal Glands: Composed of cortex (outer portion) where steroids are made and medulla (inner portion) where catecholamines are made

Gonads: Releases sex hormones

Pancreas: Controls blood sugar

3 Classes of Hormones

Autocrine Hormones: Functions at the cell that makes them

Paracrine Hormones: Function regionally

Endocrine Hormones: Functions at a distance

Types of Hormones

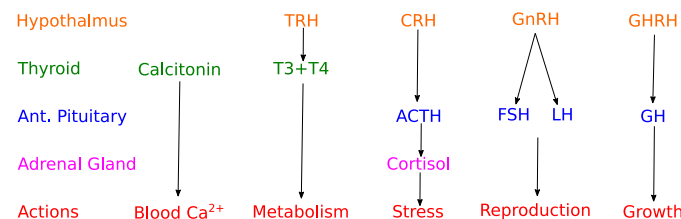
Proteins and Polypeptides: Made in RER and packaged in Golgi into vesicles. Due to them often being polar their receptors are on the cells surface.

Steroids: Derived from lipids most notably cholesterol. All steroids are composed of 4 ring structure (3 6-carbon, and 1 5-carbon). Steroid receptors are typically inside the cell.

Tyrosine Derivatives: Derived from amino acid tyrosine and can act like steroid or protein based hormones

Hormones

Hormone Pathways



Anterior Pituitary Gland

FSH: Regulate growth and regulation

LH: Regulate growth and regulation

ACTH: Regulate adrenal gland

TSH: Regulates thyroid gland

Prolactin: Stimulate lactation and plays a role in other physiological functions

Endorphins: Analgesic effect

GH: Stimulates growth

FLAGPEG

Posterior Pituitary Gland

Oxytocin: Controls uterine functions and contraction

ADH: Controls water level

Gonads

Male:

- Testosterone production is stimulated by LH

- Sperm production is stimulated by FSH

Female:

- Follicles are stimulated by FSH
- Estrogen production is triggered by LH
- Ovulation is triggered by LH

Pineal Gland

Melatonin: Regulates circadian rhythm

Adrenal Gland

Adrenal Medulla (Inner): Catechoalmines (Adrenaline and noradrenaline) controlling fight or flight response

Adrenal Cortex (Outer):Cortisol and Aldosterone (Steroid hormones) which regulate metabolism and fluid balance

Reproduction

Male

Production in 7 steps in the testes:

- 1. Seminiferous tubules
- 2. Epididymis
- 3. Vas deferens
- 4. Ejaculatory Duct
- 5. Nothing
- 6. Urethra

7. Penis

SEVEN UP

Supporting organs and structures

Seminal vesicles: Produces fluid mixes with sperm to help protect and nourish

Prostate Gland: Produces fluid that will be mixed with sperm

Bulbourethral gland: Produces fluid that will clean out urethra

Female

Muscles

Categories of Muscles

Skeletal: Fast straight striated muscles mainly attached to bones and are responsible for skeletal movement

Cardiac: Mid-speed branched striated muscles involved in the heart specialized in synchronized control

Smooth: Slow smooth muscles on walls of hollow organs and blood vessels

Fibers

Fiber	Type 1	Type 2A	Type 2B
Speed	Slow	Medium	Fast
Respiration	Aerobic	Both	Anaerobic
Endurance	High	Medium	Low
Myoglobin	Many	Medium	Few