IB TOPIC 6.6, D.5, 11.4
HORMONES, HOMEOSTASIS, AND REPRODUCTION, OH MY!
Comparing NS & ES

- Animals have two systems of internal communication and regulation

- The nervous system
  - Response time:
    - Fast, quick
  - Signals:
    - electrical
  - Specialized cells:
    - neurons

- The endocrine system
  - Response time:
    - slower, longer
  - Signals:
    - chemical
  - Specialized glands:
    - endocrine glands
ENDOCRINE SYSTEM
THE MAJOR GLANDS

- Hypothalamus
- Pineal gland
- Pituitary gland
- Thyroid gland
- Parathyroid glands
- Adrenal glands
- Pancreas
- Ovary (female)
- Testis (male)
Endocrine IB Understandings

- Insulin & Glucagon
  - $\beta$ and $\alpha$ cell respectively
  - control blood glucose concentration
  - Insulin: gets glucose in (into the cells)
  - Glucagon: if glucose is gone, signals liver to release glucose (into the blood)
Diabetes Mellitus

• Diabetes mellitus, perhaps the best-known endocrine disorder
  – Is caused by a deficiency of insulin or a decreased response to insulin in target tissues
  – Is marked by elevated blood glucose levels
• Type I diabetes mellitus (insulin-dependent diabetes)
  – Is an autoimmune disorder
  – immune system destroys the beta cells of the pancreas
  – treated: insulin added to the blood

• Type II diabetes mellitus (non-insulin-dependent diabetes)
  – either deficiency of insulin or,
  – more commonly, by reduced responsiveness of target cells due to some change in insulin receptors
  – treated: insulin and lifestyle
Control & effect of thyroid hormones

• Two negative feedback loop ex.:
• Effect of thyroxine:
  • Stimulate metabolism
  • Influence development and maturation
• Too much: Hyperthyroidism
  • Graves Disease
Graves Disease
**Melatonin**

- Secreted by pineal gland; regulates sleep cycle
- Can reduce effects of Jet Lag (induces earlier sleep cycle)
Leptin

- Hormone secreted by cells in adipose tissue
- Tells the brain you’re full
- Acts on hypothalamus:
  - Inhibits appetite
- Why do some people overeat? Leptin injection as treatment for obesity?
  - Leptin insensitivity
CLOSE UP: ENDOCRINE SYSTEM

TOPIC D.5

Essential Questions:

• What are endocrine glands?

• What are the two types of hormones?

• What is the role of the pituitary gland?

• How do these pathways work:
  • Growth hormone
  • Lactation

Exocrine | Endocrine
---|---

Hormone Travels in Bloodstream Throughout Body

Endocrine cells secrete hormone into the bloodstream.

target cells with hormone receptors
**TYPES OF HORMONES**

**STEROID VS PEPTIDE**

- **Steroid hormones**
  - Why can they easily enter a cell?
  - Receptors in cytoplasm or nucleus
  - Act as transcription factor
  - Ex: estrogen, progesterone, testosterone

- **Peptide hormones**
  - Cell surface receptor, triggers signal transduction cascade
  - Ex: insulin, glucagon, leptin, oxytocin
THE HYPOTHALAMUS AND PITUITARY GLAND

- Hypothalamus:
  - region o/t brain
  - neurosecretory cells
  - Makes ADH, Oxytocin
    - stored & released in posterior pituitary
- Pituitary gland ("the master gland")
  - Two parts:
    - Posterior
      - Stores and releases ADH, Oxytocin
    - Anterior...
Tropic Effects Only
- FSH, follicle-stimulating hormone
- LH, luteinizing hormone
- TSH, thyroid-stimulating hormone
- ACTH, adrenocorticotropic hormone

Nontropic Effects Only
- Prolactin
- MSH, melanocyte-stimulating hormone
- Endorphin

Nontropic and Tropic Effects
- Growth hormone
LACTATION
DONEC QUIS NUNC
GROWTH HORMONE
DONEC QUIS NUNC
PRACTICE QUESTION

Using the diagram, identify an organ containing an exocrine gland. [1]
Using the diagram, identify a hormone involved in the development of a follicle. [1]
Using the diagram, identify a steroid hormone. [1]
State two effects of prolactin. [2]
List two hormones produced by the posterior pituitary gland. [2]