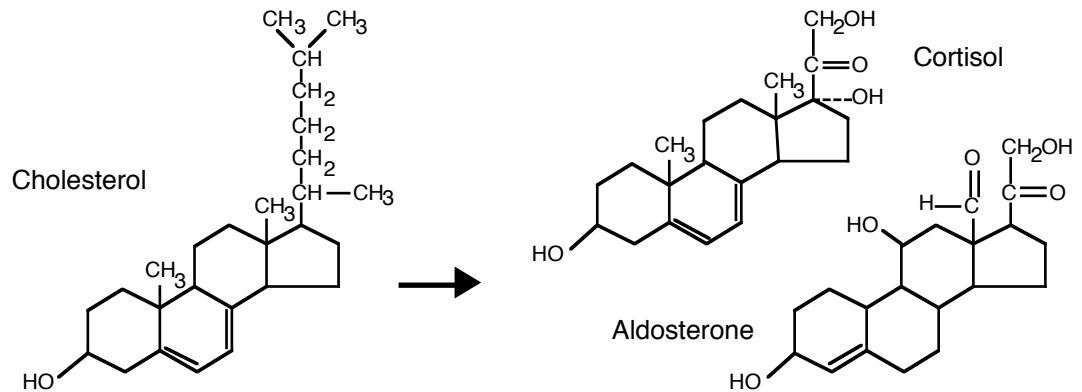


## The Endocrine System

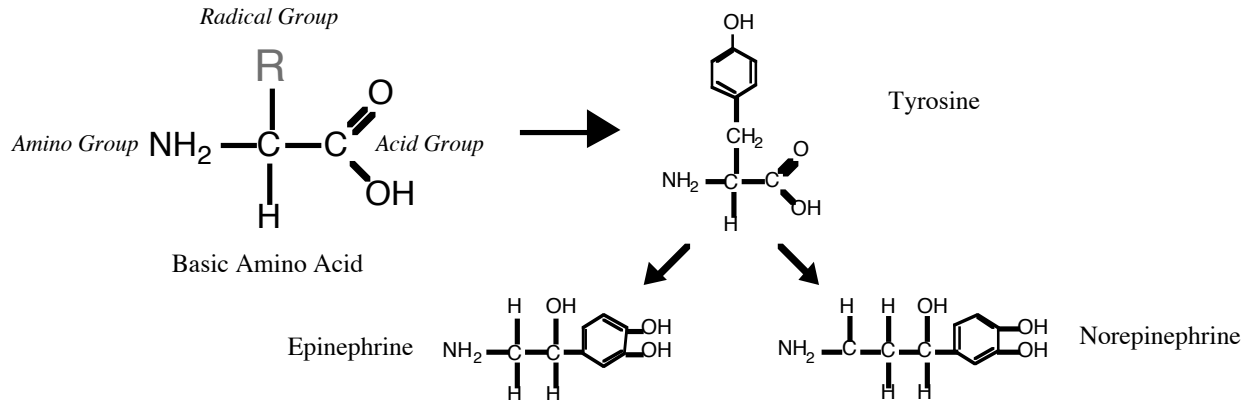
1. Introduction
  - A. Endocrine Glands
    - Endocrine vs. Exocrine Glands
  - B. Hormones
  - C. Target Tissues / Cells
2. Basic Functions
  - A. Maintenance of Homeostasis
  - B. Regulatory Functions
    - i. Growth
    - ii. Development
    - iii. Reproductive Matters

### 3. Biochemistry of Hormones

#### A. Steroids



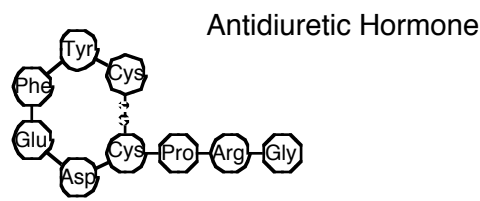
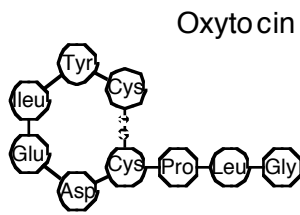
#### B. Amines



C. Peptides



- Antidiuretic Hormone
- Oxytocin



D. Proteins

E. Glycoproteins

4. Feedback Control System

A. Negative Feedback System (See *Endocrine Pathways* Handout: “Control Paradigm (Negative Feedback System)”)

- i. Example: (See *Endocrine Pathways* Handout: “Negative Feedback Example”)

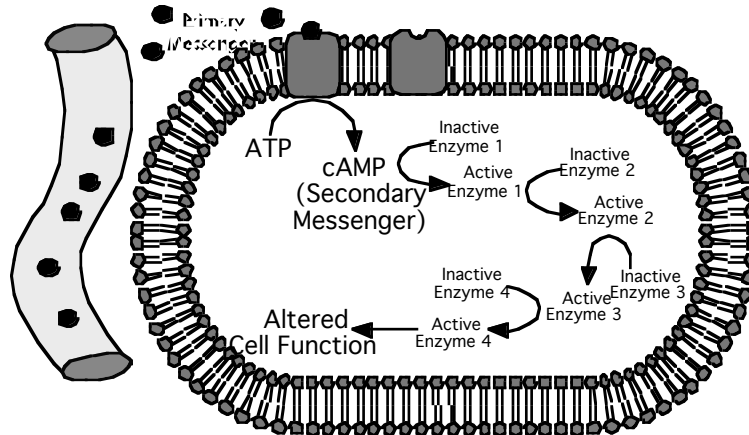
B. Positive Feedback System (See *Endocrine Pathways* Handout: “Positive Feedback Example”)

- i. Child Birth and Oxytocin

5. Mechanisms of Hormone Control

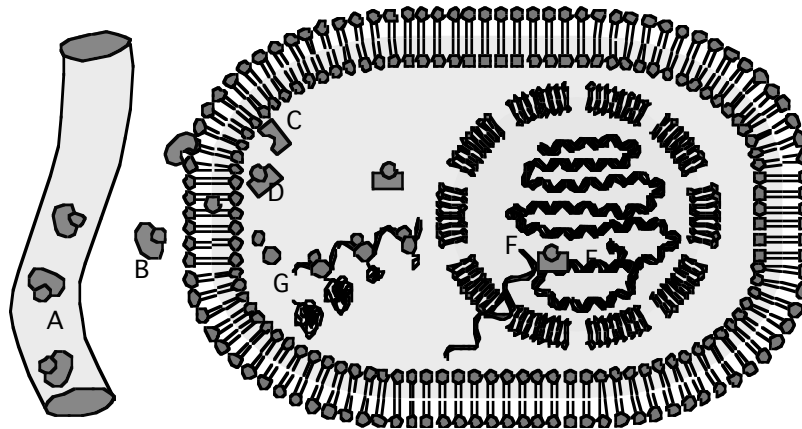
A. Fixed-Membrane-Receptor Mechanism

ii. Mechanism



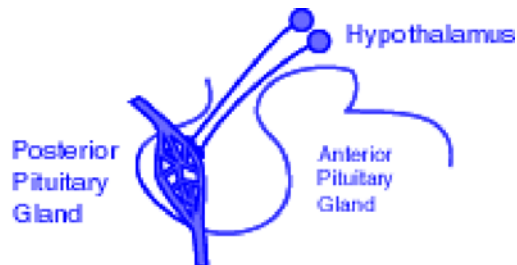
ii. Examples

B. Mobile-Receptor Mechanism



6. Pituitary Gland

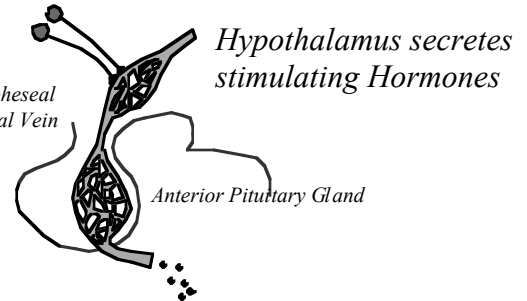
A. Posterior Lobe (Neurohypophysis)



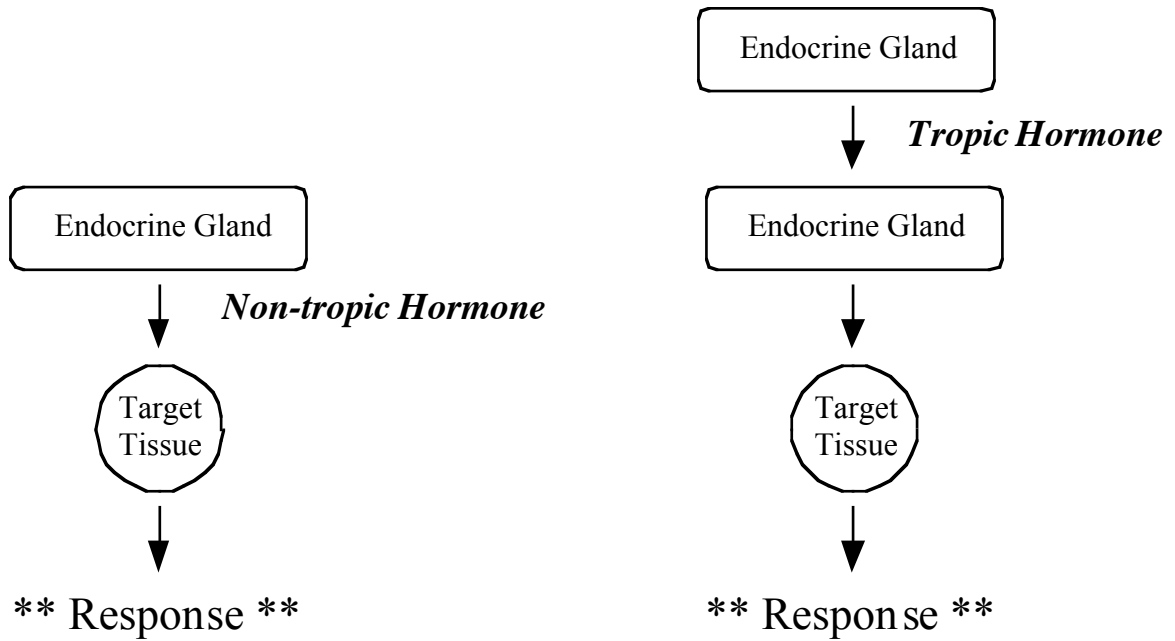
- i. Neurosecretory Cells
  - ADH Supraoptic Nucleus → ADH
  - Oxytocin Paraventricular Nucleus → Oxytocin
  - Infundibulum
- ii. Hormones of the Neurohypophysis
  - a. Antidiuretic Hormone (ADH) (or Vasopressin)
    - (See ***Endocrine Pathways*** Handout: “Water Balance and Antidiuretic Hormone (ADH)”)
    - Diuretic
    - Antidiuretic
  - b. Oxytocin
    - (See ***Endocrine Pathways*** Handout: “Positive Feedback Example”)
    - Myoepithelial Cells
    - Positive Feedback Mechanism

B. Anterior Lobe (Adenohypophysis)

*Pituitary Gland in response to stimulating hormones secretes tropic or non-tropic hormones into the blood stream.*



- i. Hypothalamic-Hypophyseal Portal System
- ii. Hormones of the Adenohypophysis
  - Tropic and Non-tropic Hormones



i. Non-Tropic Hormones

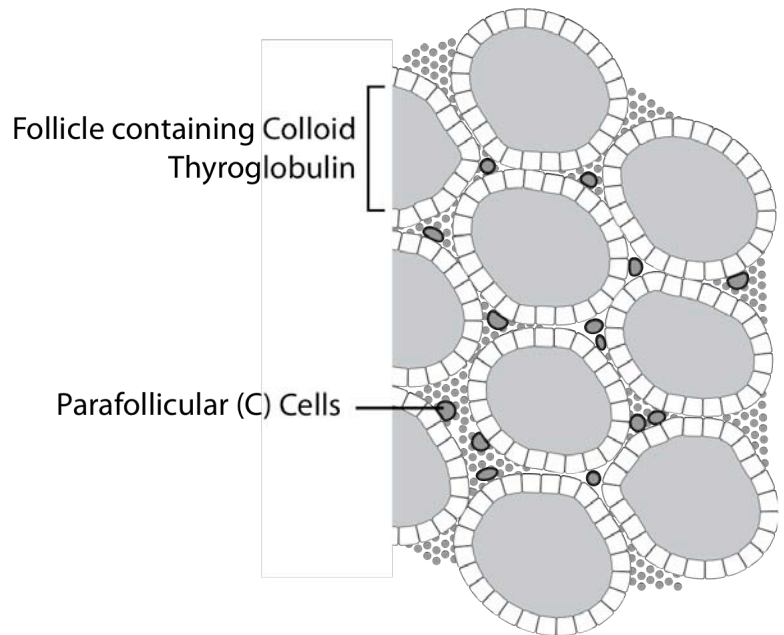
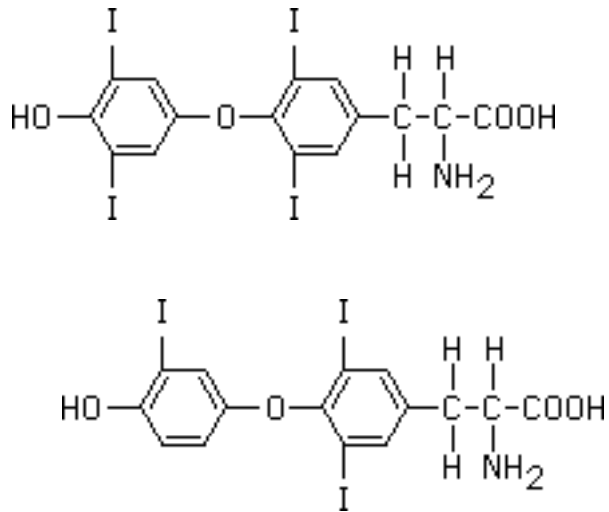
a. Growth Hormone (GH)

\* (See *Endocrine Pathways* Handout: “Growth Hormone”)

- Nontropic.
- Anabolic Effect
- Amino Acid Uptake Increase
- Fat Metabolism
- Epiphyseal Plate
- \* Dwarfism
- \* Acromegaly
- Mechanism
  - \* Growth-Hormone Releasing Hormone (GHRH)
  - \* Growth-Hormone Inhibiting Hormone (GHIH)

ii. Some Tropic Hormones

a.	Prolactin	Females	Mammary Gland Development Milk Production
		+	
		Males	
b.	Follicle-Stimulating Hormone (FSH)	Females	Follicle Development
		+	
		Males	
c.	Luteinizing Hormone (LH)	Females	Ovulation
		+	
		Males	Interstitial Cells Testosterone
		+	
		Gonadotropin-Releasing Hormone (GnRH)	
g.	Melanocyte-Stimulating Hormone (MSH)		



7. Thyroid Gland (Follicles of gland)

\* (See **Endocrine Pathways** Handout:  
“Thyroxine and the Basal Metabolic Rate  
(BMR)” page #7 (??))

- Follicular Cells

A. Thyroxine (T4) and Triiodothyronine (T3)

- i. Structure
  - a. Follicles
  - b. Colloid
- ii. Synthesis
  - a. Tyrosine
  - b. Iodine
- iii. Function
  - a. Increase Metabolism
  - b. Calorigenic Effect
- iv. Thyroid Malfunction
  - a. Hyperthyroidism

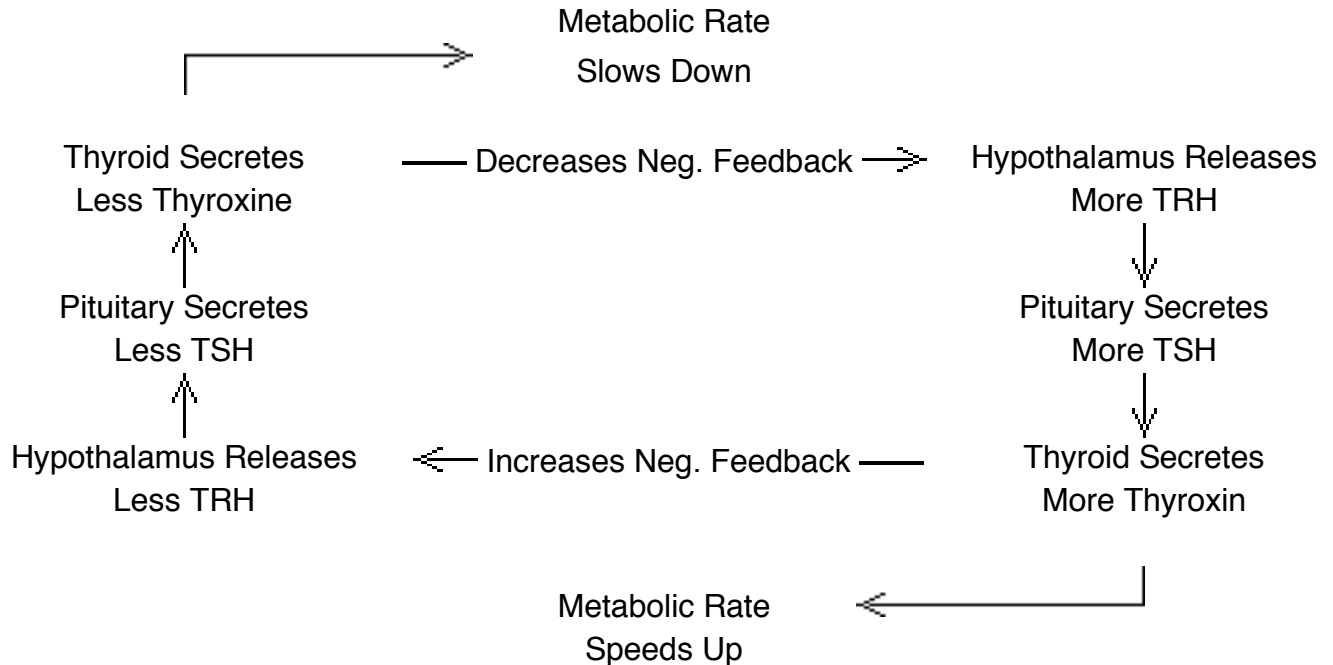
b. Hypothyroidism

c. Goiter

\* (Pull out Handout: (***Iodine and Goiter***”)

v. Synthesis of Thyroid Hormone

vi. An *Alternative* diagram for Thyroid regulation:



8. Parathyroid Glands AND Thyroid Gland (Parafollicular cells NOT Follicles)

\* (See ***Endocrine Pathways*** Handout: “Calcium Regulation in the Blood”)

A. Parathyroid Hormone

i. Function

ii. Mechanisms

a. Calcium Reabsorption

b. Kidney Reabsorption

c. Digestive Absorption of Calcium

B. Parafollicular Cells of Thyroid Gland

9. Adrenal Glands

\* (See ***Endocrine Pathways*** Handout:

“Adrenal Gland and Stress”)

- Medulla
- Cortex

A. Adrenal Cortex

i. General Information

ii. Anatomy

- a. Zona Glomerulosa
- b. Zona Fasciculata
- c. Zona Reticularis

iii. Hormones of the Adrenal Gland

a. Glucocorticoids

- Gluconeogenesis
- Cortisol and Corticosterone
- Corticotropin-Releasing Hormone (CRH)

b. Mineralocorticoid

- Aldosterone

B. Adrenal Medulla

\* (Again, see ***Endocrine Pathways*** Handout:

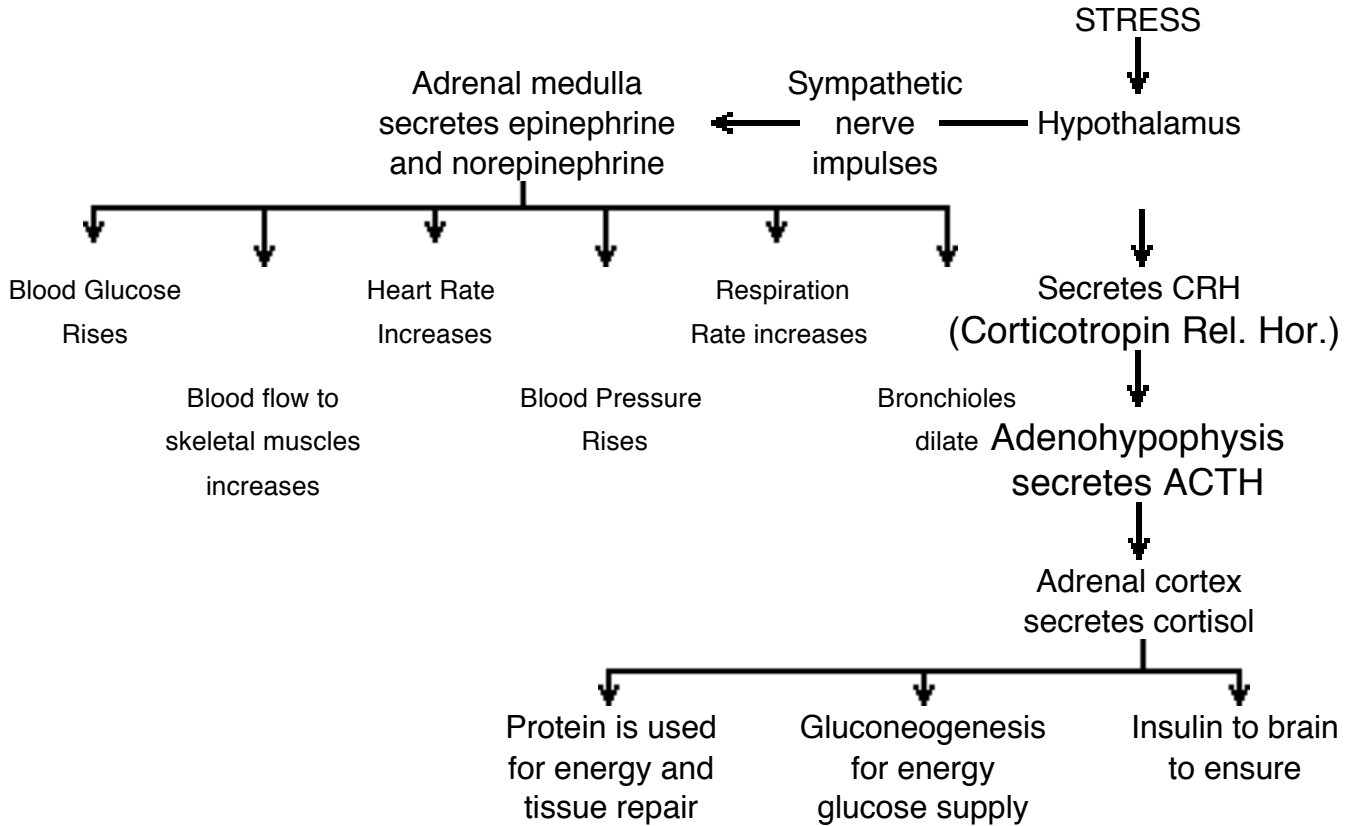
“Adrenal Gland and Stress”)

i. Hormones

- a. Epinephrine
- b. Norepinephrine

ii. Stress and the Adrenal Cortex





10. Pancreas

\* (See **Endocrine Pathways** Handout: “Glucose Regulation”)

A. Introduction

- i. Mixed Gland
  - a. Exocrine Gland
  - b. Endocrine Gland
    - Pancreatic Islets

B. Hormones

- i. Glucagon
  - a. Alpha Cells
- ii. Insulin - a peptide
  - a. Beta Cells

## Anatomy and Physiology II Student Outline – The Endocrine System

11. Gonads
  - Ovaries
  - Testes
  - A. Male Sex Hormones
    - i. Testosterone
    - ii. Luteinizing Hormone (LH)
    - iii. Follicle-Stimulating Hormone (FSH).
    - iv. Inhibin
  - B. Female Sex Hormones
    - i. Estrogens
    - ii. Relaxin
    - i. Follicle-stimulating hormone
    - ii. Luteinizing hormone
12. Other Sources of Hormones
  - A. Kidneys
    - i. Renin
    - ii. Erythropoietin
      - \* (See **Endocrine Pathways** Handout: “Oxygen Carrying Capacity of Blood”)
  - B. Pineal Gland
    - i. Melatonin
  - C. Thymus Gland
  - D. Digestive System
    - i. Gastrin
    - ii. Secretin
    - iii. Cholecystokinin
  - E. Placenta