I. Introduction

A) Endocrine System

(1) _
   (a) Secretions 'dumped' into blood stream and carried throughout body

(2) _
   (a) chemical messengers that act on distant body parts

(3) ‘target’ cells have _
   (a) that bind/interact with hormones and affect the target cells metabolic activities

B) Endocrine System Organs scattered throughout body
   (1) Hypothalamus
   (2) Pituitary gland
   (3) Pineal gland
   (4) Thyroid gland
   (5) Parathyroid gland
   (6) Adrenal gland
   (7) Pancreas
   (8) Gonads

C) Coordination of Body Function:

(1) _
   (a) Fast-acting
   (b) Neurotransmitters
   (c) Act locally
   (d) Hypothalamus linked directly to endocrine system

(2) _
   (a) Slower acting
   (b) Hormones
   (c) Act throughout body
D) Hormone Action

(1) 2 categories of hormones:
   (a) (Nonsteroid) **Peptide hormones**
      1) Amino acids, peptides, proteins
      2) Water soluble
      3) 
   (b) **Steroid hormones**
      1) Steroid complex ring structure
      2) lipid-soluble
      3) 
      4) ex: testosterone, estrogen, progesterone

(2) Target organs have _

(a) that bind hormone and initiate a response
(b) **Highly specific**

(3) **Steroid Hormones Mechanism of Action**

(a) hormone diffuse across plasma membrane
(b) Hormone enters nucleus
(c) 
(d) Hormone-receptor complex interacts with DNA
(e) Activates a DNA gene (code for a protein)
(f) 

(4) **Peptide Hormones Mechanism of Action**

(a) 
(b) Hormone-receptor complex activates a cytoplasmic protein (2**nd** messenger)
(c) 
   1) initiates a series of chemical reactions
   2) within cytoplasm (enzyme cascade)
(c) 
   1) initiates a series of chemical reactions
   2) within cytoplasm (enzyme cascade)
(d) 
(e) Results in a change on cellular function (note: NO new proteins are synthesized)
II. Endocrine Glands

A) Hypothalamus: regulate internal environment
   (1) Controls anterior pituitary gland secretions
   (2) Produces hormones that are stored in posterior pituitary gland
   (3) Regulate heart beat, body temperature, water balance

B) Pituitary Gland

(1) Posterior Pituitary gland: Hormones produced in hypothalamus and stored in posterior pituitary gland

   (a) Hormone: (vasopressin)
      1) target: kidneys
      2) Function: water absorption
      3) Dysfunction: diabetes insipidus (watery urine)

   (b) Hormone:
      1) Target: uterus and mammary glands
      2) Function: stimulate uterine muscle contraction (positive feedback mechanism) and milk release

(2) Anterior Pituitary gland

   (a) Hormone: _
      1) target: thyroid
      2) function: stimulate thyroid to produce hormones (more later)

   (b) Hormone:
      1) target: adrenal cortex
      2) function: stimulate adrenal cortex to produce hormones

   (c) Hormone:
      1) FSH (see Reproductive System)
      2) LH (see reproductive system)

   (d) Hormone:
      1) target: mammary glands
      2) function: stimulate milk production

   (e) Hormone:
      1) target: soft body tissues and bones
      2) function: cell division (mitosis), protein synthesis, bone growth
      3) dysfunction:
         a) pituitary dwarfism (hyposecretion) individuals perfectly proportioned just small
         b) gigantism: hypersecretion
         c) acromegaly: hypersecretion in adults—hands/feet/face become overly large
C) **Thyroid Gland**

(1) Hormone: Thyroxine and Triiodothyronine T3/T4

(a) 
(b) target: all tissues
(c) Function:
   1) Increases metabolic rate
   2) Regulate growth and development
(d) Dysfunction:
   1) *Simple goiter*: lack dietary Iodine—gland enlarges
   2) *Grave’s Disease/ hyperthyroidism*: eye protrusion, hyperactive, nervous, irritable, insomnia

(2) Hormone: _

(a) target: kidneys, bones, intestines
(b) Function: Lowers blood calcium—important in nerve impulse conduction, muscle contraction and blood clotting pathways

D) **Parathyroid gland**

(1) Hormone: PTH parathyroid hormone
(2) target: bones, kidneys and intestines
(3) function: raises blood calcium levels
(4) Dysfunction: hyposecretion results in tetany (continuous muscle contraction)

E) **Thymus**

(1) hormone: Thymosin
(2) target: _
(3) function: production and maturation of T-cells

F) **Adrenal Gland**

(1) Adrenal cortex

(a) hormone:
   1) target: all tissues
   2) Function: raise blood glucose and stimulate breakdown of proteins, carbohydrates and lipids

(b) _
   1) target: kidney
   2) function: reabsorption of sodium

(c) Sex hormones (small amounts of male and female)
   1) target: gonads, skin, muscle, bone
   2) Function: stimulate development of sexual characteristics
(2) **Adrenal medulla**

(a) hormone:  
(b) target: cardiac and other muscles  
(c) function:  
1) emergency situations  
2) raise blood glucose levels

**G) Pancreas**

(1) _

(a) hydrolytic enzymes of digestion  
(b) bicarbonate (buffer)

(2) Hormone:  
(a) target: liver, muscles, adipose  
(b) function: (Negative Feedback)  
1) lower blood glucose  
2) promote glycogen formation

(3) Hormone:_

(a) target: liver, muscles, adipose  
(b) function:  
1) promote glycogen breakdown  
2) increase blood glucose levels

(4) Dysfunction

(a) _

1) cells unable to take up and/or metabolize glucose

(b) _

1) pancreas is not producing enough insulin

(c) _

1) pancreas produces insulin but liver and muscle cells do not respond (common in obese/inactive individuals)