

Bio& 242, Unit 4

Endocrine & Reproductive System Study Guide

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THE ENDOCRINE SYSTEM (CH 17):

Introduction: You have a fairly short time to learn the Endocrine material. It will help greatly if you approach the Endocrine system in a logical manner. I'd suggest that you start by learning all the organs/glands, their special cells and the hormones they produce. Second, learn the hormones' target tissue and the function or actions of the hormone on that tissue. Third, learn the hormone interactions, particularly hormones the regulation the release of other hormones. After you have worked on mastering this information, it should be easier to understand the clinical consequences and disorders associated with hyper- or hypo-secretion of the hormones.

1. Know the location and function of the follow organs, glands, structures, and tissues.
Organs: Hypothalamus, Infundibulum, Posterior pituitary (neurohypophysis), Anterior pituitary (adenohypophysis), Pancreas
Adrenal glands, Testes, Ovaries, Parathyroid glands, Thyroid gland
Cells and Tissues: Neurosecretory cells, Islets of Langerhans, Hypophyseal portal veins, Hypothalamo-hypophyseal tract, Chromophobes, Basophils, Acidophils
2. Understand the types of hormones and mode of action for Hydrophilic (water soluble) and Hydrophobic (fat soluble) hormones.
Types of hormone systems: Endocrine, Paracrine, Autocrine

Hydrophilic mechanism: First messenger, Membrane receptor, G protein, Second messenger, Protein Kinase, cAMP

Hydrophobic mechanism: Transport protein, Receptor, Activated receptor-hormone complex, gene expression,
3. Understand how hormones interact and how hormone activity is controlled in the body.

Hormone interaction: Synergistic effects, Permissive effects, Antagonistic effects.

Hormone Control: Enzyme amplification, up-regulation, Down regulation, Hormone clearance
4. Know the chemical classes for hormones. Steroids, oligopeptides, Polypeptides, Glycoproteins, monoamines.
5. Know the following hormones. For each hormone on the list, know: source, target tissue, action or function, their regulation, and disorders associated with hyper/hypo-secretion. Use the flow chart provided to guide you with this material.

List of hormones:

Hypothalamus: (releasing Factors) Growth Hormone Releasing hormone, Thyrotropin Releasing Hormone, Gonadotropic Releasing Hormone, Prolactin releasing Hormone, Corticotropin Releasing Hormone **(inhibiting factors)** Growth Hormone Inhibiting Hormone or Somatostatin, Prolactin Inhibiting Hormone, Dopamine

Posterior Pituitary or neurohypophysis: Releases two hormones produced by the Hypothalamus, ADH and Oxytocin

Anterior Pituitary Gland or Adenohypophysis: (Somatotrophs) Human Growth Hormone “hGH,” **(Thyrotrophs)** Thyroid-Stimulating Hormone “TSH,” **(Gonadotrophs)** Follicle-Stimulating Hormone “FSH,” Luteinizing Hormone “LH,” **(Lactotrophs)** Prolactin “PRL,” **(Corticotrophs)** Adrenocorticotrophic Hormone “ACTH,” Melanocyte Stimulating Hormone “MSH”

Thyroid Gland: (Follicular cells) T₃ and T₄, **(Parafollicular cells)** Calcitonin

Parathyroid Gland: (Principal cells) Parathyroid Hormone “PTH”

Adrenal Gland Cortex: (Zona glomerulosa) Mineralocorticoids- Aldosterone, **(Zona fasciculata)** Glucocorticoids- cortisol, corticosterone, cortisone, **(Zona reticularis)** androgens- Dehydroepiandrosterone DHEA

Adrenal Gland Medulla: (Chromaffin cells) Epinephrine and Norepinephrine

Pancreas: Islets of Langerhans (Alpha cells) Glucagon, **(Beta cells)** Insulin, **(Delta cells)** Somatostatin or insulin-like growth factor, **(F cells)** Pancreatic polypeptide.

Ovaries: (granulosa or follicular cells) Estrogen and Progesterone, **(Corpus luteum)** Estrogen, Progesterone, Relaxin, and Inhibin

Testes: (Leydig cells) Testosterone and Dihydrotestosterone “DHT,” **(Sertoli cells)** Androgen-binding protein “ABP” and Inhibin.

Placenta: Human Chorionic Gonadotropin (HCG), Human placental lactogen or human Chorionic Somatomammotropin, Placental prolactin, relaxin, progesterone, estrogen

Pineal Gland: serotonin and melatonin.

Kidneys: Erythropoietin

Thymus: Thymopoietin

6. Know the following endocrine disorders and medical terms:
acromegaly, Giantism, Dwarfism, Galactorrhea, Amenorrhea, Grave’s disease, Diabetes insipidus, Diabetes mellitus, Cretinism, Myxedema, Exophthalmos, Endemic goiter, Cushing’s disease, Addison’s disease, Virilizing adenoma, Hyperglycemia, Hypoglycemia, Ketoacidosis, Seasonal Affective Disorder.

THE MALE REPRODUCTIVE SYSTEM (CH 27):

1. Know the following structures of the MALE reproductive system:
Testis, Epididymis, Scrotum, Prepuce, External urethral orifice, Glans penis, Corona Penis, Spongy urethra, Bulbospongiosus muscle, Urogenital diaphragm
Ischiocavernosus muscle, Bulbourethral gland, Prostate gland, Membranous urethra
Prostatic urethra, Ejaculatory duct, Ampulla of ductus (vas) deferens, Seminal vesicles
Cremaster muscle, Dartos muscle, Inguinal canal, Corpora cavernosa, Tunica albuginea
Corpus spongiosum, Bulb, Vas deferens, Gubernaculum testis,
HISTOLOGY OF TESTES:
Lobule, Seminiferous tubules, Spermatogonium, Primary spermatocyte, Secondary spermatocyte, Spermatids, Spermatozoa, Cells of Leydig, Sertoli cells, Rete testis, Efferent duct, Ductus epididymis
 2. Understand the process of gender determination for males: genetic sex, gonadal sex, sry gene, Wolffian duct, Mullerian duct, Anti-mullerian hormone or mullerian-inhibiting factor (MIF), Testosterone, Dihydrotestosterone,
 3. Know the following structure associated with the development of the male genitalia. Also understand the homologous structures that develop with both sexes.
Genital tubercle, Urogenital folds, and Labioscrotal folds.
 4. Understand the process of spermatogenesis and the hormonal regulation of spermatogenesis. Relate to the stages of meiosis. Meiosis!, Meiosis !!
Terms: primordial germ cells, spermatogonia, Primary spermatocyte, secondary spermatocyte, spermatid, spermatozoon
 5. Know the glands involved and mechanism for semen production. Prostate, Seminal vesicles, bulbourethral glands, Ampulla of ductus (vas) deferens.
 6. Understand the physiology of sexual response for males: arousal, vasocongestion, erection, emission, orgasm, Resolution, detumescence, refractory period.
Also know the following terms: Analingus, Coitus, Coitus interruptus, Cunnilingus, Fellatio, Intromission, Libido
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THE FEMALE REPRODUCTIVE SYSTEM (CH 28):

1. Know the following structures of the FEMALE reproductive system:
Ovaries, Broad ligament, Mesovarium, Ovarian ligament, Suspensory ligament
Fallopian tubes, Infundibulum, Fimbriae, Uterus, Fundus, Uterine cavity, Endometrium
Myometrium, Perimetrium, Body of uterus, Uterosacral ligament, Round ligament, Cervix,
Internal os, External os, Vagina, Rugae, Fornix, Vulva, Mons pubis, Labia majora
Labia minora, Clitoris, Prepuce, Vestibule, Mammary glands, Vaginal orifice, Areola
Nipple, Lactiferous ducts, Lobules, Lactiferous sinuses, Ischiocavernosus muscle,
Cooper's (suspensory) ligaments, Bulbospongiosus muscle, External urethral orifice,
Round ligament

HISTOLOGY OF THE OVARY: Primordial follicle, Primary follicle, Zona pellucida, Secondary follicle, Tertiary or Graafian follicle, Primary oocyte, Corpus luteum, Corpus albicans

2. Understand the process of gender determination for females: genetic sex, gonadal sex, sry gene, Wolffian duct, Mullerian duct, Anti-mullerian hormone or mullerian-inhibiting factor (MIF), Testosterone, Dihydrotestosterone,
3. Know the following structure associated with the development of the female genitalia. Also understand the homologous structures the develop with both sexes.
Genital tubercle, Urogenital folds, and Labioscrotal folds.
4. Understand the process of and hormonal regulation of oogenesis. Relate to the stages of meiosis. Meiosis!, Meiosis !! Terms: Oogonia, Primordial follicle, Primary follicle, Primary Oocyte, Secondary follicle, Graafian follicle, First polar body, Second polar body, atresia
5. Understand the hormonal regulation of the female reproductive (ovarian) cycle including the changes in the endometrium and menstruation. Know the signs, symptoms, and hormone changes associated with menopause.
Follicular phase: Preantral phase (primordial follicles, primary follicles), Antral phase (secondary follicle, dominant follicle, graafian follicle), Preovulatory phase, Ovulation, Luteal phase (corpus luteum, involution, corpus albicans)
Menstrual cycle: Menstrual phase, Proliferative phase, Secretory phase, Premenstrual phase.
Terms: Menses, Amenorrhea, Dysmenorrhea, Menarche, Menopause
Hormones: LH, FSH, Estradiol, Progesterone
6. Understand the physiology of sexual response for females: arousal (excitement and plateau) vaginal transudation, Orgasmic platform, Tenting effect, Erection, Breast vasocongestion, Orgasm, Detumescence.
Also know the following terms: Analingus, Coitus, Coitus interruptus, Cunnilingus, Fellatio
7. Know the following stages of pregnancy and associated hormones.
Stages: Gestation time, 1st trimester, 2nd trimester, 3rd trimester,
Hormones: Human Chorionic Gonadotropin, Estrogen, Progesterone, Human Chorionic Somatomammotropin, Relaxin, Human Chorionic Thyrotropin
8. Know the stages, terms, and hormones association with childbirth.
Stages: Dilation, Expulsion, Placental
Terms: Braxton Hicks contractions, labor contractions, parturition, primipara, multipara, Effacement, crowning, afterbirth, postpartum, involution, lochia, amniotic fluid, episiotomy,
Hormones: Corticotrophic-releasing hormone, Oxytocin
9. Know the following structures, terms and hormones associated with lactation.
Structures: Mammary gland, body, axillary tail, Nipple, Areola, Areolar gland, Lobe, lobule, lactiferous duct, lactiferous sinus, Myoepithelial cells
Terms: breast preparation, Milk let-down(ejection), Colostrum, meconium
Hormones: Estrogen, Progesterone, Human Chorionic Somatomammotropin, Prolactin

10. Know the following reproductive disorders and medical terms:
cryptorchidism, vasectomy, prostate cancer, circumcision, ovarian cancer, breast cancer, mammography, lumpectomy, mastectomy, STD, chlamydia, gonorrhea, prostatectomy, impotence, endometriosis, Pelvic Inflammatory Disease (PID), smegma, cervical cancer.

DEVELOPMENT AND INHERITANCE (CH 29):

1. Know the following terms and structures associated with fertilization:
Sperm: Acrosome
Egg: Zona pellucida, Corona radiata
Terms: Capacitation, Acrosomal reaction, Zygote,
2. Understand the mechanism that prevents more than one sperm from contacting the egg.
Terms: Polysermy, Cortical Granules, Fast block, Slow block, Molar pregnancy
2. Know the following terms and structures associated with the Pre-embryonic stage:
Blastomeres, Cleavage, Morula, Blastocyst, Trophoblast, Embryoblast (Inner cell mass), Blastocoel
3. Know the following terms and structures associated with embryogenesis and Embryonic stage.
Terms: Embryonic disc, Primitive streak, Bilaminar embryonic disc Trilaminar embryonic
Primary Embryonic Tissues: Ectoderm, Endoderm, and Mesoderm
Extraembryonic membranes: Chorion, Chorion Villi, Amnion, Amniotic cavity, Amniotic fluid, Yolk sac, Allantois
4. Know the following structures associated with implantation and the development of the placenta:
Layers of the endometrium: Decidua basalis, Decidua capsularis, Decidua parietalis
Structure of the plcenta: placental sinus, Chorionic villi
Umbilical Cord: Umbilical arteries, Umbilical vein
5. Understand the types of twins and the patterns for twinning: Dizygotic twins and Monozygotic twins
6. Know the basic pattern of organ system development from the PRENATAL DEVELOPMENT Lab Handout.