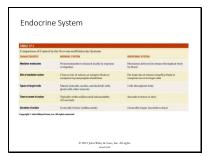
Name:				
Ms. Randal Unit 8: En	ll Anatomy and Physio docrine and Reprodu	logy ctive Sys	tems	
Slide 1				
	Unit 8 Endocrine and Reproductive Systems			
Slide 2	Lesson 1: Hormones			
	Objective: Describe the functions and mechanisms of hormone action Discuss the regulation of hormone levels through positive or negative feedback Compare types of endocrine stimuli			

Introduction

- The endocrine and nervous systems function together to regulate body activities
- The endocrine system releases hormones to control body activities and help maintain homeostasis
- In contrast to the rapid communication and control associated with the nervous system, the endocrine system responses are slower and more sustained

Slide 4



Slide 5

Endocrine system

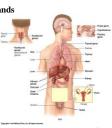
- Made up of the cells, tissues, and organs that secrete hormones into body fluids.
 Regulates a number of metabolic processes within cells, and the whole body.
- Hormones diffuse into the bloodstream to act on target cells some distance away.

Two kinds of glands,

- 1. exocrine (secretes products into ducts) and
- endocrine (secrete products into body fluids to affect target cells).

Endocrine glands

Pituitary gland, thyroid gland, parathyroid glands, adrenal glands, pancreas, and other hormonesecreting glands and tissues.



Slide 7

Two main classes of Hormones

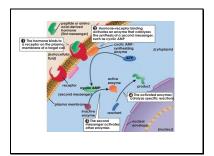
- 1. Amino acid-based hormones
- Amino acid derivatives, peptides, and proteins
- 2. Steroids
- Synthesized from cholesterol
- Gonadal and adrenocortical hormones

They can influence target cells even if they are present only in small concentrations

Slide 8

Peptide Hormones(Amino Acid)

- Peptide hormones do not enter the cell directly. These hormones bind to receptor proteins in the cell membrane.
- •When the hormone binds with the receptor protein, a secondary messenger molecule initiates the cell response.
- •Because peptide hormones are water soluble, they often produce fast responses.

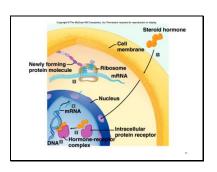


Slide 10

Steroid Hormones

- Steroid hormones enter through the cell membrane and bind to receptors inside of the target cell.

 These hormones may directly stimulate transcription of genes to make certain proteins.
- Because steroids work by triggering gene activity, the response is slower than peptide hormones.



 		-	

Control of Hormonal Secretions

- Hormone levels are very precisely regulated.
- · Control Mechanisms
 - Release of tropic hormones from the hypothalamus controls secretions of the anterior pituitary.
 - The nervous system influences certain endocrine glands directly.
 - Other glands respond directly to changes in the internal fluid composition.

12

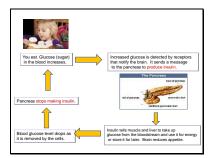
Slide 13

Control of Hormones External stimuli by way of nerves from the sensory organs in the nervous system Internal stimuli by way of nerves and other hormones from inside the body

Slide 14

Negative Feedback Systems

- Commonly, *negative feedback mechanisms* control hormonal releases.
- Gland is sensitive to the concentration of the substance it regulates or which regulates it.
- When the concentration of the regulated substance reaches a certain level (high or low), it inhibits the gland from secreting more hormone until the concentration returns to normal.



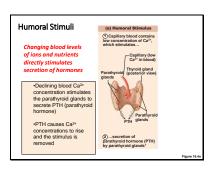
Slide 16

Blood levels of hormones

- Are controlled by negative feedback systems
- Vary only within a narrow desirable range

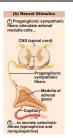
Hormones are synthesized and released in response to

- 1. Humoral stimuli
- 2. Neural stimuli
- 3. Hormonal stimuli



Neural Stimuli

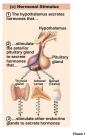
- •Nerve fibers stimulate hormone release
- Sympathetic nervous system fibers stimulate the adrenal medulla to secrete catecholamines



Slide 19

Hormonal Stimuli

- Hypothalamic hormones stimulate the release of most anterior pituitary hormones stimulate the release of most anterior pituitary hormones Anterior pituitary hormones stimulate targets to secrete still more hormones Hypothalamic-pituitary-target endocrine organs redeback loog: hormones from the final target organs inhibit he release of the anterior pituitary hormones



Slide 20

Lesson 2: Glands

Objective:

•Summarize the site of production, regulation, and effects of the hormones of the pituitary, thyroid, parathyroid, adrenal, pineal and thymus glands

Hypothalamus

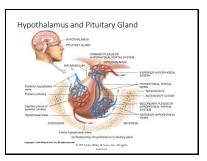
- Major integrating link between the nervous and endocrine systems
 Region of brain below the thalamus
 Cell bodies of neurosecretory cells

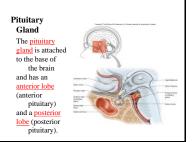
- Pituitary gland controls other endocrine glands, but is itself controlled by the hypothalamus

 Some hypothalamic hormones stimulate or inhibit release of anterior pituitary hormones

 Others are stored and released from the posterior pituitary

Slide 22



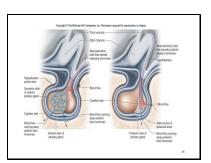


The brain controls the activity of the pituitary gland.

- Releasing hormones from the hypothalamus control the secretions of the anterior pituitary.

 The releasing hormones are carried in the bloodstream directly to the anterior pituitary by hypophyseal portal veins.
- The posterior pituitary releases hormones into the bloodstream in response to nerve impulses from the hypothalamus.

Slide 25



Slide 26

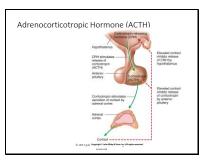
Anterior Pituitary Hormones

- Adrenocorticotropic hormone (ACTH)
- Human growth hormone (hGH)
- Thyroid-stimulating hormone (TSH)
- Follicle-stimulating hormone (FSH)
- Luteinizing hormone (LH)
 Prolactin (PRL)
- Melanocyte-stimulating hormone (MSH)

Adrenocorticotropic Hormone (ACTH)

- Controls the secretion of glucocorticoids such as cortisol from the adrenal cortex
- Secretion stimulated by corticotropinreleasing (CRH) hormone from hypothalamus
- · Also stimulated by stress-related stimuli
- Rising cortisol blood levels inhibits both ACTH and CRH release by negative feedback

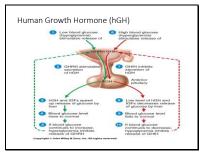
Slide 28



Slide 29

Human Growth Hormone (hGH)

- Promotes synthesis and secretion of insulin like growth factors (IGFs) that stimulate body growth and repair, increase lipolysis, and elevate blood glucose levels
- Secretion stimulated by growth hormonereleasing (GHRH) and inhibited by growth hormone-inhibiting (GHIH) hormones from hypothalamus
- Blood glucose level is a major regulator of GHRH and GHIH secretion



Slide 31

Thyroid-Stimulating Hormone (TSH)

- Stimulates the thyroid gland to secrete triiodothyronine (T₃) and thyroxine (T₄)
- Secretion stimulated by thyrotropinreleasing (TRH) from hypothalamus
- T₃ and T₄ blood level is a major regulator of TRH secretion

Slide 32

Follicle-Stimulating Hormone (FSH)

- In females: targets ovaries for monthly development of several ovarian follicles that surround a developing oocyte
- In males: targets testes for production of sperm
- Secretion stimulated by gonadotropinreleasing (GnRH) hormone from hypothalamus
- Blood estrogen or testosterone level is a major regulator of GnRH and FSH secretion

Luteinizing Hormone (LH)

- In females: triggers ovulation, the release of oocyte from ovary, and stimulates secretion of progesterone by ovary after ovulation; also with FSH stimulates secretion of estrogen by ovaries
- In males: stimulates secretion of testosterone by the testes
- Secretion stimulated by gonadotropinreleasing (GnRH) hormone from hypothalamus

Slide 34

Prolactin (PRL)

- Initiates milk production by mammary glands
- Secretion stimulated by prolactin-releasing (PRH) and prolactin-inhibiting (PIH) hormones from hypothalamus
- Sucking action of nursing infant causes a reduction in PIH, therefore increasing PRL secretion
- Function in males not known, but excess causes erectile dysfunction

Slide 35

Melanocyte-Stimulating Hormone (MSH)

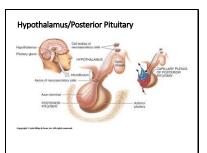
- Function in human is unknown, but receptors in the brain suggests it may influence brain activity
- Secretion stimulated by excessive level of corticotropin-releasing hormone (CRH) and inhibited by prolactin-inhibiting hormone (PIH) from hypothalamus
- Excess can cause darkening of skin

Hypothalamus/Posterior Pituitary

- Posterior pituitary does not synthesize any hormones

- stores and releases hormones from hypothalamus neurosecretory cell axons Release triggered by nerve impulses Hormones carried from posterior pituitary blood capillaries through general body circulation to target cells
- Posterior pituitary hormones
- Oxytocin Antidiuretic hormone

Slide 37



Slide 38

Oxytocin (OT)

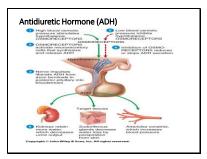
- Enhances smooth muscle contractions in the uterine wall to facilitate labor and delivery
- Stimulates milk ejection from mammary glands after delivery
- Secretion stimulated by uterine stretching and suckling during nursing
- Function in males and nonpregnant females not clear, but may foster parental caretaking

Antidiuretic Hormone (ADH)

- Causes the kidneys to return more water to the blood while decreasing urine volume
- Decreases water loss through sweat glands
- Causes constriction of arterioles to increase blood pressure (also known as vasopressin)
- Secretion stimulated by high blood osmotic pressure, inhibited by low blood osmotic pressure

Slide 40



Slide 41

Thyroid Gland

- Anatomy

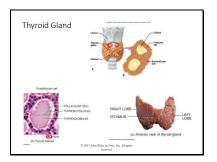
- Anatomy

 Located inferior to the larynx and anterior to the trachea

 Thyroid follicles with follicular cells that produce triiodothyronine (T₃) and thyroxine (T₄)

 Parafollicular cells produce calcitonin (CT)

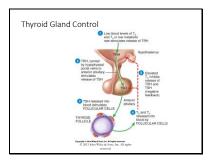
 Only endocrine gland that stores its secretory products in large supply



Slide 43

T₃ and T₄

- Synthesized from iodine and tyrosine within thyroglobulin
- Transported in the blood bound to thyroxinebinding globulin
- Secretion controlled by thyrotropin-releasing hormone (TRH) from hypothalamus and thyroid-stimulating hormone (TSH) from anterior pituitary



Calcitonin (CT)

- Lowers the blood levels of calcium and phosphates
- Promotes the up-take into bone extracellular matrix
- Secretion stimulated by high level of calcium in the blood

Slide 46

Parathyroid Gland and Hormone

- Anatomy
- Embedded in the posterior surface of the thyroid gland
- Chief cells produce parathyroid hormone (PTH)
 Oxyphil cell function not known

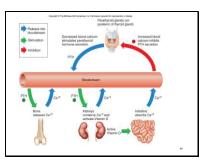
Parathyroid Gland and Hormone Parathyroid Cland and Hormone		
	Gland and	The state of the s

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Parathyroid Hormone (PTH)

- Regulates blood levels of calcium (Ca²⁺), magnesium (Mg²⁺), and phosphate (HPO₄²⁻)
 Causes increased Ca²⁺ and HPO₄²⁻ release from bones to blood
- Decreases loss of Ca²⁺ and Mg²⁺ from blood to
- Increases the loss of HPO₄²⁻ from blood to urine Stimulates synthesis of calcitriol by kidneys, that increases absorption of Ca²⁺, HPO₄²⁻ and Mg²⁺ from ingested food into blood
- Secretion stimulated by high level of calcium in blood (opposite effect to calcitonin)

Slide 49



Slide 50

Adrenal Gland

- Anatomy
- Located superior to each kidney
- Structurally and functionally two distinct regions

- regions

 Adrenal cortex three zones produce steroid hormones

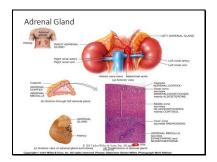
 > Outer zone: mineralocorticoids

 > Middle zone: glucocorticoids

 > inner zone: androgens

 Adrenal medulla modified sympathetic ganglion of autonomic nervous system secrete hormones

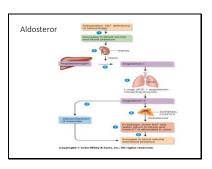
 > Epinephrine and norepinephrine



Slide 52

Aldosterone

- Major mineralocorticoid produced
- Increases kidney reabsorption of sodium $(Na^{\pm)}$ and water from urine to the blood
- Increases excretion of potassium $(K^{\pm)}$ into urine
- Helps adjust blood pressure and blood volume
- Secretion is controlled by the reninangiotensin-aldosterone pathway

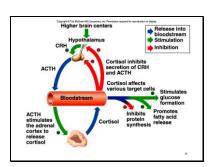


Cortisol

- Major glucocorticoid produced
- Regulates metabolism and resistance to stress

- Increases protein breakdown
 Increases protein breakdown
 Enhances glucose formation
 Breaks down triglycerides
 Inhibits inflammation and immune system response
- Secretion is controlled by corticotropin-releasing hormone (CRH) from the hypothalamus and adrenocorticotropic hormone (ACTH) from the anterior pituitary

Slide 55



Slide 56

Androgen

- Produced in both males and females, but more significant effect in females
- Stimulate growth of axillary and pubic hair, aid prepubertal growth spurts, and contribute to libido in females
- Secretion is not well understood, but controlled by adrenocorticotropic hormone (ACTH)

	,	

Epinephrine and Norepinephrine

- Augment the sympathetic nervous system fight-or-flight response
- Ingricor-ingric response

 Increase heart rate and force of contraction

 Increase blood flow to heart, liver, skeletal muscles, and adipose tissue

 Dilate airways to lung

 Increase blood levels of glucose and fatty acids

- Secretion is controlled directly by the autonomic nervous system during stressful situations and during exercise

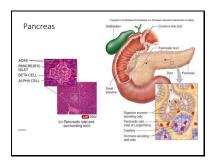
Slide 58

- Anatomy
- Located in the abdomen near the duodenum of the small intestine
- Both an endocrine and exocrine gland
- Exocrine digestive enzymes
 Endocrine secrete hormones
- Pancreatic islet of endocrine cells

 Alpha cells secrete glucagon

 Beta cells secrete insulin

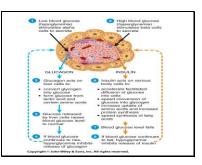




Glucagon and Insulin

- Low blood glucose level causes secretion of glucagon
 Acts on liver cells to release glucose into the blood
- High blood glucose level causes secretion of
- Acts on body cells to increase diffusion of glucose from blood into cells
 Increases protein and fatty acid synthesis
- Secretion of both also affected by autonomic nervous system, diet, and other hormones

Slide 61



Slide 62

Other Endocrine Glands

Pineal Gland

 The <u>pineal gland</u>, near the upper portion of the thalamus, secretes <u>melatonin</u>, which is involved in the regulation of circadian rhythms of the body.

Thymus Gland

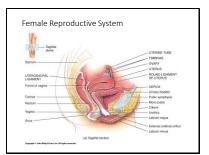
In the thrung gland, lying between the lungs under the sternum, secretes thymosins that affect production and differentiation of T lymphocytes that are important in immunity.

Slide 63]		
	Reproductive Glands The ovaries produce estrogen and progesterone. The place to the control of the co			
	The placenta produces estrogen, progesterone, and gonadotropin. The testes produce testosterone.			
		J		
Slide 64]		
	Digestive Glands The digestive glands secrete hormones associated with the processes of digestion.			
	Other Hormone Producing Organs • The heart secretes atrial natriuretic peptide affecting sodium and the kidneys secrete erythropoietin for blood		 	
	cell production.		 	
]	 	
Slide 65	Lesson 3: Female Reproductive System		 	
	Objective:		 	
	Describe the structure and function of the organs of the female reproductive system List the steps of oogenesis			
	.	4		

Female Reproductive System

- Ovaries
 Paired female gonads in abdominal cavity
- Uterine tubes or oviducts
 Tubes transporting secondary oocyte to site of fertilization and zygote to uterus
- Uterus
 Site of fetal development
- Vagina
 Passageway from cervix to exterior • Vulva - collective external structures
- Mammary glands
 Part of integumentary and reproductive systems

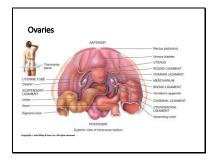
Slide 67



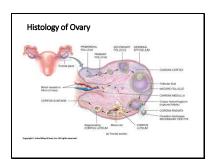
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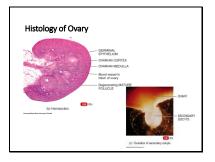
Ovaries

- Suspended on either side of uterus in peritoneal cavity, held in position by ligaments
 Broad ligament, mesovarium, ovarian ligament, and suspensory ligament
- Produce secondary oocytes
 Follicles in different stages of development surround and nourish developing oocytes
- •Also produce and secrete hormones
- Progesterone, estrogen, inhibin and relaxin



Slide 70





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Oogenesis

- Oogonia complete mitosis during fetal development
 Primary oocytes (diploid; 2n) formed before birth and many begin to degenerate (atresia)

 Mojoric
- •Meiosis
- Meiosis

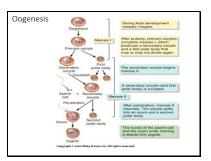
 Meiosis I a few primary oocytes enter prophase

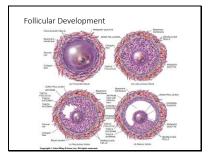
 But arrested development until after puberty

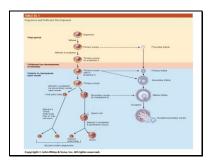
 Complete meiosis as follicle develops to produce secondary oocyte and polar body (unequal cytoplasm distribution)

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Slide 73

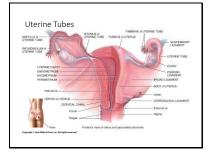




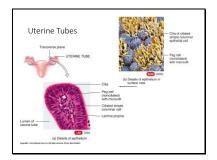


Slide 76

- Extend laterally from uterus
 Infundibulum distal funnel shape end of tube, open to serous fluid of peritoneal cavity
 Fimbriae fingerlike extensions sweep oocyte into infundibulum
 Ampulla widest, longest portion, typically site of fertilization
 Isthmus short, narrow connection to uterus
- •Ciliated epithelial cells lining tube and peristaltic contractions of smooth muscle transport secondary oocyte or zygote (after fertilization)



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Slide 79

Uterus

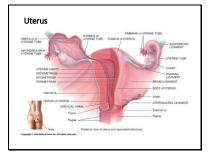
- •Major regions
- Fundus, body, and cervix
- •Layers of wall
- Perimetrium outer protective layer, supported by broad, uterosacral, cardinal and round ligaments

 Myometrium three smooth muscle layers important during labor

 Endometrium

 Stratum functionalis sloughs off

 Stratum basalis produces new layer after menstruation





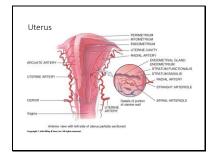
Slide 82

Uterus

- •Functions

- Menstruation and regrowth of sloughed-off lining
 Implantation of fertilized ovum
 Contribute to structure of placenta
 Support development of fetus during pregnancy
 Labor

- Extensive blood supply
 Uterine, arcuate, radial, straight and spiral arteries

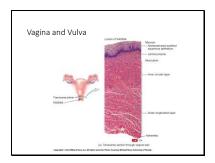


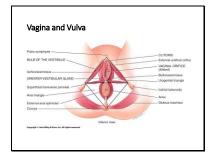
Vagina and Vulva

- Vagina
 Receptacle for penis during sexual intercourse
 Outlet for menstrual flow
 Passageway for childbirth

- Passageway for childbirth
 Vulva
 External genitals of female
 Include mons pubis, labia majora, labia minora, clitoris, vestibule, vaginal and urethral orifices (separate in female), bulb of the vestibule, paraurethral glands, and greater vestibular glands
 Many structures homologous (same embryonic origins) to male structures

Slide 85





Mammary Glands

- Each breast anterior to pectoralis major and serratus anterior muscles
- serratus anterior muscles

 Nipple with lactiferous ducts, areola, and suspensory ligaments

 Mammary gland functions for lactation

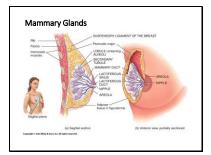
 Modified sudoriferous gland that produces milk

 Lobules composed of alveoli separated by adipose tissue

 Myoepithelial cells contract to propel milk through ducts

 Secondary tubules, mammary ducts, lactiferous sinuses, and lactiferous ducts

Slide 88



Slide 89

Lesson 4: Female Menstrual Cycle

- Describe the structure and function of the organs of the female reproductive system
- Describe the hormonal changes that occur during the ovarian and menstrual cycles
- Trace the path of an oocyte from ovary to fertilization

 ,		

Female Reproductive Cycle

- •Ovarian cycle
- Occurs in ovary during and after maturation of oocyte
- •Uterine cycle
- Concurrent changes in endometrium of uterus to prepare to receive fertilized ovum and support its development
- •Also related changes in mammary glands and cervix

Slide 91

Hormone Regulation of Female Cycle

- •At puberty, gonadotropin-releasing hormone (hypothalamus)
- (hypothalamus)

 stimulates secretion of two anterior pituitary
 gonadotropin hormones

 •Follicle-stimulating hormone (FSH)

 · Initiates follicular gowth and estrogen secretion

 •Luteinizing hormone (LH)

 · Simulates further follicular development and estrogen

 · Tinggers outsition and corpus lottem secretion of estrogen,
 progesterone, relamin, and inhibin

 · Inhibits TSH, and LH to lesser extent

 · Relaxes uterine muscle and pubic symphysis

Slide 92

Hormone Regulation of Female Cycle

- •Estrogen
- ESTrogen

 Stimulate development and maintenance of female reproductive structures and secondary sex characteristics

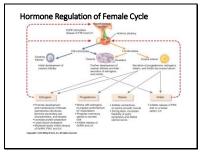
 Stimulates protein anabolism

 Decreases blood cholesterol levels

- Progesterone

 Works with estrogen to prepare endometrium for implantation

 Prepares mammary glands for milk secretion
- •Negative feedback regulation mechanism



Slide 94

Phases of Female Cycle

- Menstrual phase
- Menstrual phase:
 In ovaries, primordial follicle develop into primary,
 then secondary follicles
 In the uterus, stratum functionalis of the
 endometrium is shed, discharging blood tissue
 fluid, mucus, and epithelial cells
- Preovulatory phase
- In ovaries, a group of follicles begins to undergo maturation

 One becomes dominant, and others degenerate
 Graafian follicle secretes estrogens and inhibin, which decreases FSH and stops other follicles from growing
 In uterus, estrogens stimulate repair of endometrium

Slide 95

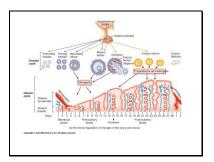
Phases of Female Cycle

- Ovulation
- OVUIATION

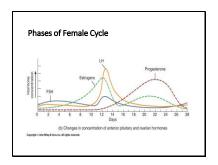
 * High levels of estrogen exert positive feedback effect on anterior pituitary and hypothalamus

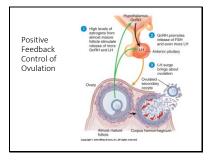
 * Surge of LH causes rupture of graafian follicle and release of secondary ocyte with zona pellucida and corona radiata cells into pelvic cavity

- Postovulatorry phase
 In ovaries, the corpus luteum develops from the ruptured follicle
 Stimulated by LH, secretes progesterone, estrogens, relaxin, and inhibit
 In uterus, endometrium thickens in readiness for implantation



Slide 97



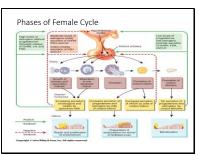


Phases of Female Cycle

- If fertilization and implantation do not occur
- In the ovaries, corpus luteum degenerates and levels of progesterone and estrogens decrease
 In the uterus, menstruation triggered by decreasing hormones
 Initiation of another reproductive cycle

- If fertilization and implantation do occur
 In the ovaries, human chorionic gonadotropin secreted by embryo maintains corpus luteum, so it continues to secrete progesterone and estrogens
 In the uterus, endometrium development continues in preparation for implantation by the zygote

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Fertilization

- Olioin of the genetic material from a haploid sperm and haploid secondary oocyte

 Male and female pronuclei form a single nucleus
 Typically occurs in uterine tube 12 to 24 hours after ovulation

- *Typically occurs in uterine tube 12 to 24 hours after ovulation
 *Sperm use flagella to swim from vagina through cervical canal, to uterine tube
 *Capacitation changes that prepare for penetration of corona radiata to zona pellucida
 *Acrosomal reaction release of acrosomal enzymes to digest path through zona pellucida
 *Polyspermy block fast and slow reactions prevent another sperm penetration

Lesson 5: Male Reproductive System

- Describe the structure and function of the organs of the male reproductive system
 Describe the structure and function of the sperm cell

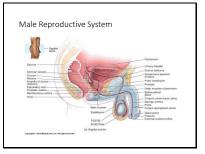
- Explain the events during spermatogenesis that produce haploid sperm from diploid cells
 Identify the importance of testosterone in male reproductive function

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Male Reproductive System

- Testes
 Paired male gonads in scrotum
 System of ducts
 Epididymis, ductus deferens, ejaculatory ducts, and urethra
 Accessory glands
 Seminal vesicles, prostate, and bulbourethral glands
 Supportion structures

- •Supporting structures
 •Scrotum and penis



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Scrotum

- Loose skin and underlying hypodermis support testes in two sacs
 Normal sperm production in testes occurs at temperature a few degrees below body temperature
 Testes descend through inguinal canals during fetal development

- development

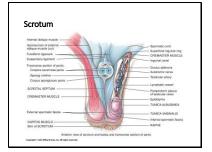
 Cremaster and dartos muscles in spermatic cord
 regulate temperature of testes

 Contract to elevate scrotum, bringing testes closer to warmth
 of pelvic cavity

 Relax to move them further away for cooling

 Spermatic cord also contains blood and lymph vessels, nerves,
 and ductus deferens

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Testes

- •Contain seminiferous tubules that
- produce sperm during spermatogenesis

- Produce sperm during spermatogenesis

 Spermatogenic cells

 Begin sperm production at puberty

 Sertoli cells

 Nourish and control movement of developing sperm cells to release in lumen

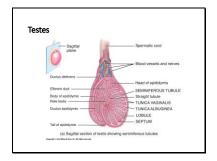
 Form blood-testis barrier to prevent immune response

 Secrete inhibin hormone to decrease spermatogenesis

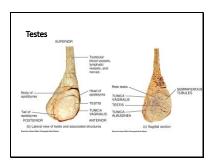
 Leydig cells

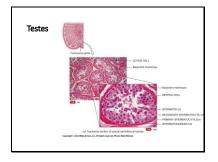
 Produce male sex hormone testosterone

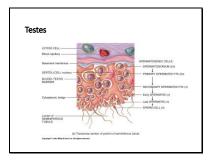
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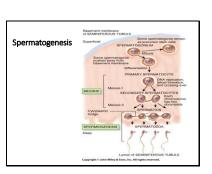




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Spermatogenesis

- Spermatogonia begin mitosis at puberty
 Some remain near basement membrane as stem cells
 Others move between Sertoli cells to become primary spermatocytes (diploid; 2n)
 Meiosis
 Meiosis I two secondary spermatids (haploid; n) with two chromatids of one of each pair of chromosome
 Meiosis II four spermatids (n) still linked by cytoplasmic bridge



Spermatogenesis

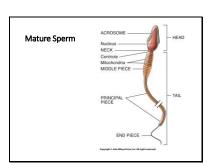
- ${\color{red}\bullet} Spermiogenesis$
- Developing sperm form an acrosome and flagellum, shed excess cytoplasm, and increase mitochondria
- Elongated sperm cells are released into lumen of seminiferous tubule

 Sertoli cells secrete fluid to push sperm toward the ducts of the testes

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Mature Sperm

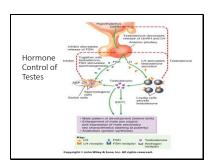
- •300 million per day produced
- •Once ejaculated, survive 48 hours in female reproductive tract
- •Mature sperm structures
- Head contains nucleus and haploid DNA
 Acrosome enzymes for penetrating secondary *ACTOOME = Enzymes to person ocyte
 *Middle piece – mitochondria produce ATP
 *Tail – flagellum for locomotion

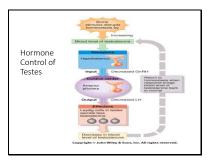


Hormone Control of Testes

- At puberty, gonadotropin-releasing hormone (hypothalamus) stimulates secretion of two anterior pituitary gonadotropin hormones
 Luteinizing hormone (LH)
 Simulatise tyelig cells to secrete letosterone
 Follicle-stimulating hormone (FSH)
 With testosterone, stimulates Sertoli cells to secrete androgen-binding protein which keep stetosterone level high in seminiferous troubles
 Inhibit from Sertoli cells)
 Inhibits FSH to help regulate the rate of spermatogenesis
 Negative feedback regulation mechanism

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Testosterone

- •Converted to dihydrotestosterone (DHT)
- in some target cells, such as in prostate
- •Both bind to same androgen receptors within nuclei of target cells for several effects
- Prenatal development
- •Development of male sexual characteristics
- •Development of sexual function
- •Stimulation of anabolism

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Male Reproductive System of Ducts

- - Seminiferous tubule lumen, straight tubules, rete testis
- •Epididymis
- Efferent ducts, ductus epididymis Site of sperm maturation
- •Ductus deferens (vas deferens)
- Ascends in spermatic cord, through inguinal canal, loops over ureter, and ends at dilated ampulla
 Stores sperm and conveys them to urethra

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Male Reproductive System of Ducts

- Ejaculatory ducts
 Union of ductus deferens and duct of seminal vesicles
 Empties sperm and seminal fluid into prostatic urethra

Male Reproductive Accessory Glands

- •Seminal vesicles
- Alkaline, viscous fluid with fructose, used by sperm for ATP production
- $\bullet \textbf{Secretion contributes to sperm viability} \\$
- Prostate
- Surrounds prostatic urethra Secretion contributes to sperm motility and viability
- Bulbourethral glands (Cowper's gland)
 Either side of membranous urethra
- Mucus for lubrication and alkaline fluid to neutralize acids from urine in urethra

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Semen

- Mixture of fluids
- Sperm and secretions from seminiferous tubules
 Secretions from seminal vesicles, prostate, and bulbourethral glands
- •Function of semen
- Fluid in which sperm are transported Supplies nutrients for sperm
- Neutralizes the acidity of the male urethra and female vagina
- •Ejaculation expulsion of semen from the urethra to the exterior of the body

Penis

- Support structure
 Contains urethra
 Passageway for ejaculation of semen and excretion of urine
 Body of penis
 Three erectile tissue masses
 We corpor curenota penis
 One corpor systemplosus penis around urethra
 Glans penis expanded distal tip with sensory receptors
 Frection engorgement of penile blood sinuses under influence of sexual excitement

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