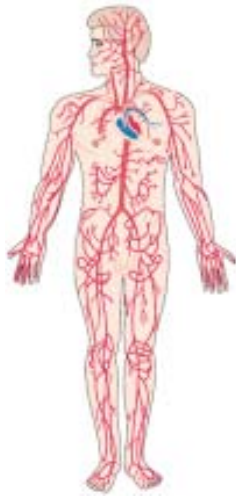


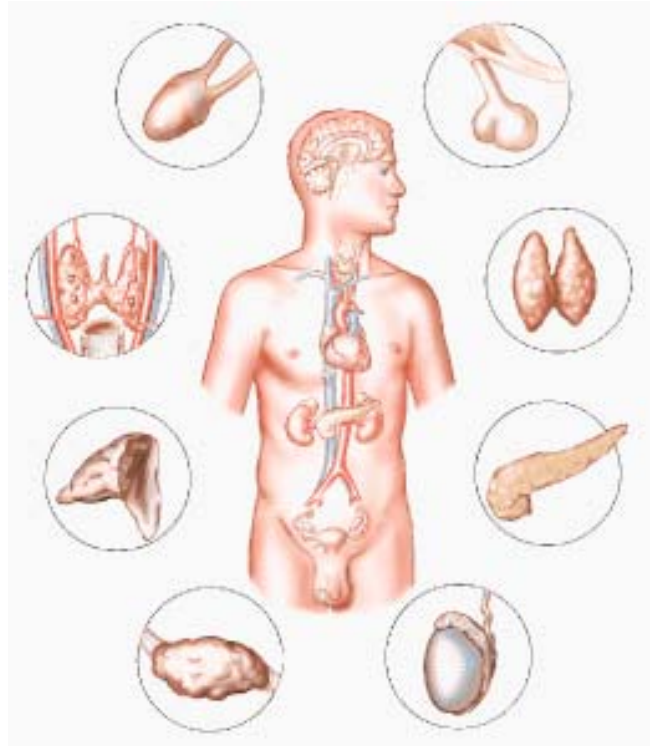
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Thyroid Gland



What is it?

***Front of the neck**- partially surrounds the trachea

***Back of neck are 4 parathyroid glands** -regulate calcium in blood, kidneys to increase Vitamin D production

*Small gland, 2 inches across, under skin, below Adam's Apple in the neck

*Appears to be a H or a bow tie

*Enlarged with goiter

What does it affect?

***Controls**- metabolism, maintenance of body weight, rate of energy use, heart rate

*Can store the hormones it produces

*Effects bone metabolism

***To produce thyroid hormones** - needs iodine - uses and recycles

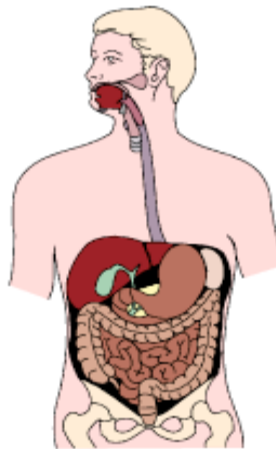
*Thyroid hormones are in 2 forms

- **Thyroxine (T4)** - slight effect on metabolic rate

- **Triiodothyronine (T3)** - 80% active hormone, 20% by thyroid

Hormones:

***Thyroid** - regulates growth, maturation, metabolism rate (increase protein by producing oxygen and increase oxygen cells use





T estes



What is it?

*Male sex glands, hormone testosterone

*2 testes- produce sex hormones (androgens)

-Testosterone - at puberty rise rapidly, increasing sperm production, sex organs mature, development of male secondary sexual characteristics- facial hair, deep voice

*Suspended in the scrotum

What does it affect?

*Controls sperm production, released in the testes

*Sexual development and reproductive function

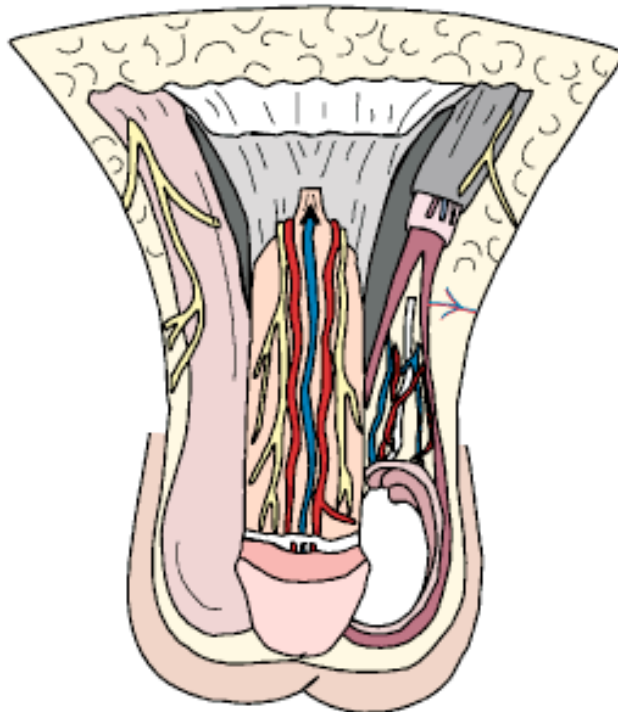
Facts:

The Testes are made of three parts:

*Vas deferens - tube that transports sperm to urethra

*Epididymis - storage for developing sperm to mature

*Seminiferous tubule - sperm are produced in these coiled tubules





Sleep



Facts:

*1/3 of life is spent asleep

***6 hours of sleep-** needed per 24 hours

***Most body activities are normal when asleep** - heartbeat, digestion, brain signals

*Brain waves different when asleep and awake

-**Awake** - buzzing with activity

-**Sleepy** - cells fire rhythmically together, alpha waves sweep across brain

tenth of a second, theta waves are slower pulses, settle down as begin to sleep

-**Sleep** - 90 minutes deep sleep, slow strong waves, whole brain pulses every second

-**After 90 minutes** - buzzes with activity as if awake, hard to rouse

***Eyes - REM** (Rapid Eye Movement) sleep, may be linked to dreaming



Snoring:

***50% of all adults-** snore occasionally

***25%** habitual snorers



*Causes by airway blockages in back of nose and throat, caused by

-obesity with the excess neck tissue

-stuffy nose from allergies or a cold

*Some people have sleep apnea

-stops breathing 10 to 15 seconds or longer during sleep

*Disrupts sleep patterns of sleeper and others

What can I do?

***Exercise-** 15 to 20 minutes per day during the day

***Decrease weight if overweight**

***Eat healthier-** increase fresh fruits, vegetables, whole grains and less fried foods, desserts, white breads, sugar, sweets, alcohol

***Sleep on side not back**

*Go to bed at the same time daily

***See your Physician**

*See a RD for Meal Planning

-Snacks, eating habits, obesity



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Skin

What is it?

*Protective wrapping

*Organ system - that regulates body temperature, senses stimuli (pain, pleasure), shield from sun and infection, largest organ

*Color, texture, folds makes skin more individualized

*Affects - mental and physical health

**Uses sunlight to make Vitamin D*

*Receives about 1/3 of body's blood supply

What does it affect?

*Melanocytes - in skin tissue, melanin darkens skin with sunlight, stimulated by MSH (Melanocyte-stimulating hormone)

Facts:

*Epidermis - top layer - thin like plastic wrap (stratum corneum contains keratin formed from dead cells protects from harmful substances)

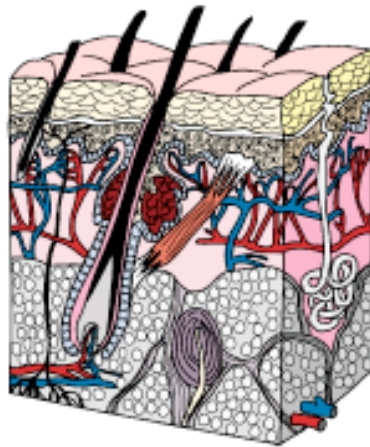
-bottom layer - melanocytes - cells that produce melanin - dark pigment in skin

*Dermis - pain, touch receptors = sweat glands, oil glands, hair follicles, blood vessels to provide nutrition to the skin

*Fat - *insulation from hot, cold*

-baby - thicker fat layer, thinner protective keratin, opposite as we age

-elderly - blood flow decreases, heals slower, less oil, wrinkles





Pituitary Gland

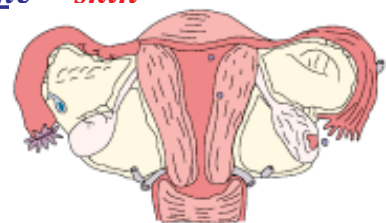


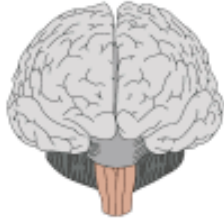
What is it?

- ***Master Gland** - controls many other endocrine glands
- *Pea-sized structure, hangs from the base of the brain, attached by nerve fibers to the hypothalamus - controls pituitary function
- ***Pituitary** has 2 lobes, anterior, posterior - produce range of hormones
- ***Anterior lobe** - triggered by hypothalamus makes at least 6 hormones
- ***Posterior lobe** - hormones stored here released into blood stream as needed
- ***Hypophyseal portal system** - vessels that carry regulatory hormones to the anterior pituitary lobe from the hypothalamus
- ***Neurosecretory** cell has 2 hormones - ADH (Antidiuretic hormone/vasopressin), oxytocin, produced in hypothalamus, flow through cell axons to posterior pituitary
- ***Kidney tubules** - ADH controls amount of water excreted in the urine, helps to constrict small arteries when blood pressure falls, helps control blood pressure
- ***Oxytocin** - uterine contractions during labor, stimulates release of breast milk

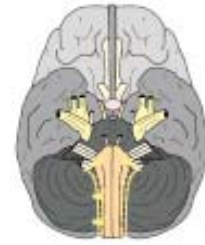
Hormones and the Organs they affect: **Organs in RED, Hormones in BLUE**

- ***Corticotropin** - controls secretion and production of hormones by the **adrenal cortex**
- ***Growth hormone** - controls growth, development, protein production
-muscles, bones
- ***Follicle-stimulating hormone and Luteinizing Hormone** - controls reproduction as sperm, semen, egg maturation, menstrual cycles, hair distribution, muscle formation, voice, skin thickness and texture, personality traits - **ovaries, testes**
- ***Oxytocin** - milk production/**uterus** muscles, milk ducts contracting/**mammary glands**
- ***Prolactin** - milk production in the **mammary glands**, starts and maintains
- ***TSH (Thyroid Stimulating Hormone)** - production and secretion of hormones of **thyroid gland**
- ***ADT (vasopressin)** - causes **kidneys** to retain water, helps control blood pressure with aldosterone
- ***Endorphins and Enkephalins** - **brain**
- ***Beta-melanocyte-stimulating hormone** - **skin**





Pineal Gland

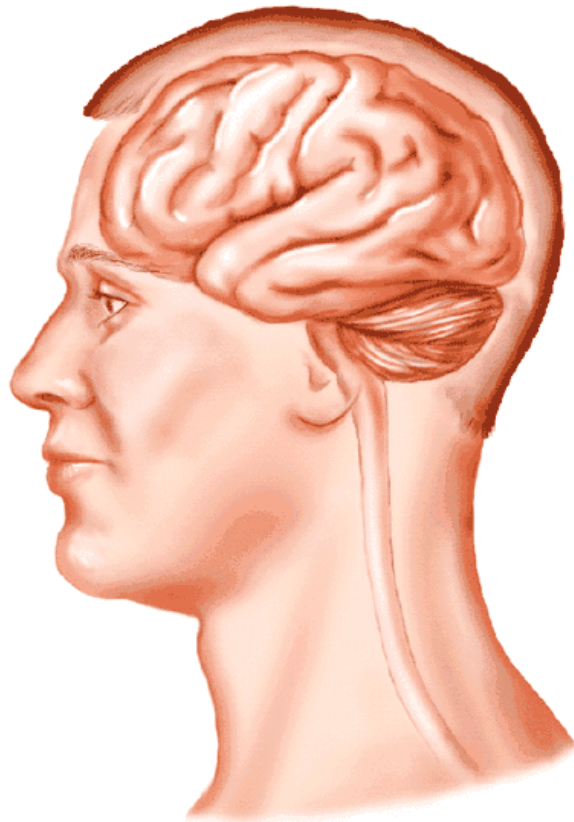


What is it?

- *Located at the base of the brain
- on the opposite side of the hypothalamus
- *Size of a large green pea

What does it affect?

- *Secretes melatonin, may influence sexual development
- *Melatonin regulates sleep/wake cycle
- helps with sleep disturbances (like jet lag)





Parathyroid Gland

What is it?

***4 Parathyroid Glands**- 2 on each side of the trachea

***Located**- at the back of the thyroid gland

***Produces**- a hormone that regulates calcium levels in the blood

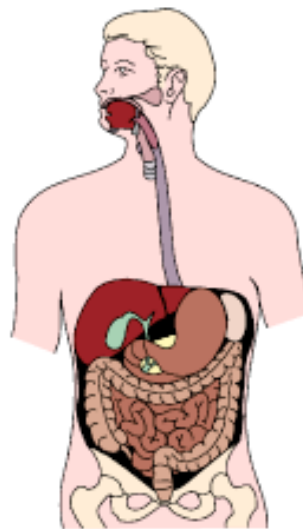
Hormones:

***Parathyroid** - controls bone formation, excretion of phosphorus and calcium, releases stored calcium, kidneys to increase Vitamin D production, which increases the calcium

Facts:

***Vitamin D**- needed to absorb calcium from the food to incorporate into bones, if not become less dense, fragile = osteoporosis

***Foods High in Calcium** - milk, dairy products, cheese, turnip greens, mustard greens, collards, kale, broccoli





Pancreas



What is it?

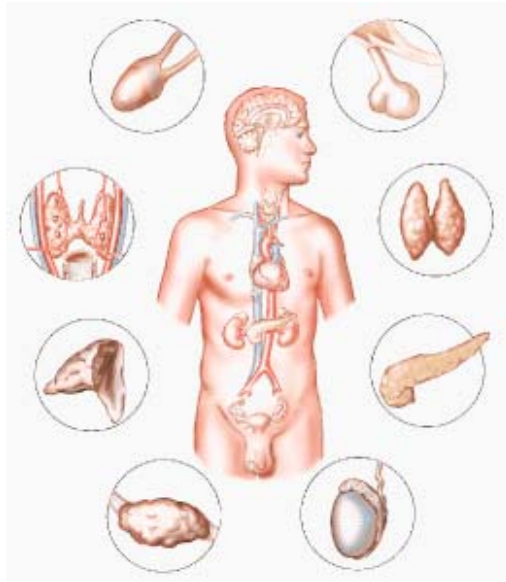
- * Elongated gland- behind the stomach partly within the duodenum
- * Secretes- digestive enzymes and hormones that regulate blood sugar

What does it affect?

- * Secretes hormones- that control glucose levels in the blood
- * Produce and secrete digestive enzymes (Acinar cells) - inside are hormone producing cells (Islets of Langerhans) and each cell cluster is made of
 - alpha cells - produce glucagon increases blood glucose
 - beta cells - produce insulin to lower blood glucose
 - delta cells - regulates insulin and glucagon secretions
- * Digestive juices- break down fats, nucleic acids, carbohydrates, protein, neutralizes stomach acid, transports enzymes to duodenum

Hormones:

- * Insulin - lowers the blood sugar level, metabolism of carbohydrates, protein, fats
- * Glucagon - raises blood sugar level





Ovary



What is it?

***Female sex glands-** 2 ovaries

-On each side of the uterus

*Produce eggs and female sex hormones

***Contains follicles-** (cell clusters- 2 million at birth) where egg cells develop, at ovulation rupture, release mature egg to fallopian tube, an egg is released each month

What does it affect?

***Produce the female sex hormones-** progesterone and estrogen

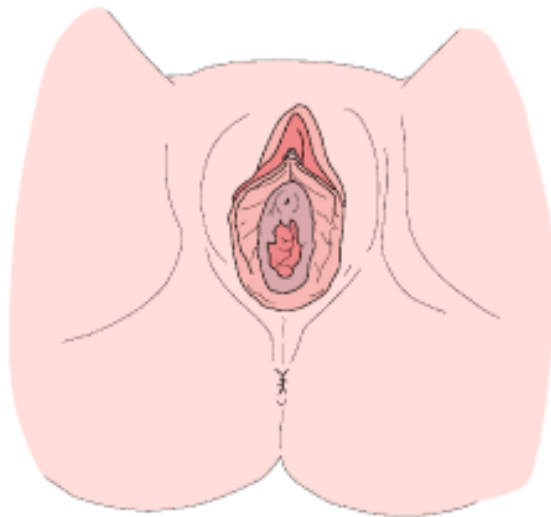
-Estrogen is produced by an egg, when mature is released, empty follicle forms a small mass (corpus luteum) that secretes progesterone

*Sexual development, fertility, reproductive functions

Hormones (Female sex hormones):

***Estrogen** - development of female sex, characteristics, reproductive system

***Progesterone** - prepares the uterus lining for implantation of the fertilized egg and mammary glands to secrete milk, (Corpus luteum secretes progesterone)





Kidney



What and where is it?

*2 reddish brown kidney bean shaped organs

*Back of the abdominal cavity, along body's main arteries and veins

*Filter blood- remove waste and excess sodium

*Organ maximum plus capacity in youth and decline with age, minor illness can cause kidney failure, at 70 kidneys are at 50% efficiency of age 40, continues to decline with age

*Structure- consist of outer and inner region

-Renal cortex - outer rim

-Renal medulla - renal pyramids - urine making units (nephrons-filtering units), collecting tubules, collecting ducts, open into calyces (cavities)

*3 pints a minute flow through the kidneys

*All the blood in the body is filtered by the kidneys in 10 minutes

*Urea- waste from breakdown of proteins in liver, creatine is waste from muscle action

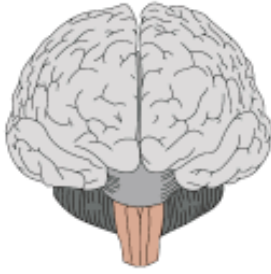
*Decreases urine output- kidneys let go of 3 pints of urine from every 4,400 pints of blood

Hormones:

*Renin and angiotensin - control blood pressure

*Erythropoietin - stimulates red blood cell (RBC) production in bone marrow, raising blood oxygen levels (every second 2 million RBC's die but replaced at the same rate)





Hypothalamus



What is it?

*Size of a lump of sugar

*Located in the brain

*Composed of nerve cells - nuclei

*Hypothalamus + Pituitary gland = regulation of body temperature, appetite, water-salt balance, sleep-wake cycle, blood flow, activity of hormones, emotions (anger, fear), feedback, speed the rate of exercise, stress

*Pituitary gland- attached to the hypothalamus by nerve fibers - a brain area that controls pituitary functions

Who does it affect?

*Most hormones from this nerve cell cluster- stimulate other glands to produce their own hormones

*Base of the brain- where hormonal and nervous systems react

*Closely linked to the limbic system, controls automatic body processes

Feedback:

*Controls hormone production - hypothalamus, pituitary, target glands

-Positive- release hormone - thyroid hormone falls too low response is weakened, hypothalamus produces more TRH, pituitary increases secretion of TSH = rise of thyroid hormone

-Negative- inhibit hormone - thyroid hormone high, produces less TRH, *reduced level of TSH* = less hormone

-Response to hormone level- hypothalamus makes TRH stimulating pituitary gland to make TSH = hormone produced by thyroid gland





Heart

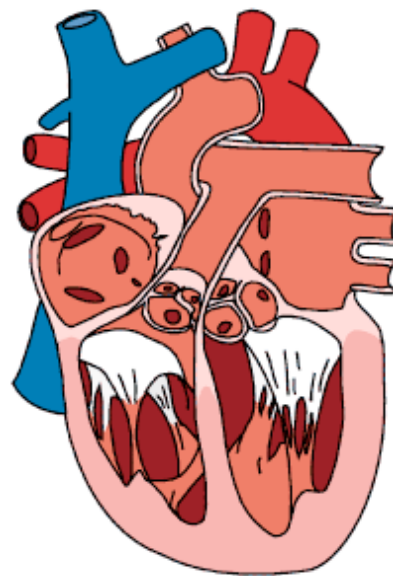


What is it?

- *Hollow muscular organ
- *Center of the chest
- *Both sides have an upper and lower chamber
 - Atrium** - upper
 - Ventricle** - lower has inlet and outlet valve
- *Blood flows in one direction

What does it affect?

- ***Produces a hormone** - atripeptin
 - reduces blood volume, blood pressure
- ***Supplies**- oxygen to the blood and gets rid of waste (CO₂-Carbon Dioxide)
- ***Heart collects**- oxygen depleted blood from the body then pumps to the lungs, where it picks up oxygen and drops off CO₂, heart collects the oxygen rich blood from the lungs and pumps to the tissues throughout the body



Growth Hormone



What is it?

- *One of the most important hormones secreted by the anterior lobe

What does it affect?

- ***Bone and general growth**
- *Acts on the whole body to produce protein synthesis
- *Normal growth and development in children
- ***Growth hormones**- are highest in the morning, lowest in mid afternoon, reason is unknown
- *Regulates metabolism
- *Can quickly increase the flow of sugar into muscles and fat
- ***Stimulates**- protein production in muscle and liver, slows production of fatty tissue
- ***Blocks**- use and uptake of sugars, maintains blood sugar levels in the brain
- ***Increasing production of**- fat, fat levels in the blood, mobilizes fat as an alternative fuel
- *Body adapts to the lack of food when fasting
- ***Often activates**- many growth factors, insulin-like growth factor I (IGF-I)

Hormones:

- ***Pituitary** - growth and development, protein production





Adrenal Gland



What is it?

*Small triangular structures at the top of each kidney - **2 layers**

-Cortex - outer layer, secretes hormones influence body's metabolic processes

Adrenal Cortex has 3 Zones -

- 1- **Aldosterone** - outside layer -inhibits the amount of sodium excreted in the urine, maintains blood pressure, blood volume, excretes potassium
 - 2- **Cortisol** - middle layer of the cortex -controls utilization of carbohydrates, proteins, fats, minerals, reduces inflammation
 - 3- **Gonado**-corticoids - inside layer - sex hormones, slight effect on sex organs, sperm production in males, distribution of body hair in females
- Medulla** - inner region, hormones in response to stress, nerve fibers link with sympathetic nervous system in fight or flight response to stress
- 1 - **Epinephrine** (adrenaline) - stimulates heart rate
 - 2 - **Norepinephrine** (noradrenaline) - helps to maintain constant blood pressure

Hormones:

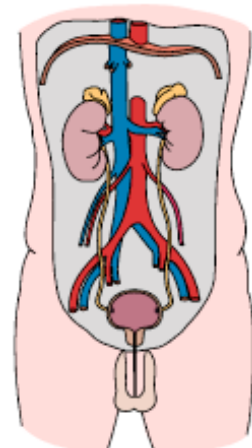
- ***Aldosterone** -regulates and retains salt, water balance, excretes potassium
- ***Corticosteroid** - anti inflammatory, maintains blood sugar level, blood pressure, muscle strength, controls salt and water balance

What does it affect?

***Adrenal gland**- on each kidney produces several hormones influence stress response, body's metabolism

***Produce steroid hormones** - influence the use of carbohydrates, proteins, fats, minerals

*Influence body's reaction to stress





Brain

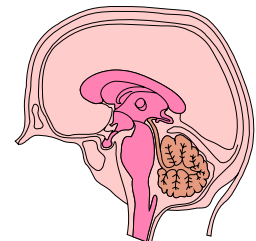
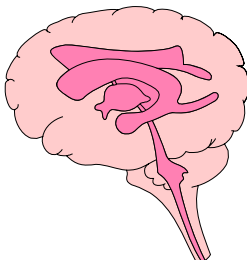


What is it?

- *Most complex structure in universe
- *Incredible nerve functions and connections, thinks for itself
 - *Appearance- large soggy purple gray wrinkled walnut
 - *Billions of nerve cells
- *Creation of- thoughts, sensations, actions, memory, behaviors, moods
 - *Receives- signals and instructions from rest of body
- *Size- small bag of flour, demands huge amounts of energy
 - *Brain cells- dependant on oxygen in the blood
- *Hypothalamus controls body heat and water, feel hungry, aggressive, wakes you up
- *Pituitary Gland - pea sized ball behind your nose, master hormone control gland
 - *Limbic system - around thalamus, processes smells, emotions, memories
- *Hippocampus - 2 small club-shaped nerve centers - moods, learning, willpower
- *Amygdala - links moods - anger with body processes controlled by hormones

Facts:

- *10 seconds without blood to the brain = death within minutes
 - *Girls' brains weigh- 2.5% of body weight
 - *Boys'- 2% of body weight
 - *Demands- > 25% of blood supply
 - *<3% of body weight
- *Has 2 halves or hemispheres - left and right, linked with a bundle of nerves (corpus callosum), right side of your brain controls the left side of your body and left side controls the right side of your body with 3 regions
 - 1- Brain stem - medulla (stalk), pons, midbrain on top
 - 2- Thalamus sits on top of brain stem - deep in center connected to spinal cord, relay station, egg-shaped
 - 3- Cerebellum - plum sized lump, controls coordination and balance, wraps around the thalamus like a big plum around a seed, where you think - memory, speech, control of movement





Endocrine System (Glands, Hormones)



What and where is it?

***Collection of hormone-** producing glands, cells, pancreas, ovaries, heart, stomach, kidneys

***Hormones** - complex chemical substances, secreted into bloodstream, regulate body functions - metabolism, growth, sexual reproduction



What does it do?

***Hormones are chemicals** - act on specific tissues, body's internal balance, circulate in blood and other body fluids

***Endocrine system-** initiates the changes at puberty

***Rising levels of sex hormones** - Male produce sperm and transport to female

***Female** - production of egg cells in the ovaries, triggers the start of menstruation, menopause - fertility ceases

***Produce and secrete hormones (messengers)-** directly to bloodstream to coordinate activities of the body

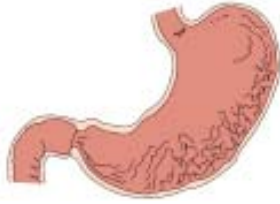
***Main organs** - hypothalamus, thyroid, pituitary, parathyroid, islets of pancreas, testes, ovaries, adrenal glands

***Pregnancy** - placenta acts as an endocrine gland plus other functions

***Hormones-** bind to a receptor and alters the cells function to slow down or to speed up, growth, development, reproduction, sexual characteristics, use and storage of energy, volume of fluid, salt and sugar in the blood

***Insulin-** affects the metabolism of protein, fat, glucose in body





Stomach



What is it?

*Large, bean shaped, hollow, muscular organ with 3 regions that stores food
-cardia, body (fundus), antrum

Who does it affect?

*Hormones- secreted by the stomach lining stimulate enzyme production that aid in digestion

Facts:

*Food enters stomach- from esophagus through sphincter (ring-shaped muscle), opens and shuts, prevents backflow

*Contracts and mixes- food with enzymes

*Cells lining the stomach secrete 3 substances-

-mucus - coats cells to prevent damage by acid, enzymes, any disruption = ulcer

-hydrochloric acid - high acidity = barrier to infection

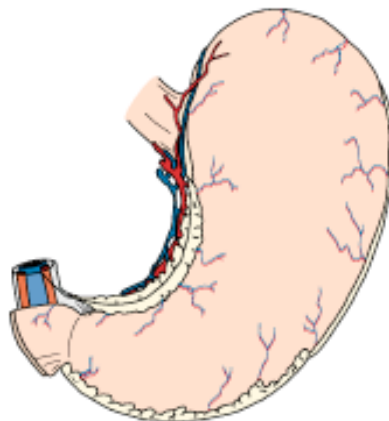
-acid secretion stimulated by nerve impulses to stomach

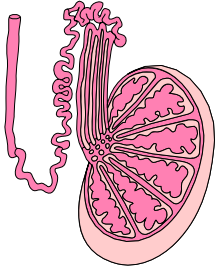
-gastrin- hormone released by stomach

-histamine - substance released by stomach

-precursor of pepsin (enzyme that breaks down protein) - responsible for 10% of protein breakdown, digests collagen (protein of meats)

*Aspirin, alcohol small amounts absorbed directly from stomach





Hormones



What are hormones?

- *Chemical messengers
- *Carry signals throughout the body
- *Circulate in the bloodstream
- *Every cell is influenced by hormones

Hormones:

***Insulin** - tells liver to stop releasing glucose

***Pancreas** (where insulin is made)- glucose too high, sends out more glucose

-Pancreas - glucose too low, sends out less insulin, liver sends more glucose

-glucagon and insulin controls and maintains blood sugar/glucose levels

***Adrenal Glands** - gets us ready for action, emergencies, on top of the kidneys, body's response to stress, how body uses carbohydrates, proteins, fats, minerals

***Pituitary Gland** - size of a marble, middle of the brain behind nose (master gland)

-Growth hormone - growth, cell activity

-TSH stimulates thyroid

-ADH - kidneys to cut urine production

-LH and FSH stimulate ovaries

***Brain** - enkephalins, endorphins reduce pain

***Thyroid** - raises cell activity, size of a marble, front of throat below voice box

-calcitonin controls calcium level in the blood

***Ovaries** - estrogen, progesterone control female menstrual cycle, less is produced during and after menopause, sexual development, reproduction, fertility

***Testes** - testosterone affects male sex organs, sexual development, reproduction, facial hair, deep voice

