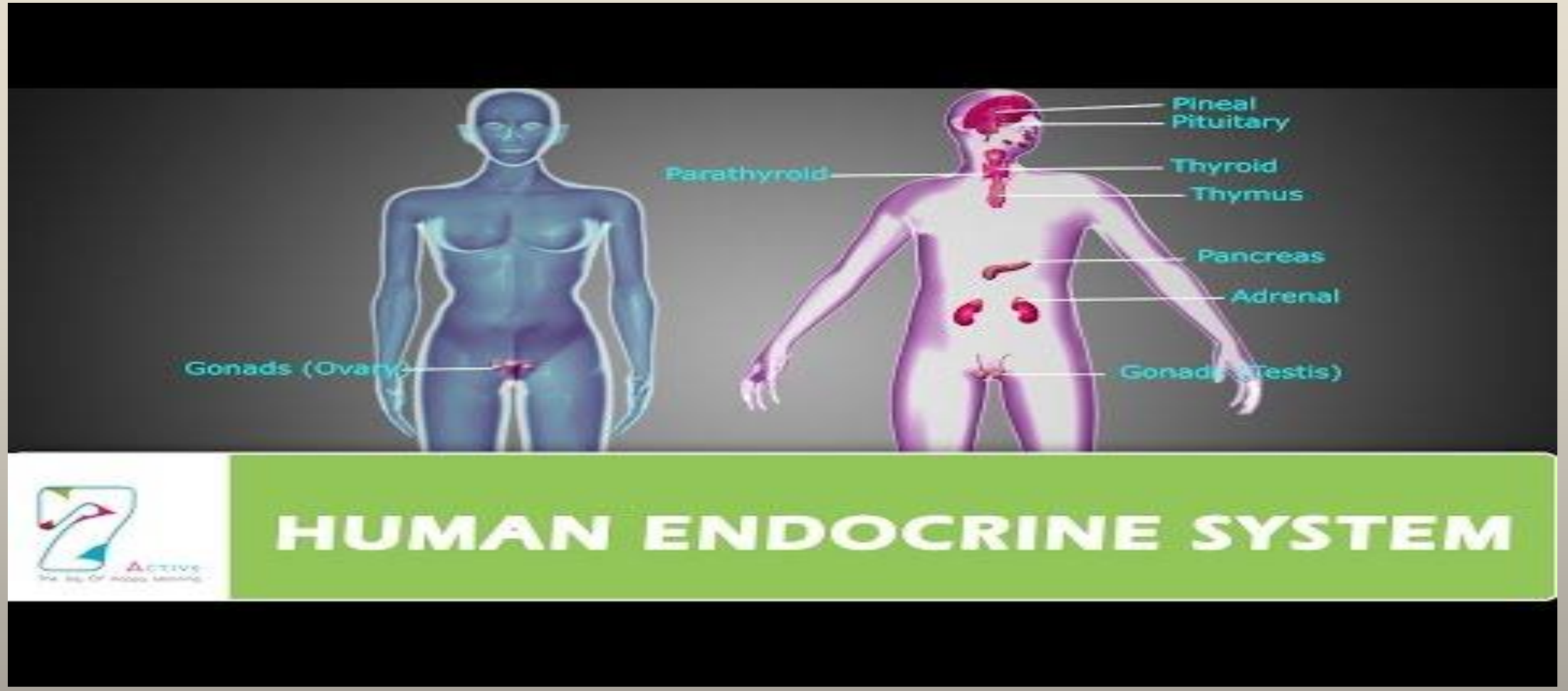
Endocrine Glands

Gland

- What are these glands?
- Glands are structures formed by special composition of cell molecules. Their functions are also specific.
- The main function of glands are discharge or secretion.
- They influenced every part of the body, human behavior and personality are also influenced by their activity.
- Life is active only because of the normal activity of glands.
- There are two types of glands
  - Exocrine glands
  - Endocrine glands


Pineal
Pituitary
Parathyroid
Thyroid
Thymus
Pancreas
Adrenal
Gonads (Ovary)
Gonads (Testis)
HUMAN ENDOCRINE SYSTEM

Exocrine glands

- They secrete their chemicals through tiny tubes or ducts which carry them to their targets mostly on the surface of the body.
- Eg. Sweat gland, salivary glands.
- This kinds of glands affect the functioning of body but doesn’t really affect behavior.

Endocrine Glands

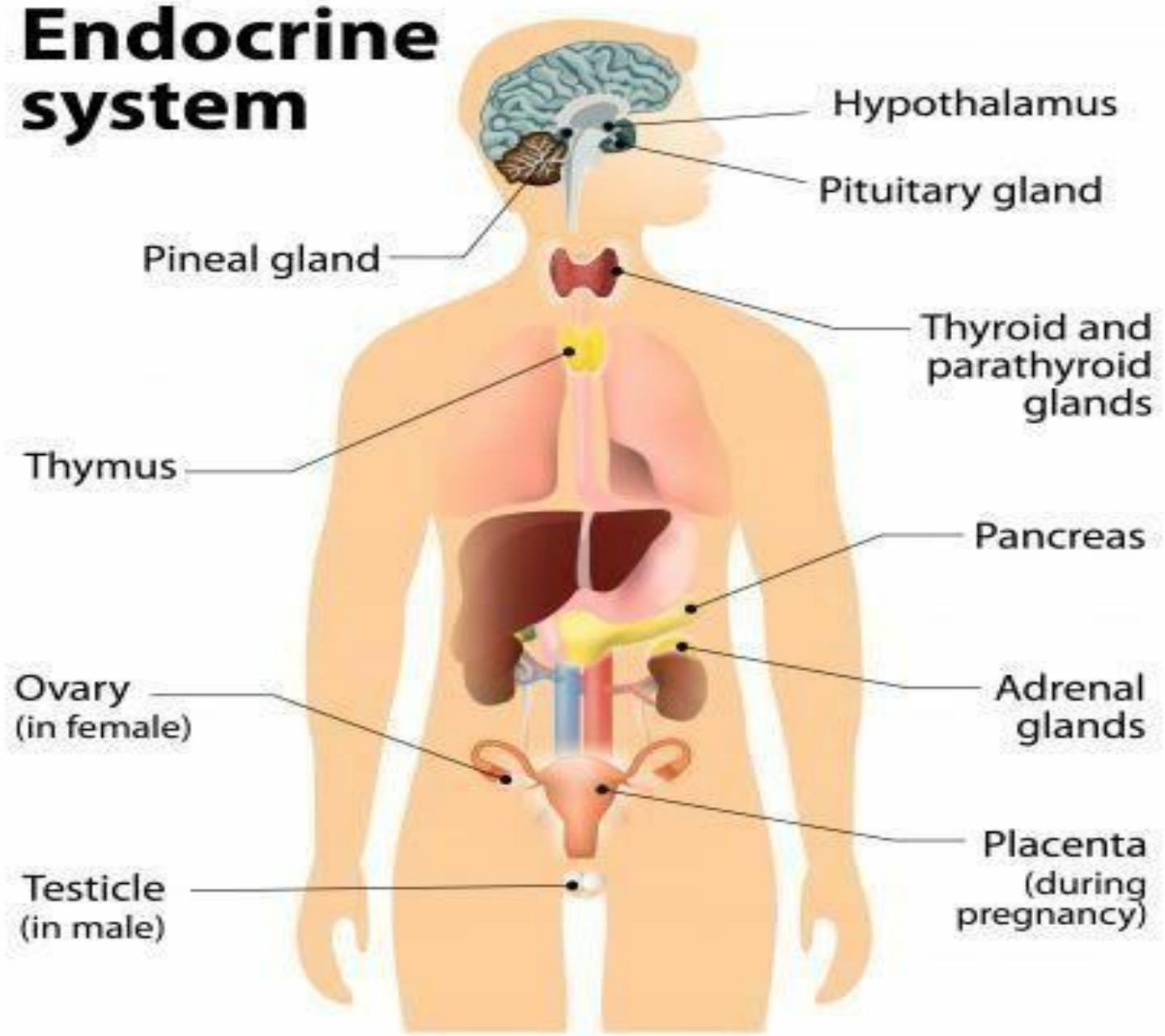
- They pour their secretion directly into bloodstream.
- Endocrine (Greek word) means ”I separated within.”
- Ductless gland
- Secreted chemicals called hormones
- Hormones Bloodstream Target organs
- Endocrine communication is generally slow due to time taken by hormones to travel to target organs, and the behavior n responses they affect may not occur until hours, weeks, years.
- Hormones –(affects) Behavior n emotions—(stimulating) muscle, organs and other glands of body.

Hormones

- Hormones (Greek word) Means “setting in motion”
- Chemical Messengers
  Secreted directly into blood
- Which carries them to organs, tissues of the body to exert their function.
- Released in small amounts (milligrams)

Functions of Hormones

- Regulates metabolic process
  Eg. Thyroid hormones
- Control the rate of chemical reactions
  Eg. Growth hormone
- Aid in the transport of substances across the cell membrane of target cell
  Eg. Insulin & glucagon
- Regulates water n electrolyte balances
  Eg. Antidiuretic hormones, calcitonin and aldosterone
- Play vital role in reproduction, growth & development
  Eg. Estrogens, progesterones and testosterone


Endocrine system
Hypothalamus
Pituitary gland
Pineal gland
Thyroid and parathyroid glands
Thymus
Pancreas
Ovary
(in female)
Adrenal glands
Placenta
(during pregnancy)
Testicle
(in male)

The Pituitary Gland

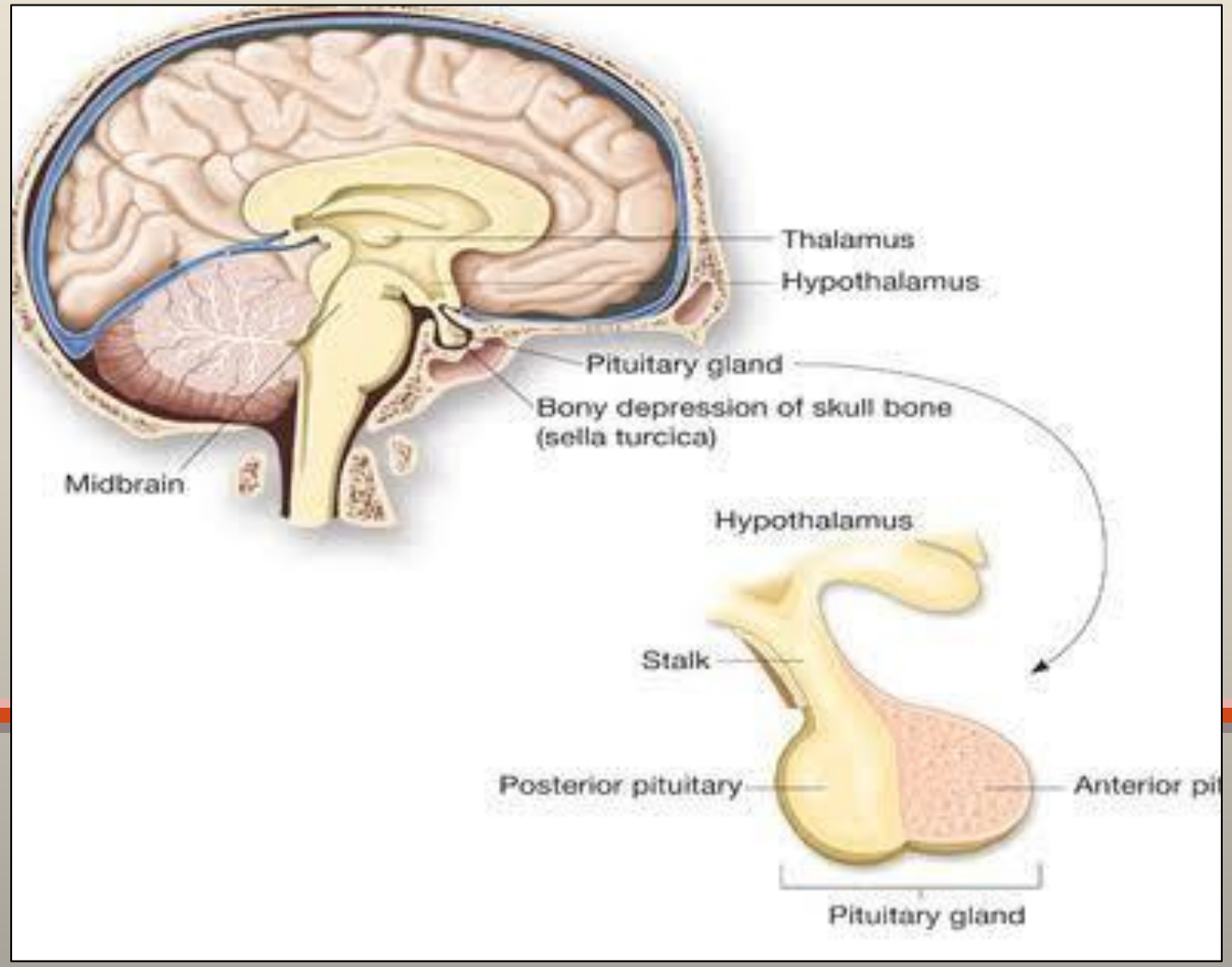
- Partly an outgrowth of the brain lies just below Hypothalamus with a stalk like structure

  Also known as **brain hypophysis** (From the greek from “lying under”- it refers because of the gland’s position on the underside of the brain.

- Hypothalamus small area of brain important in controlling the balance of our bodily functions

- Hypothalamus controls the release of Hormones from Pituitary gland

- Also known as ***master gland*** Tropic hormones influence other glands to release their hormones



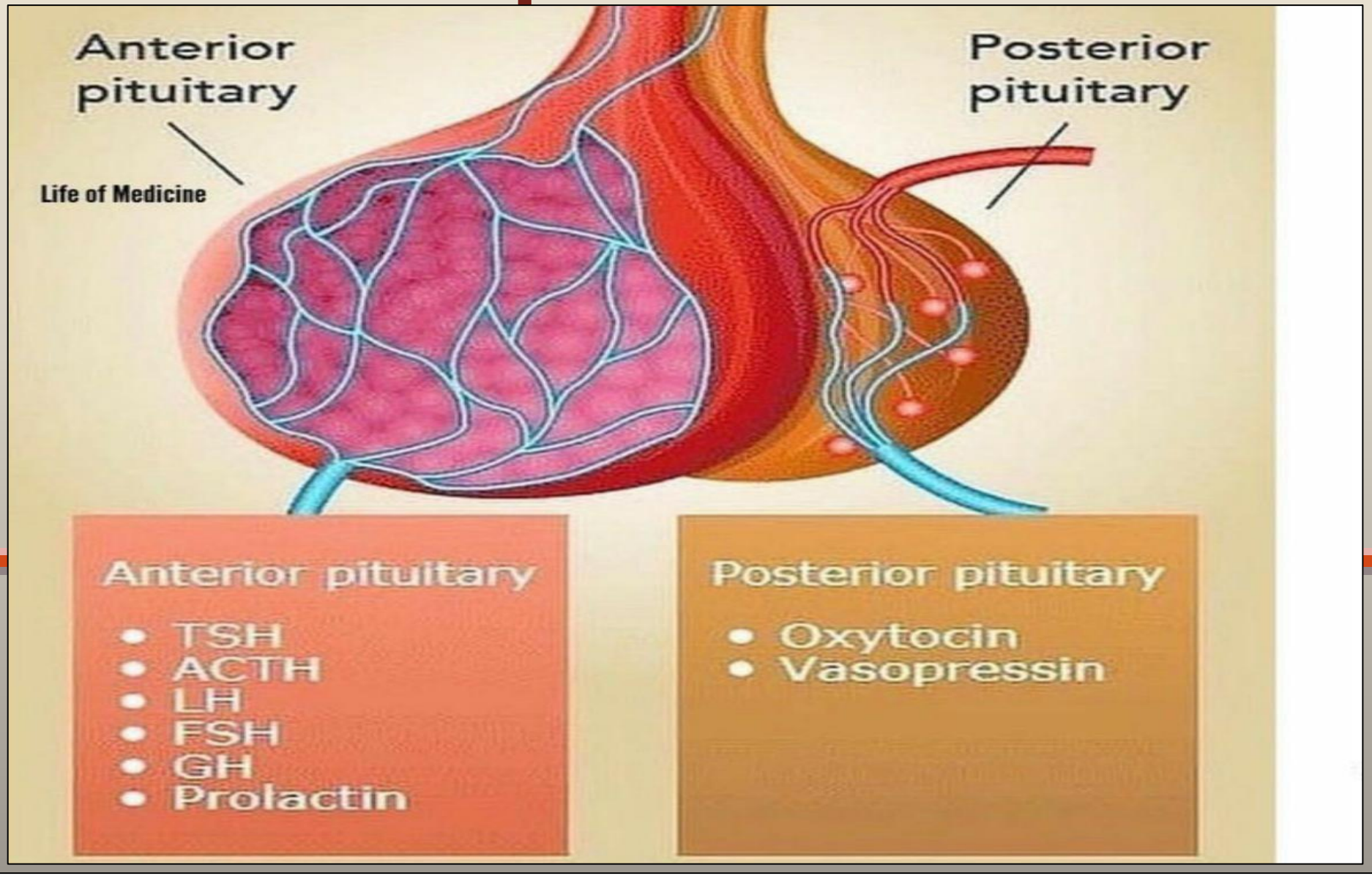
It has two main secreting parts

Hypothalamus divide pituitary in two parts.

1- Anterior lobe/ Adeno hypophysis/ Anterior pituitary

2- Neural lobe/ Neuro hypophysis/ Posterior pituitary

Hormones secreted by these parts



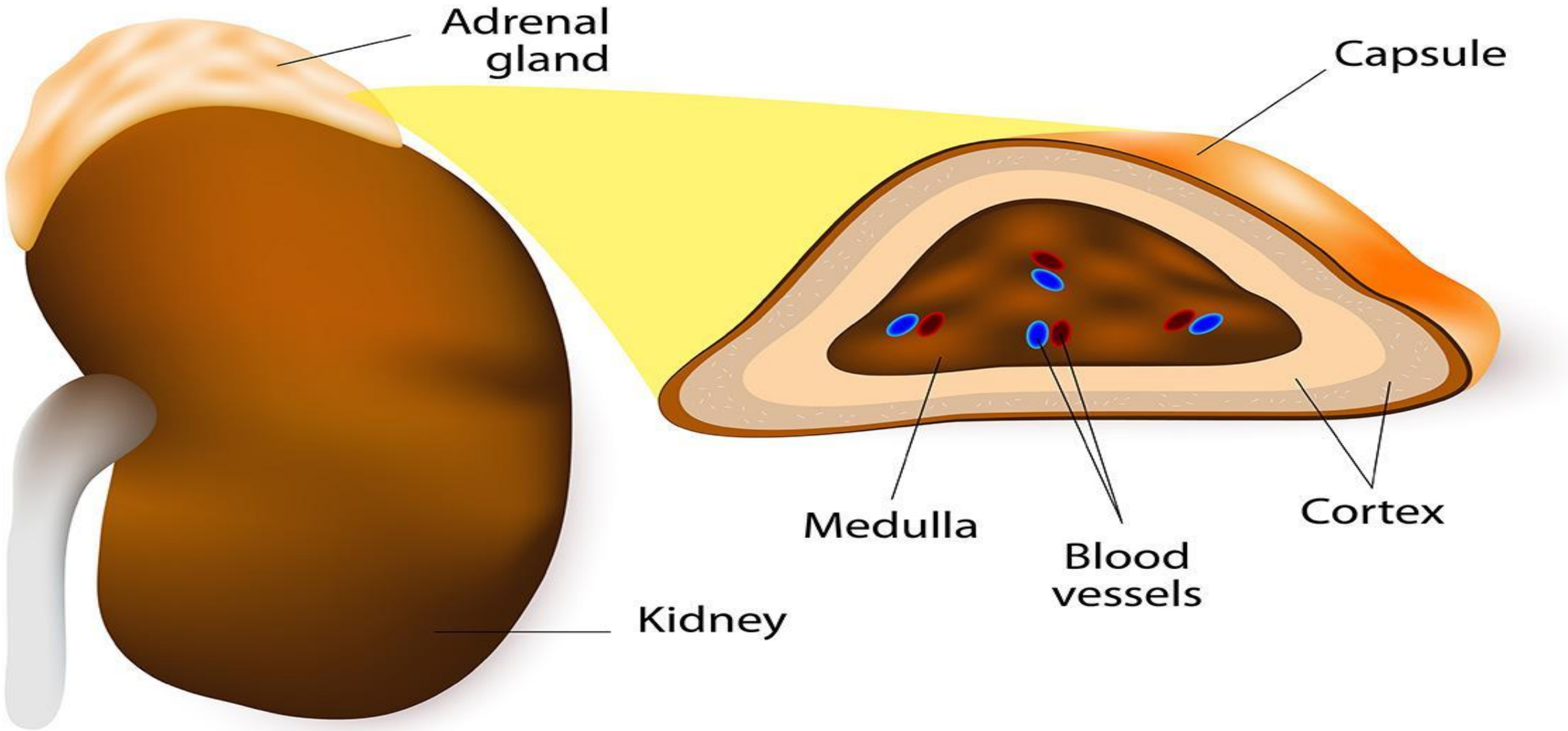
Anterior Lobe

- This lobe is 3 times larger than posterior lobe.
- Under control by Hypothalamus
- Hormones secreted by this lobe
  - **Adrinocorticotropic Hormone (ACTH)-** stimulates adrenal cortex to produce cortisol and other hormone.
  - **Thyroid Stimulating Hormone (TSH)-**stimulate the thyroid gland to secrete thyroid hormone. In its absence the thyroid gland does not function properly.
  - **Luteinizing Hormone (LH)-** in females stimulates the production of estrogen, and progesterone, in males promotes testosterone production (affects the sex gland of men and women)
  - **Follicle Stimulating Hormone(FSH)-** stimulate the production of egg cells and sperms in Gonads.
  - **Prolactin(PRL)/ Lactogenic Hormone-**stimulates milk production in mammary glands
  - **Growth Hormone(GH)/ Somatotropin Hormone(STH)-** is essential for normal growth and development of all body cells, muscles and bone cells. this affect protein metabolism and plays important role in development.

Posterior Lobe

- Secretion of posterior pituitary called as pituitrin
  - **Oxytocin(OT)-**uterine contraction during birth process and milk ejection from mammary glands
  - **Antidiuretic Hormone (ADH)/Arginine Vasopressin Hormone-** regulates and balances water in blood and also send signals to kidney to store n release water for healthy water balance in body. it regulate urine activity.

ADRENAL GLAND



Adrenal glands

- Also known as "**suprarenal glands**"
- They are two glands attached to kidney
- Each gland divided in two parts
  - Adrenal Cortex
  - Adrenal Medulla
- Hormones released from these glands helps in metabolism, immune system, blood pressure, response to stress and other essential work
- Hormones secreted by them are mainly Steroid hormones
- Both part of this gland perform distinct and separate functions

Adrenal Cortex

ADRENOCORTICOIDS/ADRENAL STEROIDS

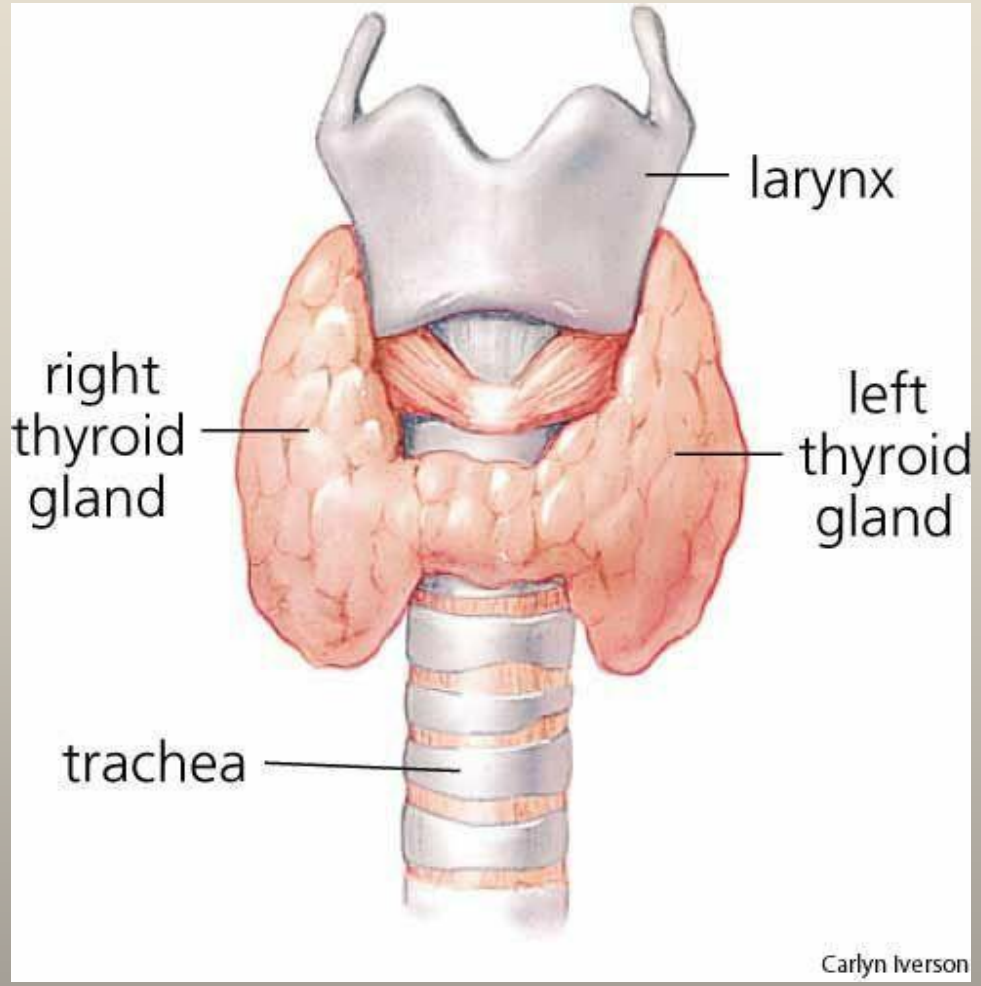
- **Mineralocorticoids**-regulates the sodium, potassium & magnesium level
  - **Aldosterone-**raises blood level of sodium and lower blood potassium level.
- **Glucocorticoids-**glucose & carbohydrates metabolism
  - **Cortisol-** carbohydrate, lipid & protein metabolism and also fight stress and emergency situation
- **Androstenedione/Sex steroid/Gonadocorticoids-** testosterone, athletic performance, hair growth, build muscle ,keep red cell healthy

Adrenal Medulla

- Inner part
- Fight or flight
- Main hormones secreted
  - **Epinephrine/Adrenaline-**activated SNS, voluntary muscles(heart), increase blood sugar level, heart rate. To provide extra energy when we stressed/afraid it releases a flood of epinephrine known as FIGHT OR FLIGHT
  - **Nor epinephrine/ Noradrenalin-** opposite effect as epinephrine, it relaxed body after Fight or flight effect. Also used as drug

Thyroid Gland

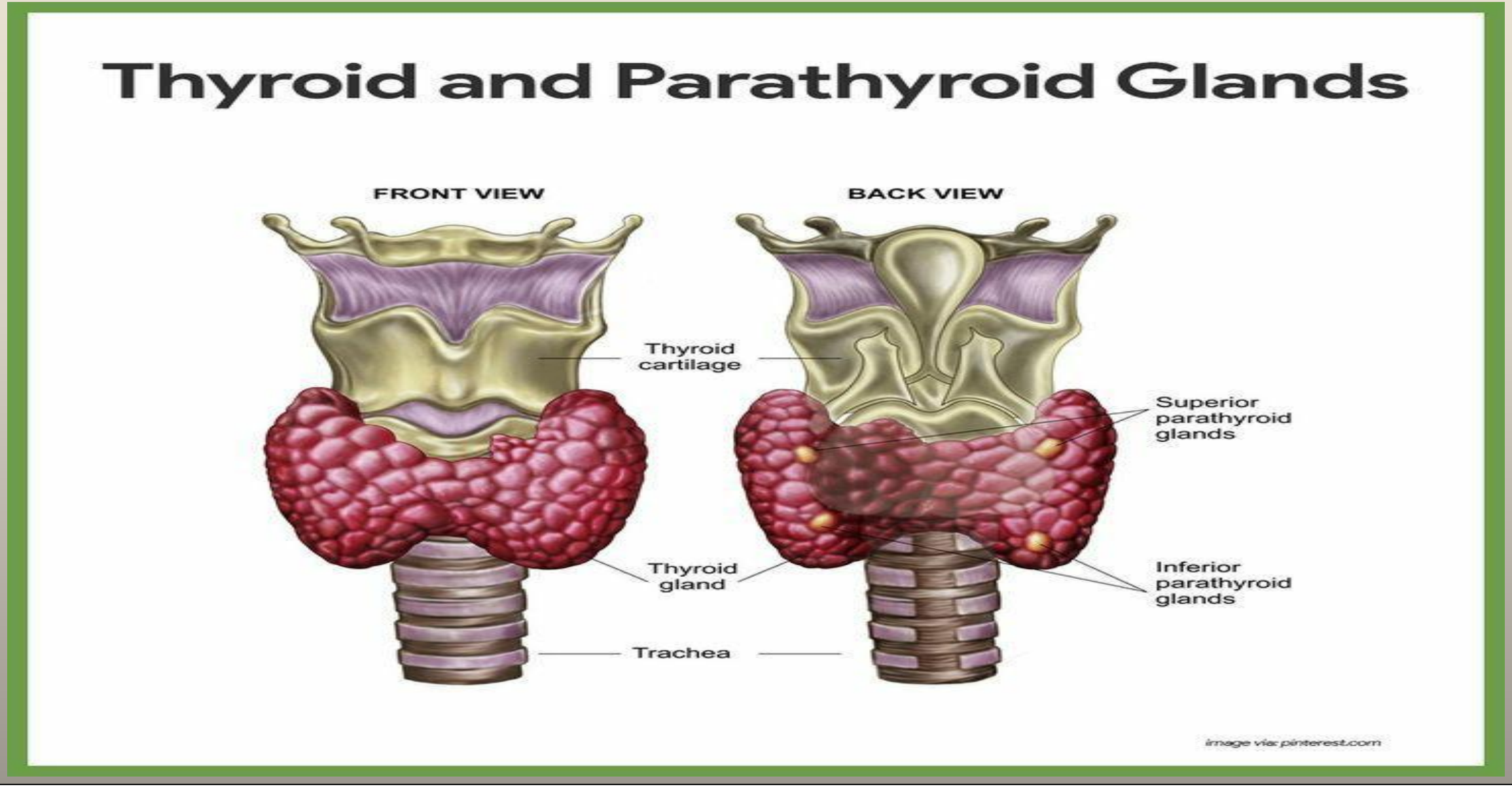
- Thyroid (Greek word-thyreos) means “A shield”
- Adult thyroid is largest endocrine gland (wt 15-25 gm)
- Located in front of Larynx (voice box) & attached to trachea (wind pipe)
- Hormones regulate growth metabolism, brain and body development
- Utilize IODINE and synthesize THYROGLOBULINE (TGB)



Hormones

- **Tri - iodo -thyronine (T3) & Thyroxine (T4) –** are iodine containing amino acids, for growth development, normal metabolism
  - **Hyper secretion-** hyperthyroidism/Goiter/Graves Disease
  - **Hypo secretion-** cretinism Myxedema
- **Calcitonin-** calcium lowering hormone, responsible for lowering calcium, phosphate and regulate digestive hormone
  - **Hypo/ hyper secretion-** affect normal balance of calcium & phosphate

Parathyroid Gland



Parathyroid Gland

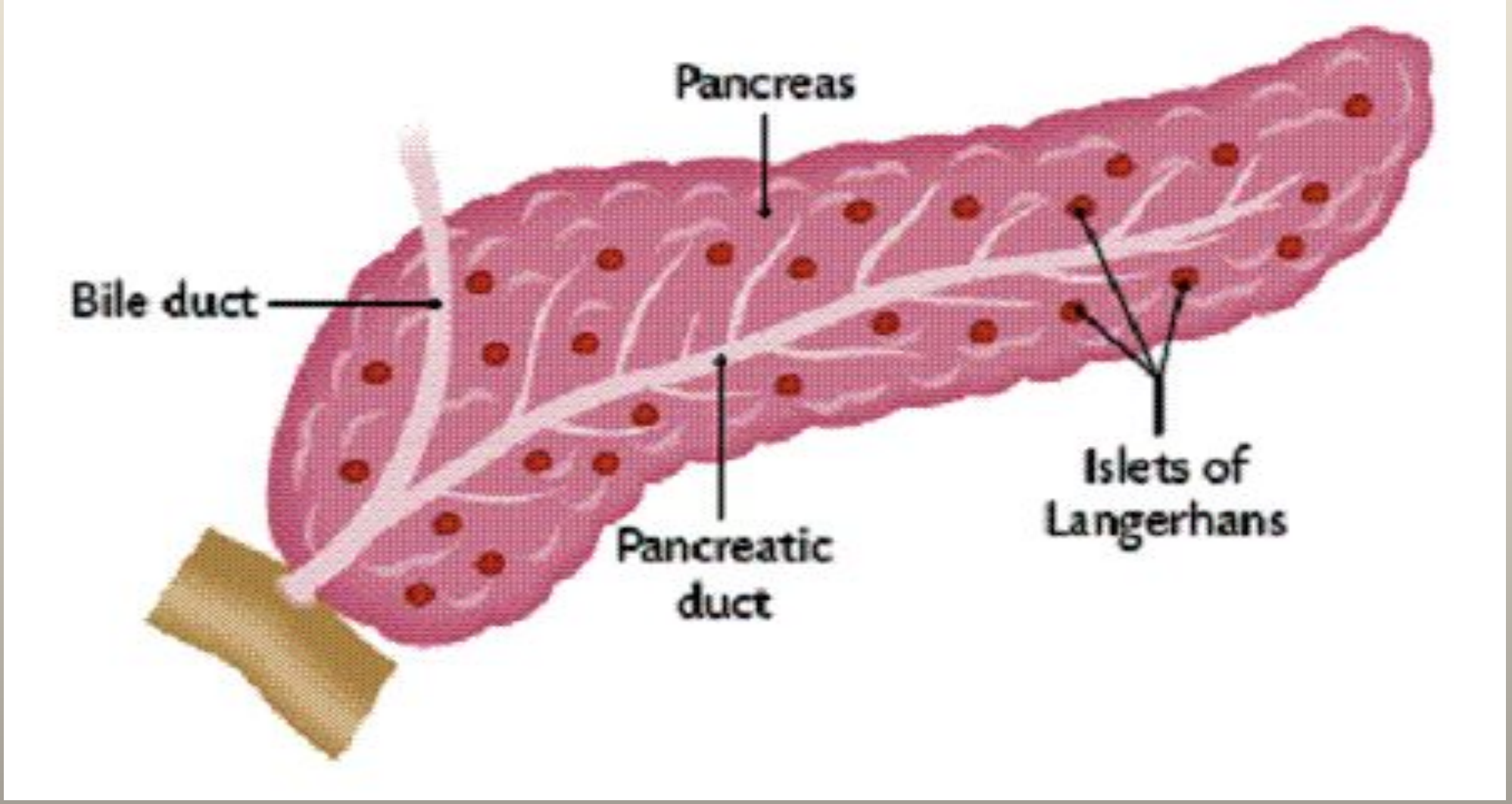
- 4 glands

  Smallest Gland
- Embedded in posterior surface of thyroid gland

- Only one hormone is secreted

  - **Parathyroid Hormone (PTH)/ Parathormone-** raise blood calcium level and lower phosphate level in blood and increase calcium absorbance from food (in intestine) , also reduces loss of calcium in urine

Pancreas Gland



Why it is called Hectocrine Gland?

- Hectocrine glands are those glands which have both endocrine and exocrine part. Pancreas is called hectocrine gland because it secrete the hormone insulin into blood which is an endocrine function and enzymes into digestive tract which is an exocrine function.

- So it is the only gland that work as both endocrine & exocrine(a hormone producing endocrine and a digestive enzyme producing exocrine)

Exocrine functions of pancreas

- Exocrine portion of pancreas has major role in **digestion of food**

- Pancreas produces **enzymes to digest**
  - Protein (trypsin & Chymotrypsin)
  - Carbohydrate (amylase)
  - And to break down fats (lipase)

- For converting the food we eat into **fuel** for the body cells

Endocrine functions of pancreas

- Islets cells (islet of langerhans) creates & releases hormones blood stream

- Main pancreatic hormones
  - **Insulin- Control the sugar level in blood- in oxidation process body gets energy- if insulin decreases- sugar level increases- no oxidation process occurs- result in diabetes. if insulin increases- oxidation process increases- sugar level decreases. Hypoglycemia- person feels irritated, lethargic**
  - **Glucagon- it increases the level of sugar in blood, but its effect is of very short duration.**
  - **Both work together for regulating the sugar level in blood.**

- There are two types of cell which produces hormones
  - **Alpha cells-** Glucagon
  - **Beta cells-** Insulin

Alpha cells

- Produces glucagon hormone
- Which act to raise blood sugar level

Beta cells

- Produces insulin hormone
- Which act to lower blood sugar level
- By the influence of insulin Carbohydrate (burnt) & Sugar so—(converted) and utilized by cells of the body
- If sugar level becomes high—(Insulin convert) extra sugar Glycogen (deposited in liver & muscles)
- Brain got constant supply of sugar because of influence of Glycogen
- Regulates sugar level in human body

Abnormal activity of this gland

Hypo secretion

- Insulin increases the blood sugar level
- Amount of sugar in the urine becomes high
- DIABETES

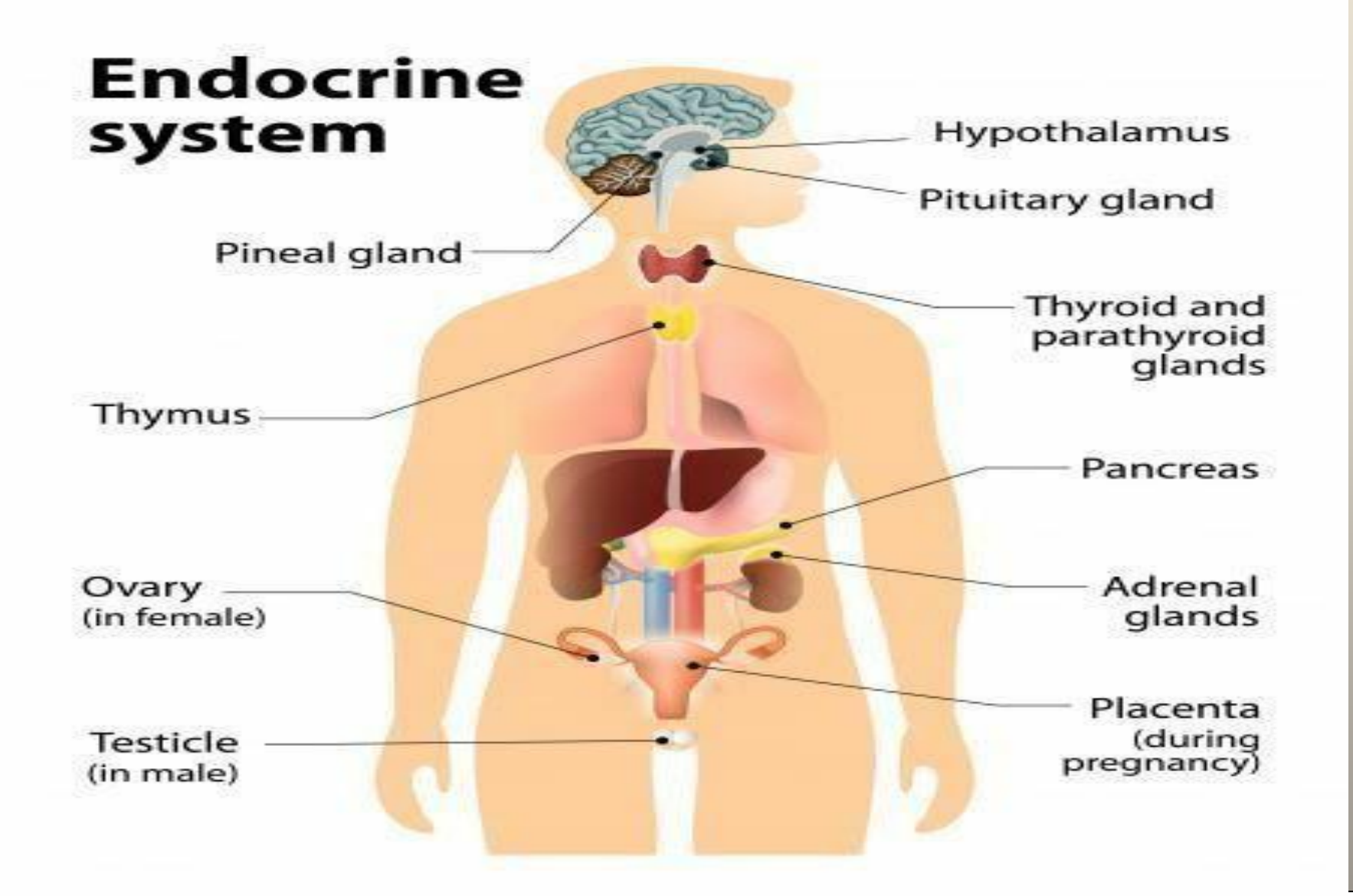
Hyper secretion

- Of its hormone Insulin results in lowering the blood sugar level
- The person become restless from time to time
- HYPOGLYCEMIA

Gonads/ Sex Glands

- Are also called as sex glands or reproductive glands.
- They are the male n female primary reproductive organs
- The Male Gonads are TESTES
- Female Gonads are OVARIES
- Both produces sex hormones and sperm cell (testes) and ova/ egg cell (ovaries)

Testes & Ovaries



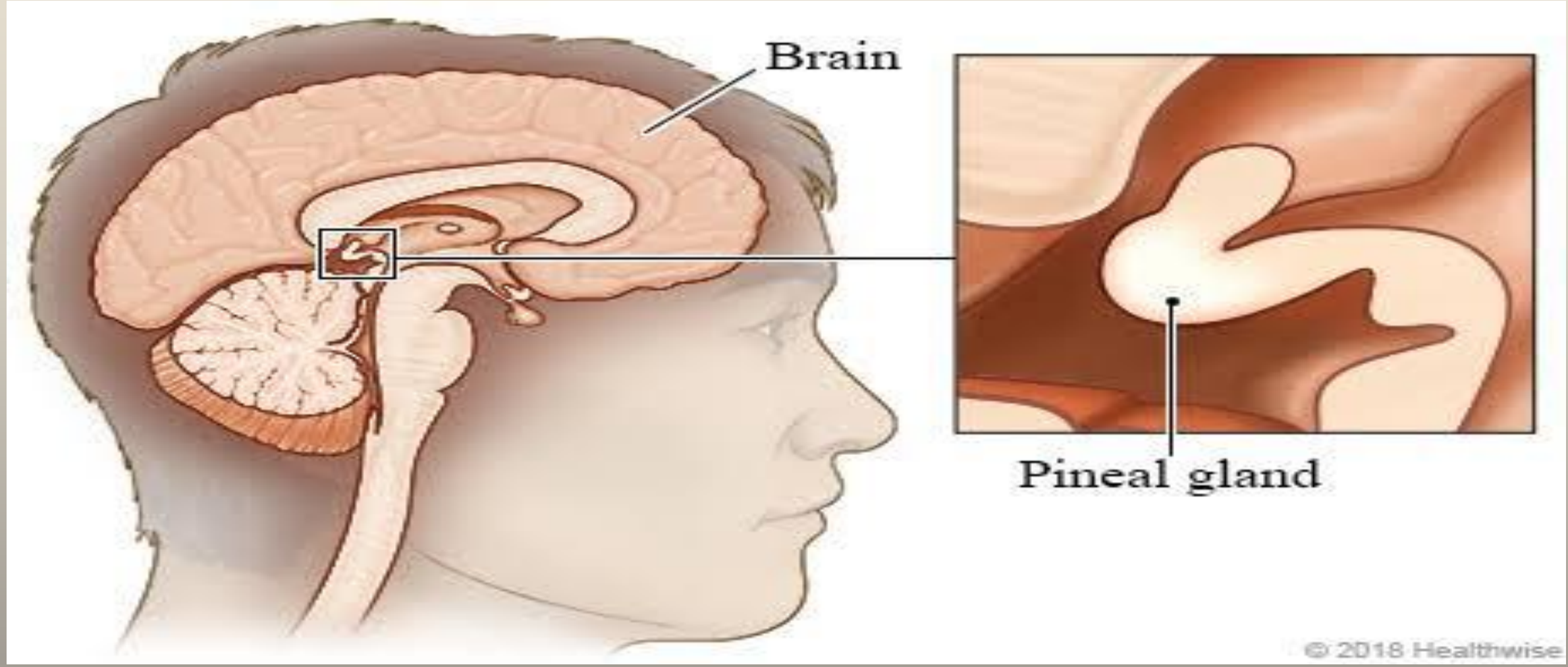
Testes

- Are also known as testicles or male gonads
- These reproductive gonads produce sperms and hormone Testosterone
- Main function of testes is maintain the health of male reproductive system
- There are two types of cells in testicles
  - **Leydig-** produce male hormones (testosterone and androgens). Main function of testosterone is maintaining sex drive, sperm production, plays key role in development of male reproductive tissues such as testes and prostates. Also responsible for development of secondary sex characteristics in males. Androgens are responsible for male features and reproductive functions .
  - **Sertoli-** aid in the production of hormones that generate sperms

Ovaries

- Also known as “female gonads”or “egg sac”or “reproductive gonads.”
- Ovaries have two functions produce eggs/ova and female hormone
- They are main source of female hormone(estrogen & progesterone)
- Controls development of female body characteristics such as body shape body hair
- Regulates menstrual cycle and pregnancy.
  - **Estrogens-**important for reproduction and development of female characteristics. Responsible for growth and maturation of uterus, uterus change during menstrual cycle ,breast development and body hair growth
  - **Progesterone-** also known as progestin. It prepare uterus for conception, aids in ovulation, stimulates mammary glands for milk production during pregnancy

The Pineal Gland



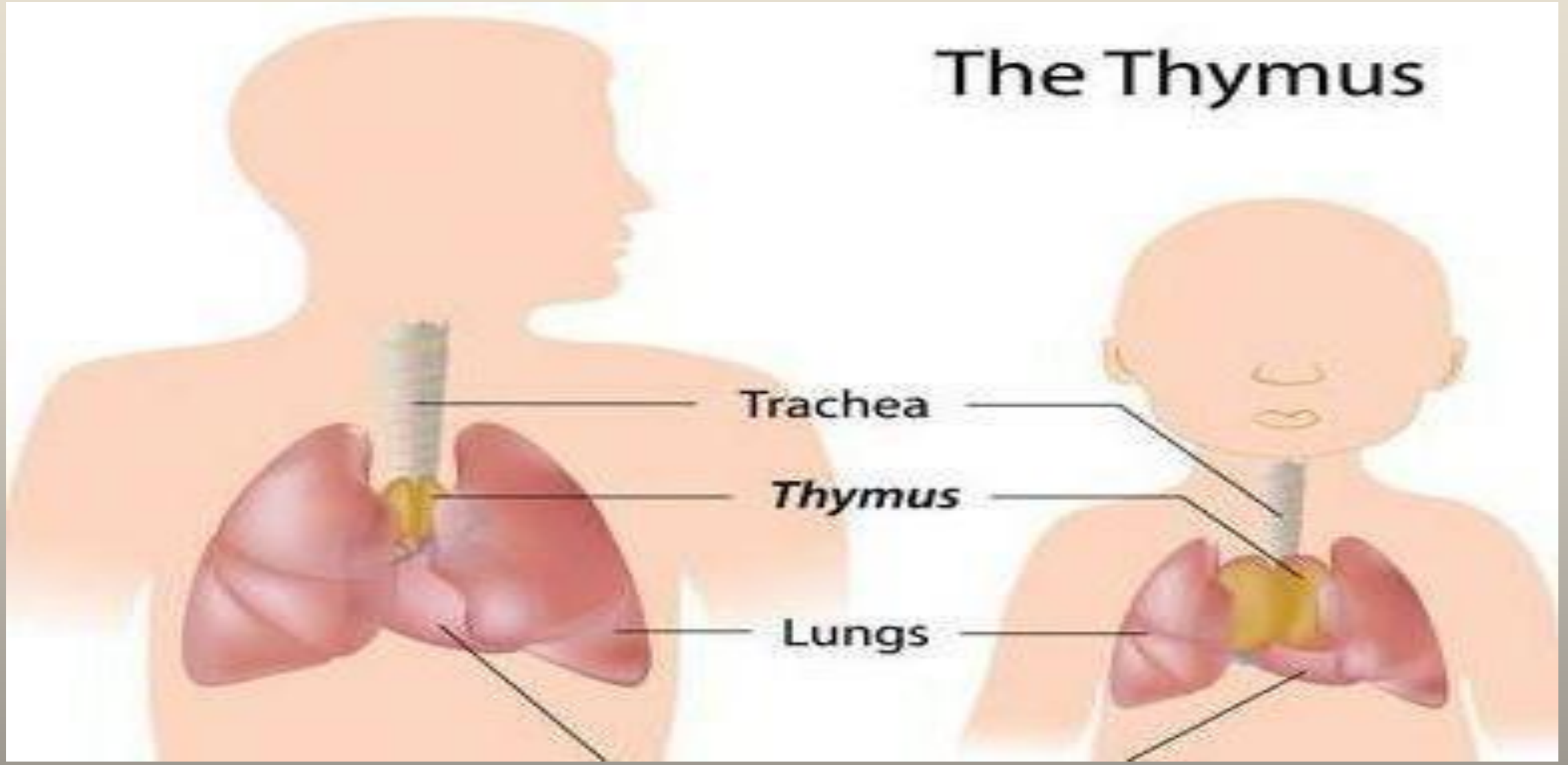
The Pineal Gland Cont..

- Its located deep in cerebrum /or we can say it's a part of cerebrum.
- size of pea

- It plays important roles in "biological rhythms"

- Secrets hormone called
  - **Melatonin-**helps in tracking day length(and season),exposure to darkness stimulates secretion of melatonin- temperature reduces, activities decline, ready to sleep; where as exposure to light inhibits its secretion
  - Regulating the sleep wake up cycle(circadian rhythms)
  - In some animals this influences seasonal behavior such as breeding, molting .

The Thymus Gland



The Thymus Gland Cont..

- The diminishing gland (over time)
- Located between lungs
- At birth weighs 10-12 gm
- During childhood and adolescence 20-30 gms
- During old age 3-6 gm
- Secrete hormone Thymosin
- It affect the production and maturation of lymphocytes in body defenses

Mucosa of Duodenum/Stomach

- It located near the last point of spinal cord. Duodenum is the first part or section of small intestine.
- Main hormones
  - **Secretin-**it regulates the PH of duodenum allowing digestive enzymes from pancreas to function optimally. Main used in pancreatic functions
  - **Cholecystokinin(CCK)**- Chole-"Bile", Cysto-"Sac", Kinin-"move", is derived from Greek words ,means "Move the bile sac (gallbladder)". Is a peptide hormone of gastrointestinal system. Responsible for stimulating the digestion of Fat and protein. Pancreozymin
  - **Enterogastron-** secreted by duodenum mucosa when fatty food is in the stomach/small intestine. It inhibits gastric movements and secretions by blocking the production/activity of gastric juices
  - **Gastrine-**produced by stomach and stimulates the release of gastric acid which break down the protein in the food we eat. Protect gut from infection.

Thank you..