



BIOLOGY

Chapter 22- CHEMICAL COORDINATION AND INTEGRATION

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Bridge Course Program for SSLC Students who want to take up Science in I PUC in 2012



Coordination of activities of different parts of the body of a multicellular organism is an important part of life. The Nervous system and the Endocrine system bring such a coordination in the body.

The two systems are integrated and control different vital activities of the body.

The endocrine glands secrete hormones.

Hormones act as chemical messengers and the coordination achieved by them is called chemical coordination.



- Exocrine and endocrine systems are the two major coordinating systems of the body.
- Exocrine system consists of all those glands of the body which possess a duct for the delivery of their secretions to the target organs. These glands are called Exocrine glands.

Eg :Sweat glands, salivary glands, tear gland, liver etc.



- Endocrine system consists of all those ductless glands of the body which release their secretions directly into the blood stream.
- These glands are called Endocrine glands.
Eg :Pituitary gland, pineal gland, thyroid gland, adrenal glands, parathyroid, thymus, pancreas and gonads.



- Endocrinology : A study of endocrine glands and their secretions .
- Endocrine glands are also called ductless glands and their secretions are called Hormones.
- The term “Hormone” was coined by Starling and Bayliss.
- Hormones are chemical messengers that are transported by blood or (lymph) from the endocrine glands to the cells or organs on which they act called Target cells or organs.



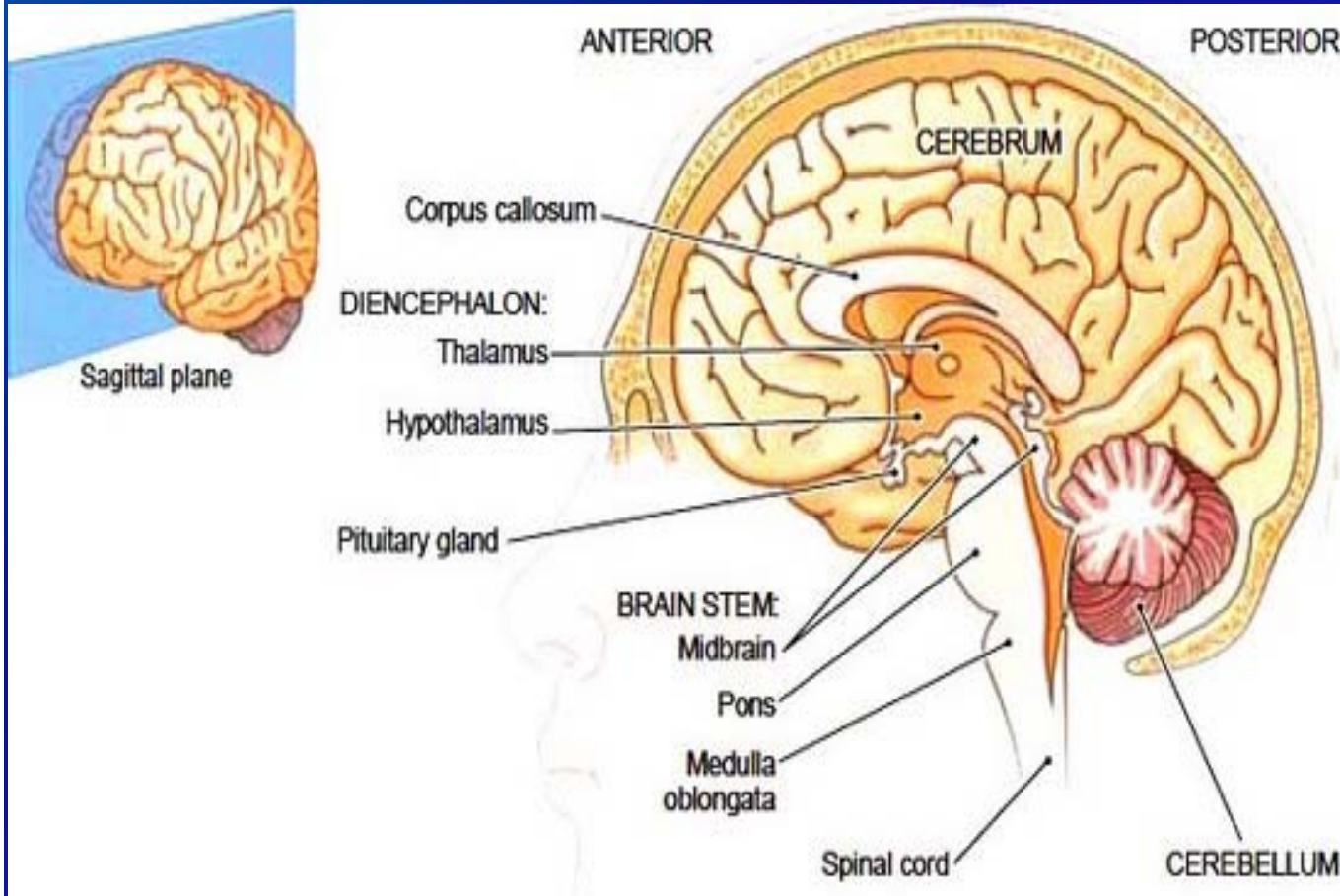
- In addition to endocrine glands there are some organs in the body which contain hormone producing cells but are NOT exclusively endocrine glands.

Eg :Pancreas and Gonads

- Hyper secretion :The more secretion from an endocrine gland than normal.
- Hypo secretion :The less secretion from an endocrine gland than normal.
- Both these conditions result in disorders.



Location and Functions of Endocrine Glands



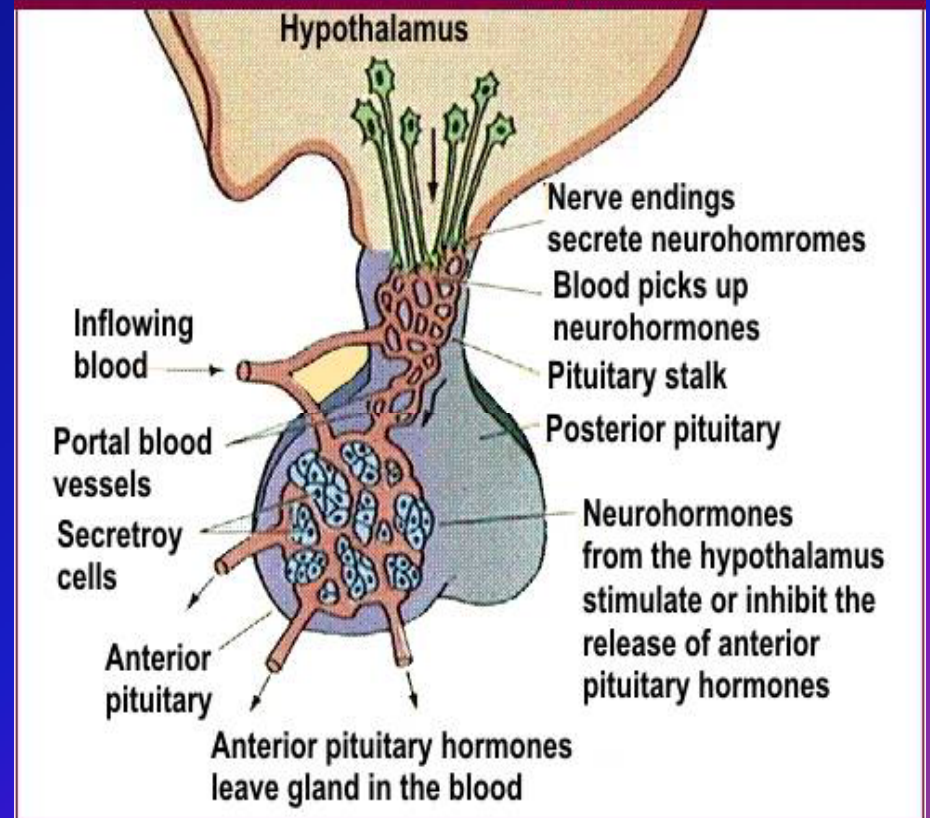


- Hypothalamus is represented by the thickened floor of the Diencephalon.
- Hypothalamus is commonly described as the “Master Gland.”
- Floor of hypothalamus has a projection called Infundibulum for the coordination of Neuronal and Hormonal activities.



PITUITARY GLAND

The Pituitary & Hypothalamus Hormone Control





It is also called as “Hypophysis Cerebri”. It is a tiny, unpaired endocrine gland located on the floor of the cranium in a depression called Sella turcica.

It is attached to the Hypothalamus with the help of a stalk called Infundibulum.

Pituitary together with Hypothalamus forms the most significant endocrine centre in the body.



FUNCTIONS

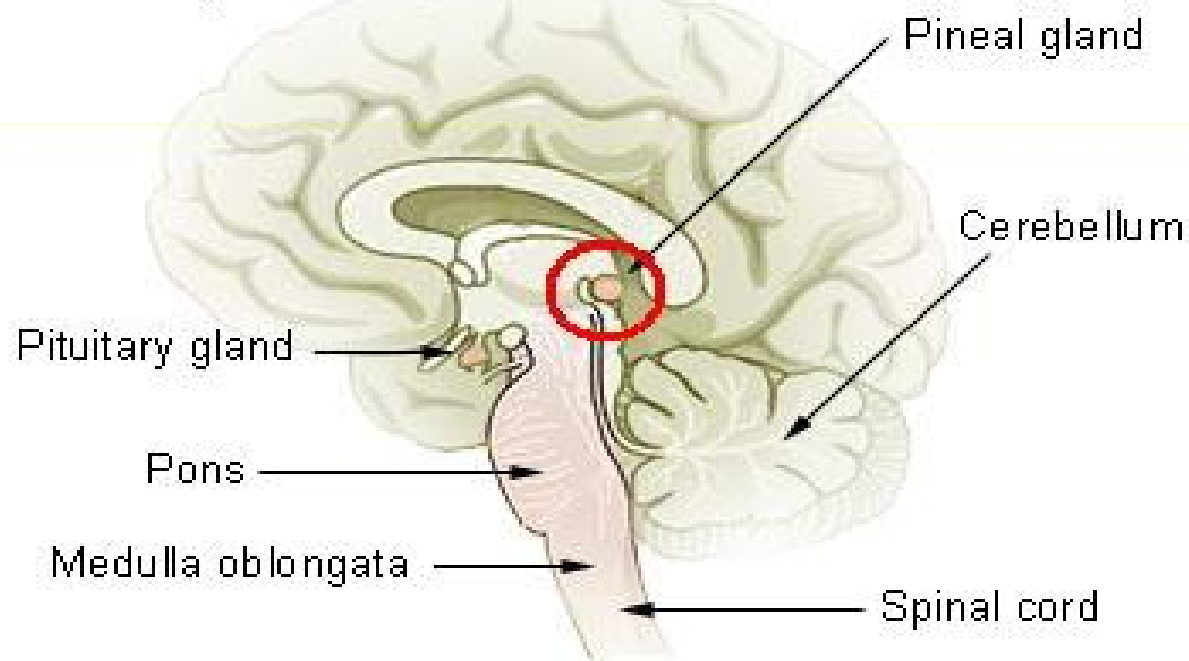


- Pituitary gland releases 7 hormones from the Adenohypophysis and 2 from the Neurohypophysis.
- STH- Growth of body and bone.
- TSH- Stimulates Thyroid gland to secrete Thyroxin.
- ACTH- Stimulates the Adrenal cortex.
- LH-Secretion of milk from mammary glands.
- ADH and Oxytocin are only stored in the Pituitary gland.
- Oxytocin – helps in child birth.
- ADH – helps in controlling water balance.



PINEAL GLAND

Pituitary and Pineal Glands



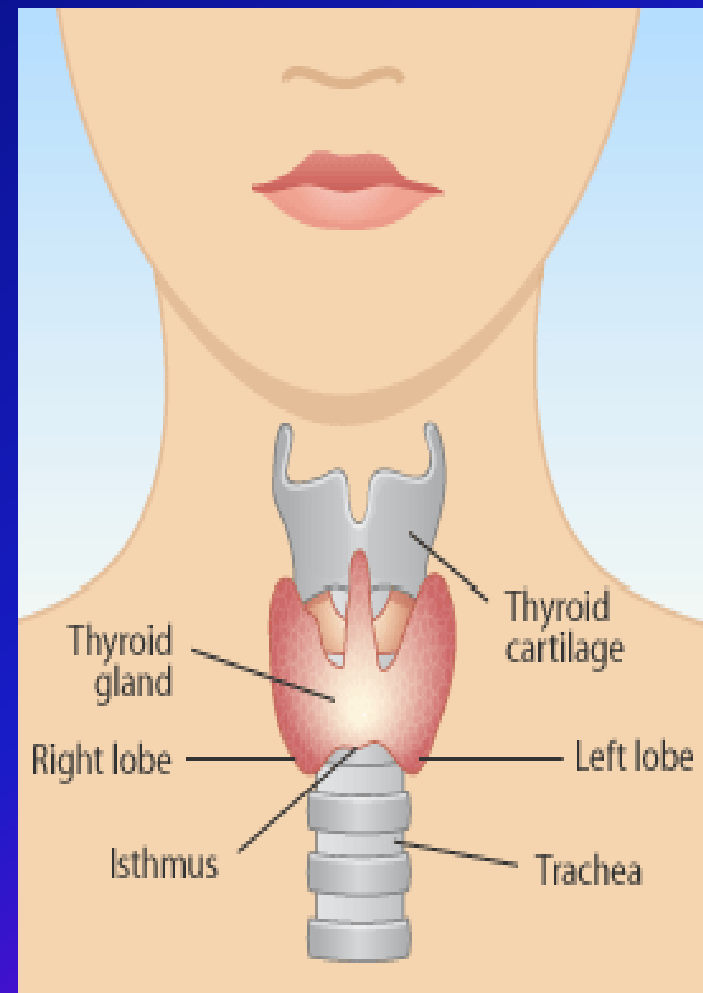


- It is the external projection of the Epithalamus. Epithalamus represents the dorsal portion of the Diencephalon.
- Pineal gland secretes the hormone Melatonin which controls the sleep-wake cycle, along with hypothalamus.



THYROID GLAND

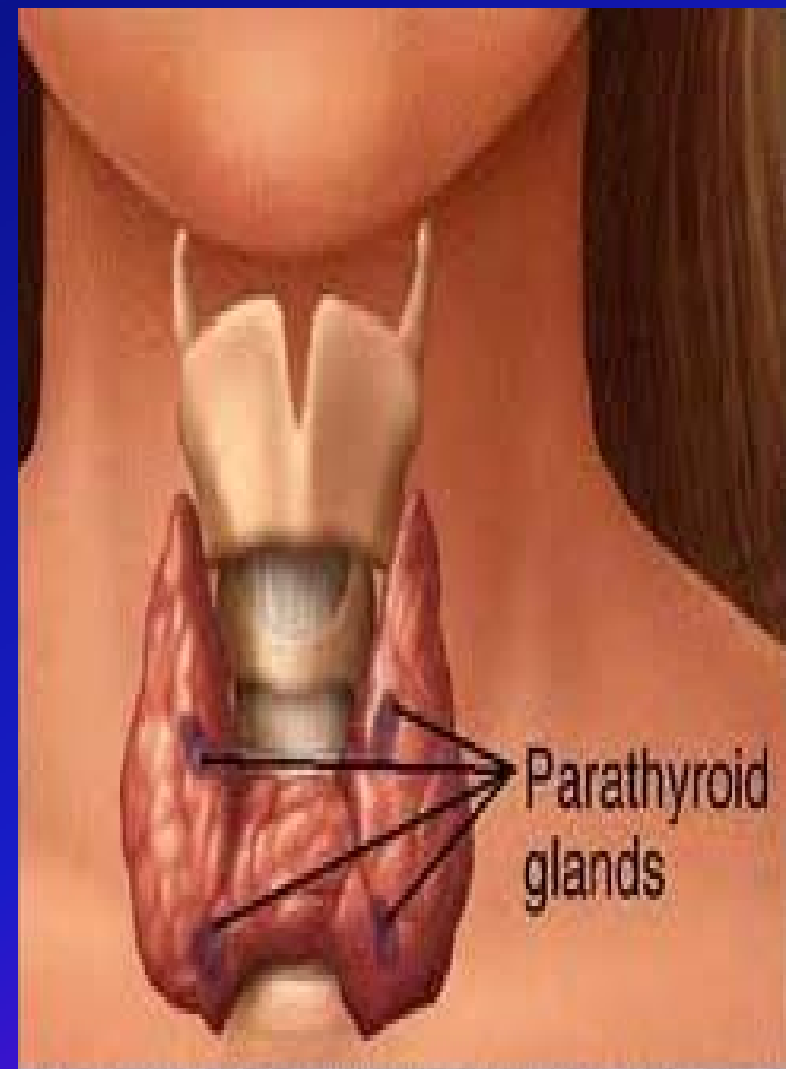
- It is situated in the neck region below the Larynx. It consists of two lobes joined in the middle by an Isthmus.
- Functions: It secretes the hormone Thyroxin.
- Thyroxin stimulates the growth and regulates the metabolism of the body.





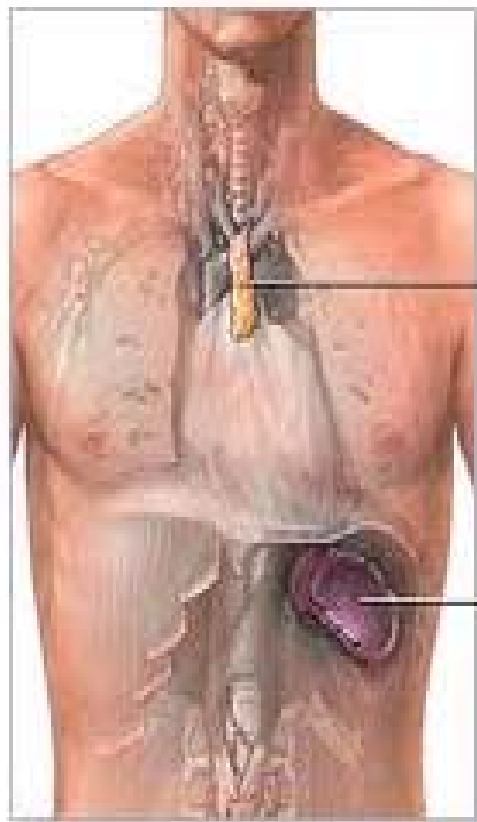
PARATHYROID GLANDS

- They are 4 in number found embedded in the tissues of the Thyroid gland.
- Function : They secrete the hormone Parathormone.
- It controls the amount of Calcium salts in the blood and bone.





THYMUS



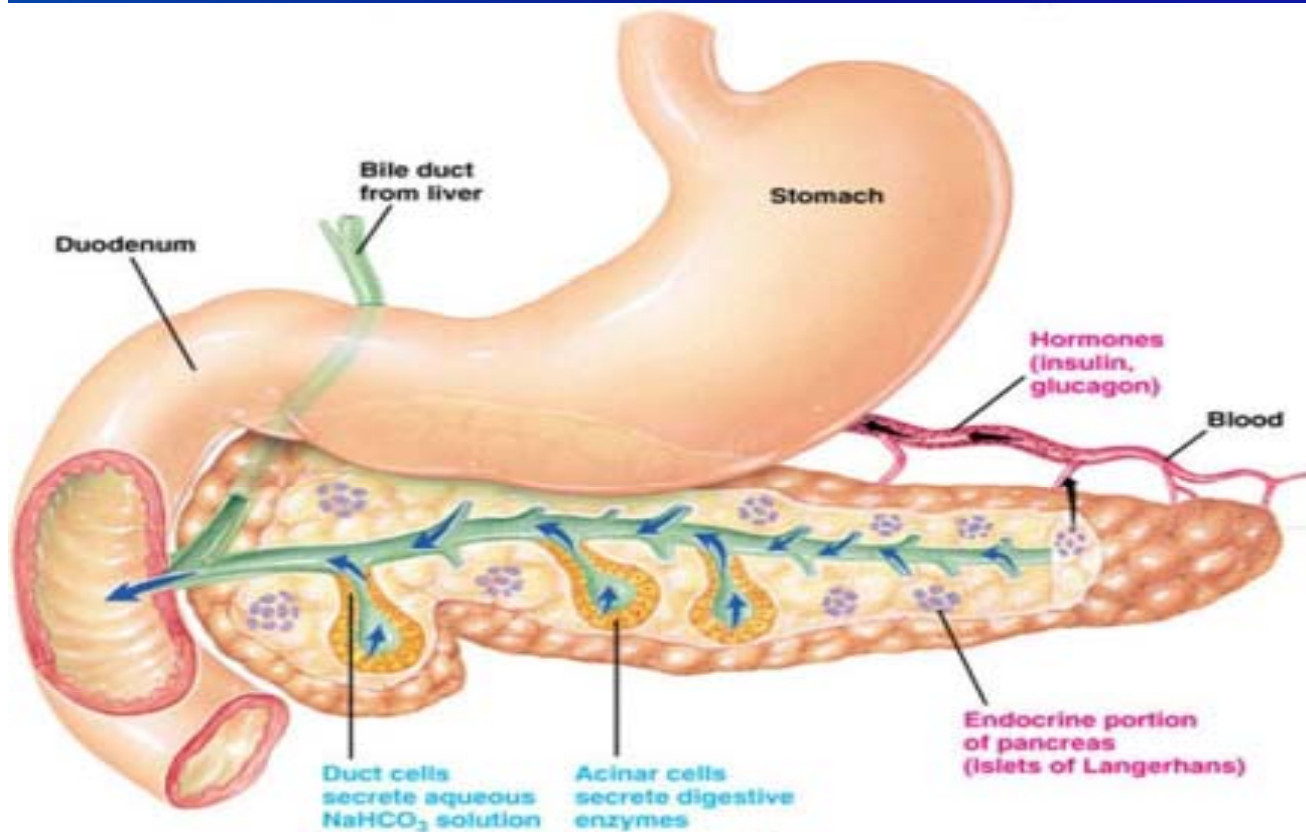
Thymus



- It is a specialized organ of the Immune system.
- It is located in the anterior superior Mediastenum in front of the heart and behind the sternum.
- It produces 4 hormones viz Thymic factor, Thymosin, Thymic humoral factor and Thymopoietin.
- They promote the maturation of T-cells and B-cells which aid our Immune system.



PANCREAS





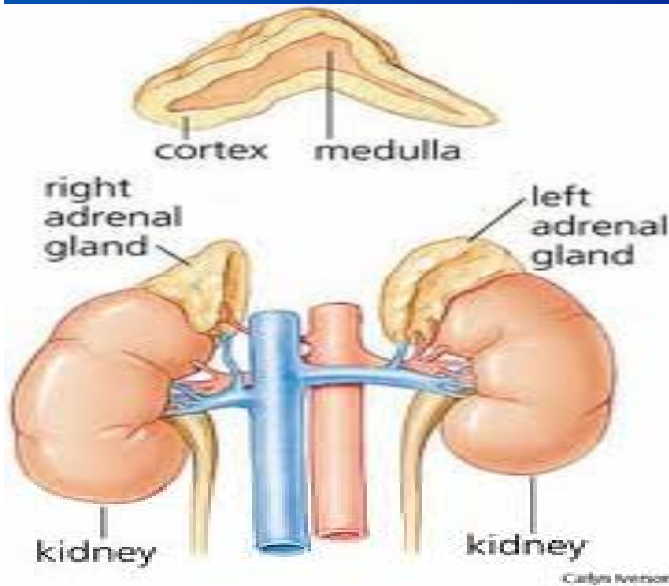
- It is a carrot shaped organ located in the C loop of Duodenum extending till the spleen.
- Function :Both exocrine and endocrine .
- The endocrine part of the pancreas represented by the Islets of Langerhans secrete 2 hormones viz Insulin and Glucagon



- They play an important role in Carbohydrate metabolism.
- Insulin inhibits the conversion of Glycogen into Glucose and regulates Sugar level in the blood.
- Glucagon converts Glycogen into Glucose as and when the Blood glucose level decreases thereby increasing the concentration of Blood sugar.



ADRENAL GLANDS



- Paired endocrine glands present a little above the Kidneys. Hence they are also called SUPRARENAL GLANDS.
- Each adrenal gland is composed of an outer Adrenal cortex and inner Adrenal medulla.



- Functions :Adrenal cortex secrete Mineralo corticoids,Gluco corticoids and sex hormones.
- They regulate the sexual development,maintain electrolyte and water balance.
- Adrenal medulla secretes 2 hormones viz Adrenalin and Nor Adrenalin.
- Adrenalin is also called “Emergency Hormone”.

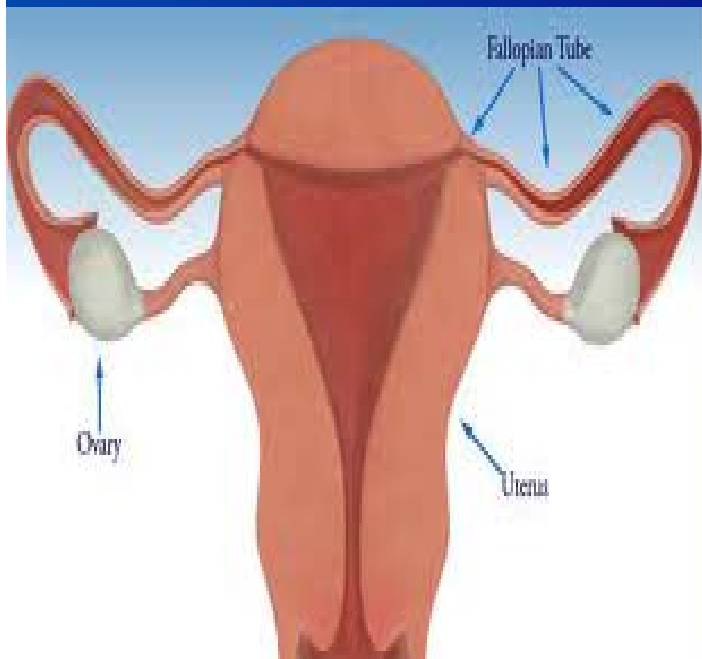


- Adrenalin brings about increased heart beat, rate of respiration and dilation of pupils there by preparing the body to face an emergency situation.
- Adrenalin is also called 3F hormone because it takes care of emergency functions of body during Fear, Fight and Flight.
- Nor adrenalin performs similar functions as Adrenalin but is responsible for the constriction of blood vessels.



GONADS

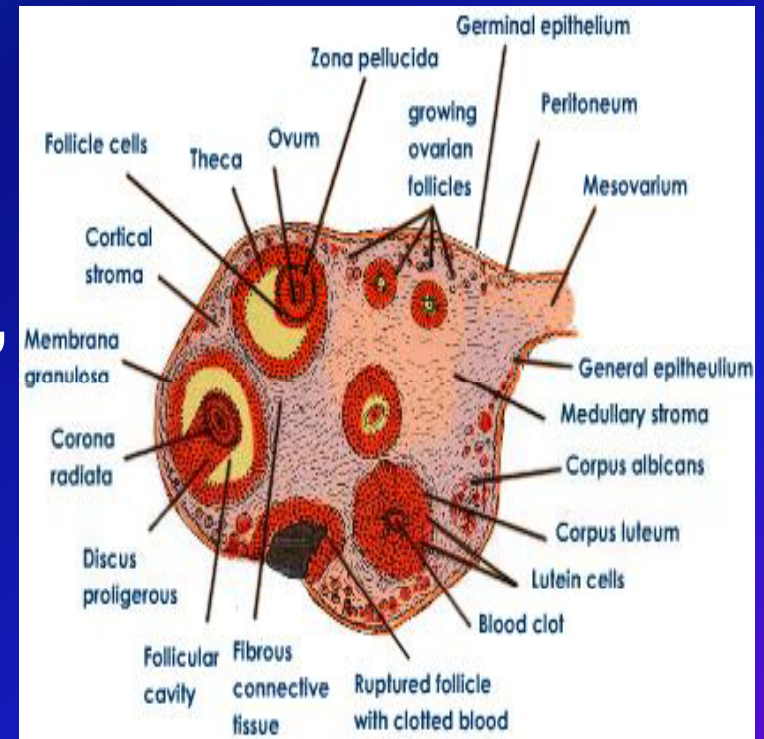
- They are reproductive organs which produce gametes.
- Female gonads are called ovaries and male gonads are called Testes.
- Ovaries are paired glands situated one on either side of the uterus attached to it by a fold of peritoneum called Mesovarium.





Functions

- Ovaries produce ovarian hormones viz Estrogen, Progesterone, Relaxin and Inhibin.
- Estrogen stimulate breast development, prepare mammary glands for lactation.
- Development of Female secondary sexual characteristics and ovarian follicles .
- Regulates menstrual cycle.





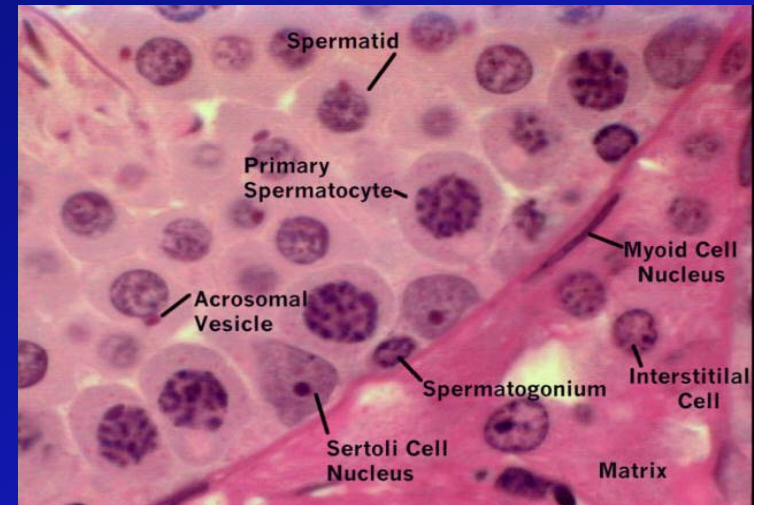
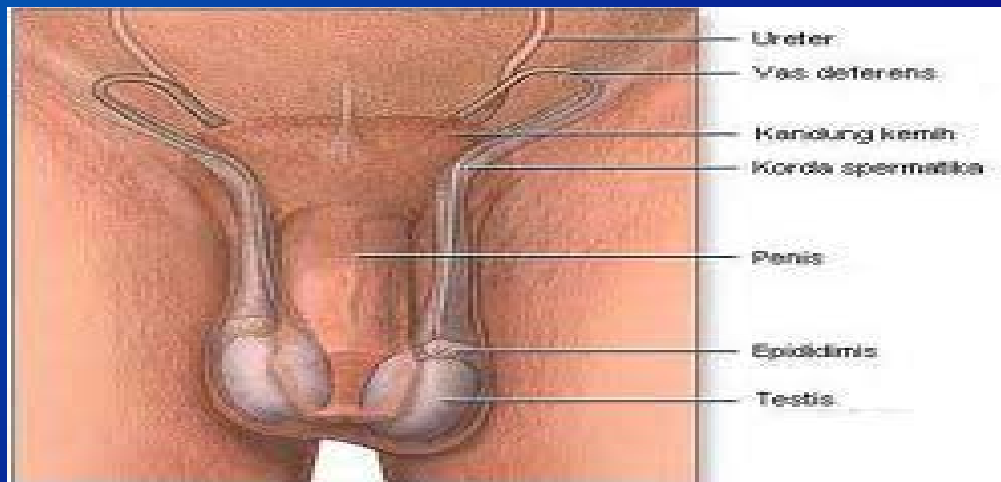
- Progesterone works with Estrogen to prepare the Uterine Endometrium for Implantation of the fertilized egg.
- It helps to maintain pregnancy. Hence called Pregnancy Hormone.
- It also helps in the development of mammary glands for the secretion of milk.
- Inhibin inhibits the secretion of FSH and LH.



- Relaxin is produced during pregnancy. It gets into action toward the end of pregnancy when it relaxes the pelvic girdle and helps dilate the uterine cervix to facilitate child birth.



TESTES



T.S OF TESTIS

Part of the male reproductive system.

Located inside the scrotum, the loose sac of skin that hangs behind the penis.

The Interstitial cells of Leydig present in the testes are endocrine cells.



- Functions : The Leydig cells secrete Male sex hormones called Testosterones.
- They are responsible for the development of Male secondary sexual characters.
- Essential for the production of sperms.
- It induces differentiation of the male accessory reproductive organs and maintains their functions.
- The hormone Inhibin secreted by the Sertoli cells of the testes exerts a negative feed back on the anterior pituitary.