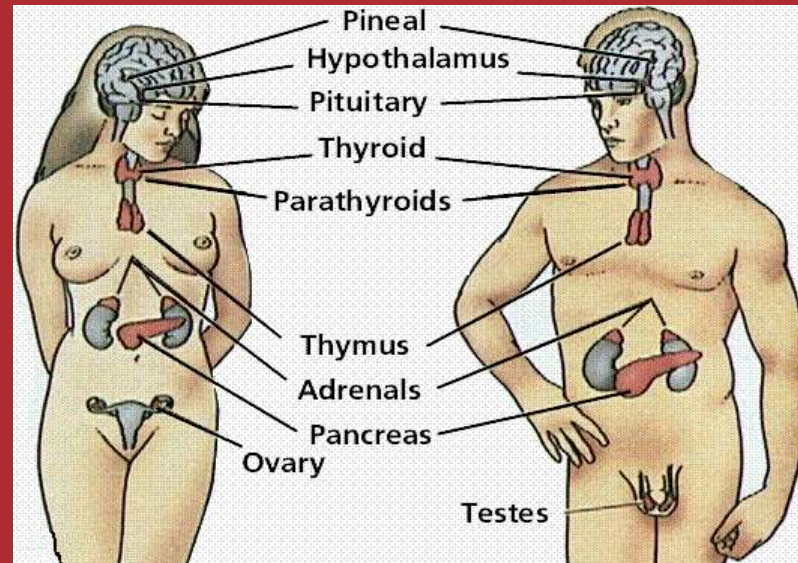


# Endocrine system



*Roger Watson*

*Twitter: @rwatson1955*

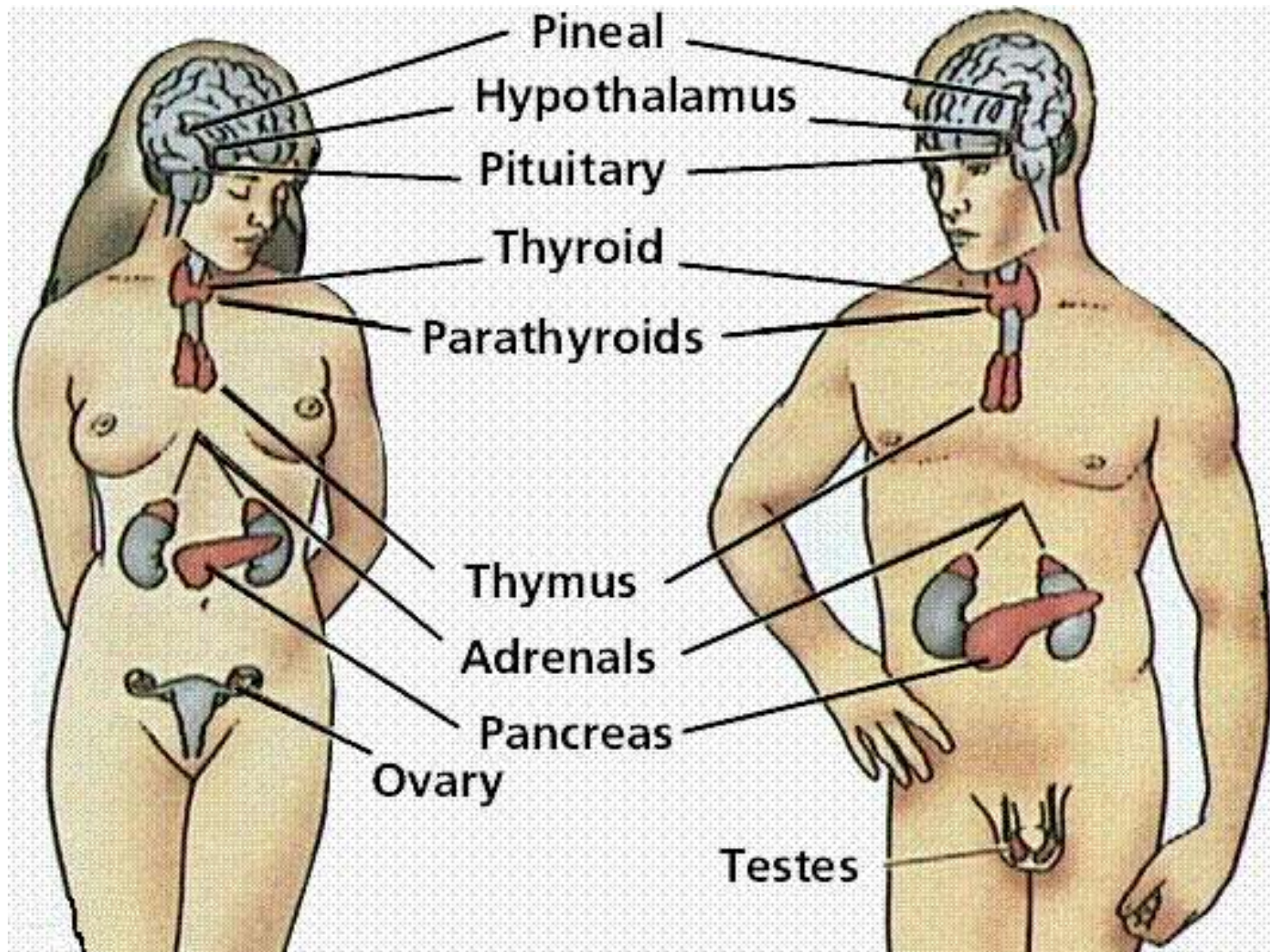
## Endocrine system

The glands of the endocrine system and the hormones they release influence almost every cell, organ, and function of our bodies. The endocrine system is instrumental in regulating mood, growth and development, tissue function, and metabolism, as well as sexual function and reproductive processes.

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**Bozeman biology You Tube link**

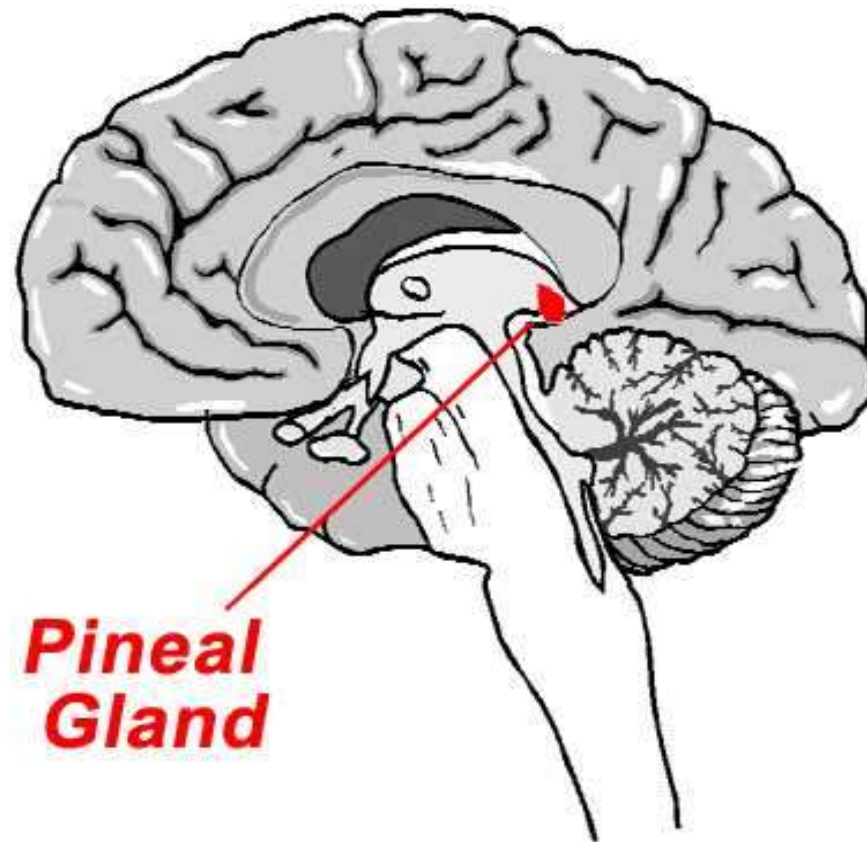
[The endocrine system](#)



## **Pineal glands**

Located deep in the brain between the cerebral hemispheres

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## Pineal gland secretions

Melatonin:

- Sexual development
- Metabolism
- Sleep

Secreted in synchronisation with circadian rhythms

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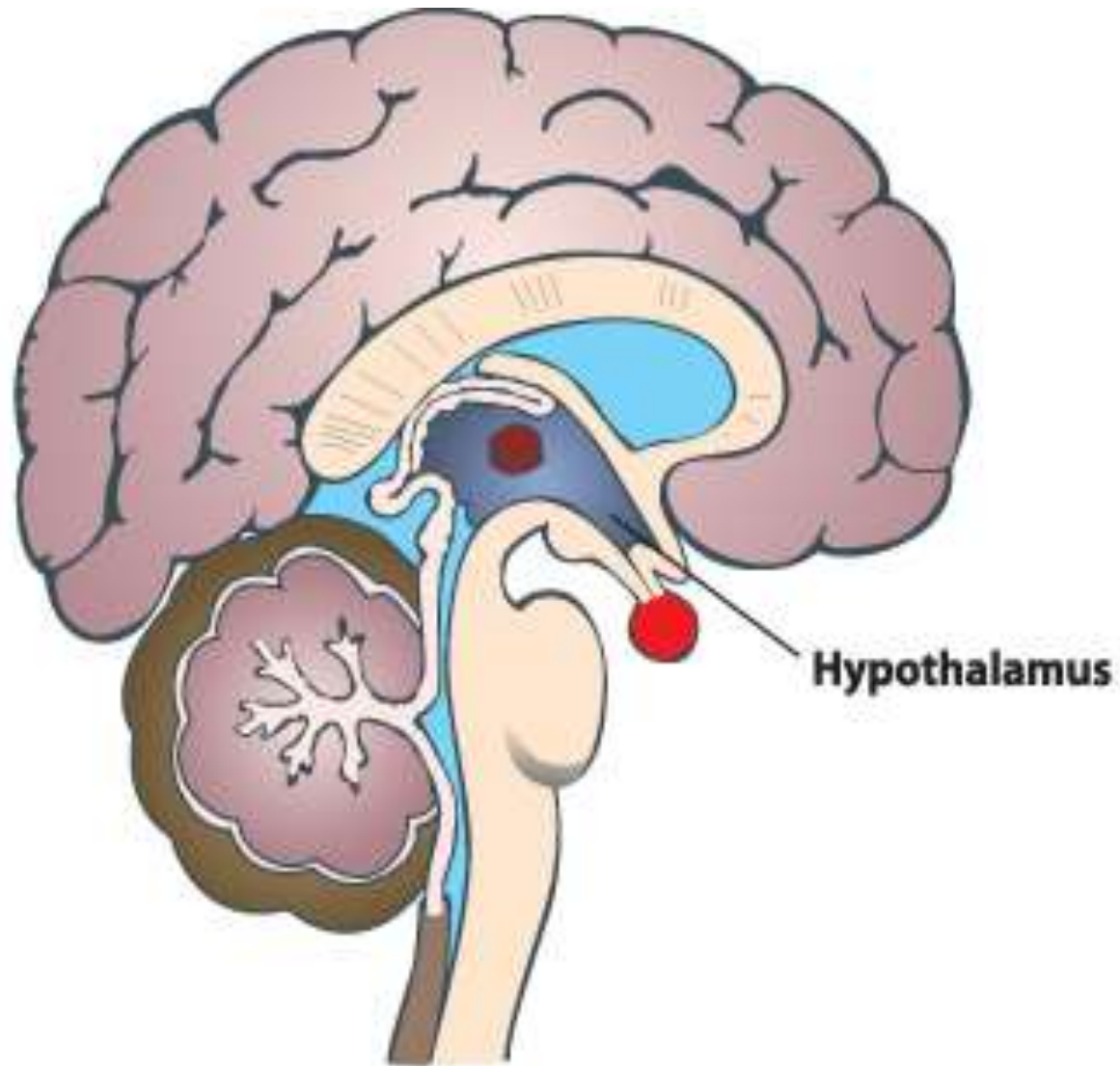
## Hypothalamus

Located below the thalamus of the brain at the base of the brain:

The hypothalamus plays a major role in the maintenance of the internal environment in two main ways – by nervous system reflexes and through the endocrine system.

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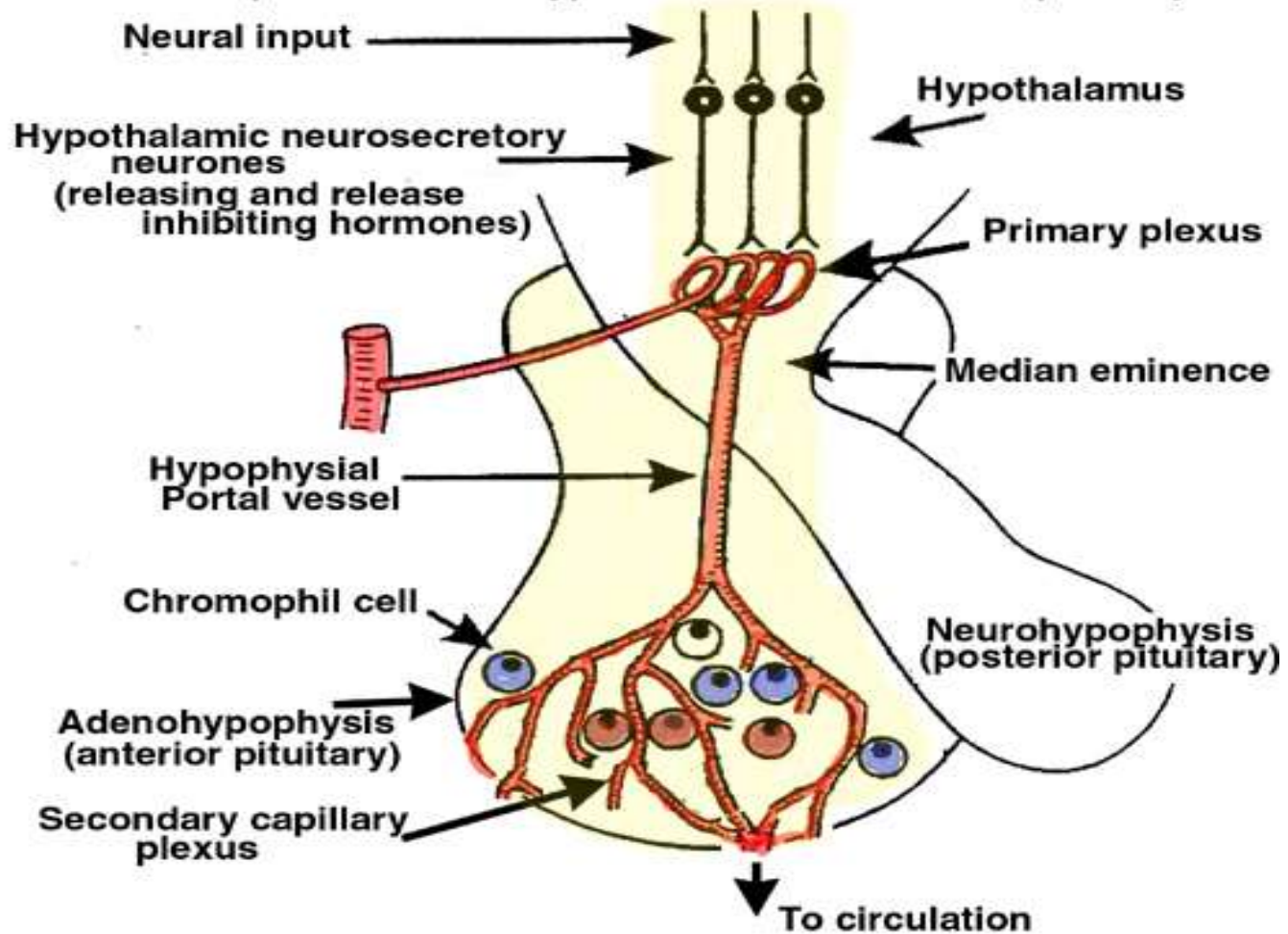


## **Hypothalamus secretions**

Hypothalamic hormones carried in the hypothalamohypophyseal portal system to the anterior pituitary.

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*Relationship between the hypothalamus and anterior pituitary*



## Hypothalamus secretions

Hypothalamic hormones:

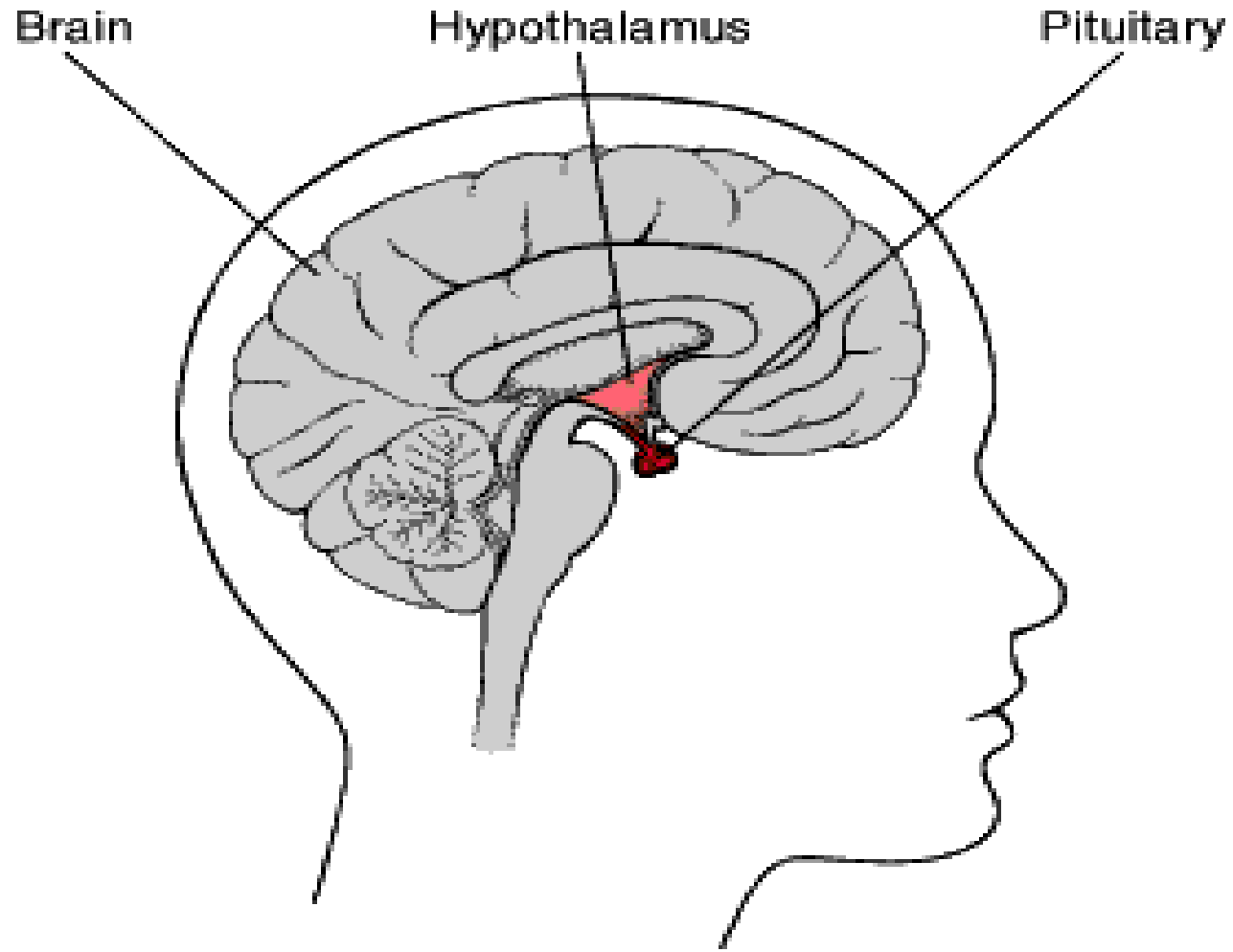
- Corticotrophin releasing hormone
  - Thyrotrophin releasing hormone
  - Growth hormone releasing hormone
  - Growth hormone release-inhibiting hormone
  - Prolactin releasing hormone
  - Prolactin release-inhibiting hormone
  - Gonadotrophin releasing hormone
  - Melanocyte stimulating releasing hormone
  - Melanocyte stimulating release-inhibiting hormone
-

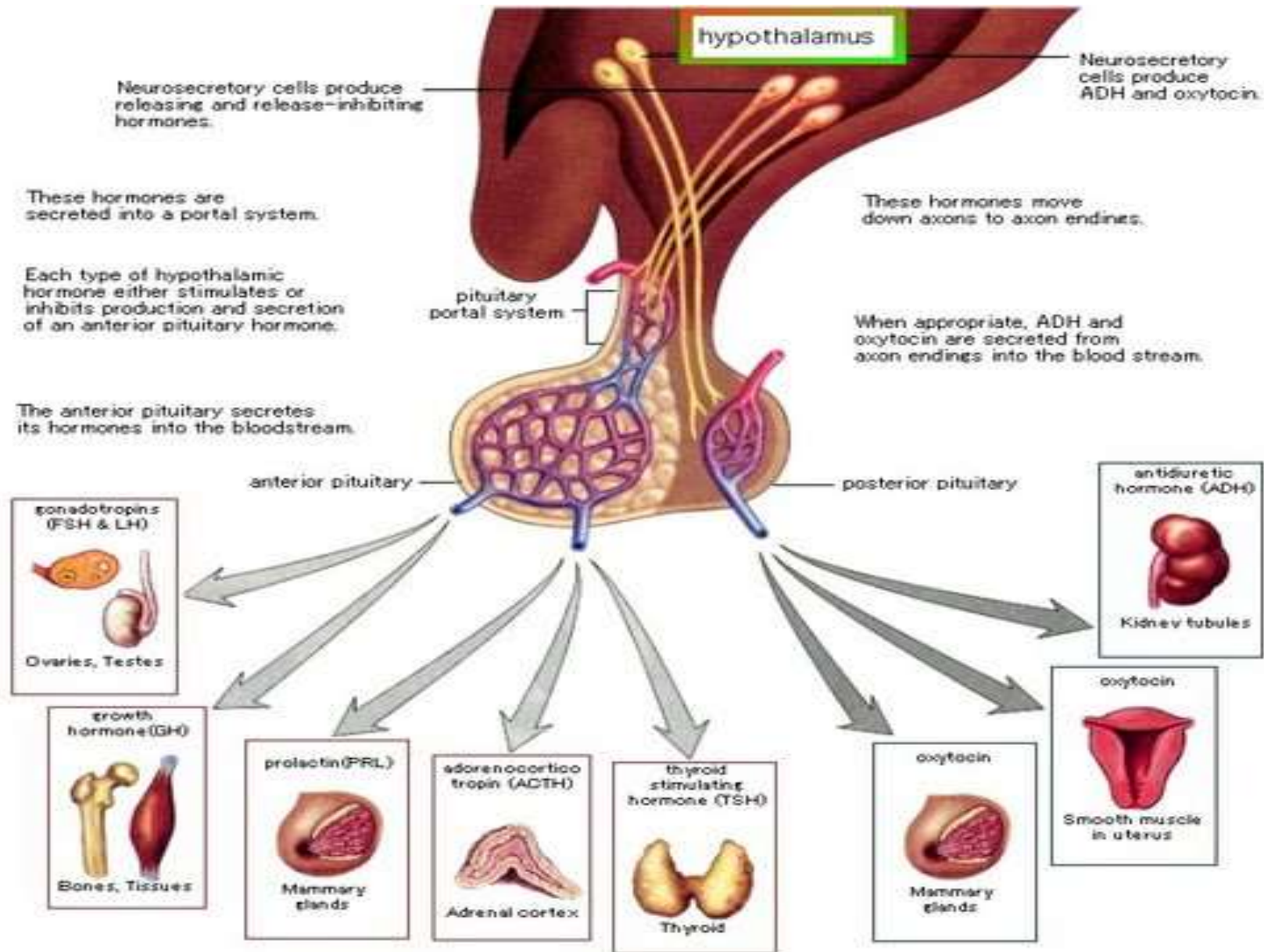
## Pituitary gland

Controls a wide range of homeostatic, metabolic and developmental functions.

Divided into three lobes:

- Anterior
  - Middle
  - Posterior
-





## Pituitary gland secretions

Anterior lobe:

- Adrenocorticotrophic hormone
  - Thyroid stimulating hormone
  - Growth hormone
  - Prolactin
  - Gonadotrophins
    - Luteinising hormone
    - Follicle stimulating hormone
-



## What anterior pituitary gland secretions do?

Adrenocorticotrophic hormone

- ↑ glucocorticoid hormone & aldosterone secretion

Thyroid stimulating hormone

- ↑ thyroid hormone secretion

Growth hormone

- ↑ growth factor secretion

Prolactin

- ↑ development of breasts

Luteinising hormone

- ↑ development of ovaries and testes
-

## Adrenal cortical hormones

### Glucocorticoids

- Control glucose metabolism
- Suppress inflammation
- Released in stress

### Aldosterone

- Controls sodium and water uptake
-

## **Adrenal cortical hormone disorders**

Cushing's disease

- Overproduction of and long exposure to cortisol

Cushing's syndrome

- Arises in long term corticosteroid therapy
-



11

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## Adrenal cortical hormone disorders

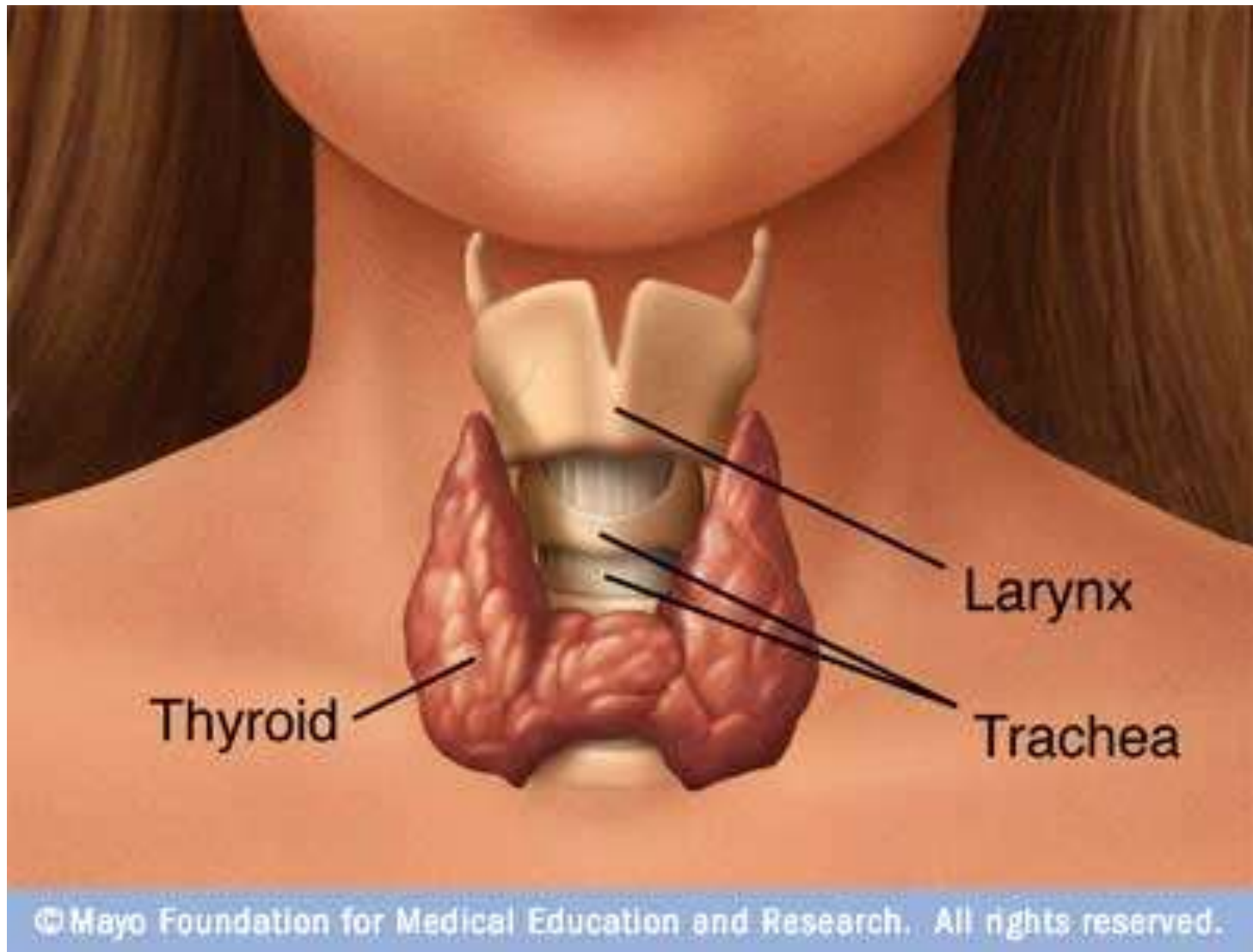
Cushing's disease

- Overproduction and long exposure to cortisol

Hyperaldosteronism

- High BP
  - Low sodium
  - Weakness, muscle spasms & paralysis
-

# Thyroid glands



## Thyroid gland secretions

Thyroid hormones:

Thyroxine

- Controls metabolic rate
-



## Thyroid gland disorders

Overproduction:  
Hyperthyroidism  
•Graves disease



## Thyroid gland disorders

Overproduction:

Hyperthyroidism

- Graves disease

Underproduction:

Hypothyroidism

- Myxoedema
-



## Pituitary gland secretions

Anterior lobe:

- Adrenocorticotrophic hormone
- Thyroid stimulating hormone
- Growth hormone
- Prolactin
- Luteinising hormone

Middle lobe:

- Melanocyte stimulating hormone

Posterior lobe:

Oxytocin

Antidiuretic hormone

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## Pituitary gland secretions

Oxytocin

- ↑ contraction of smooth muscle

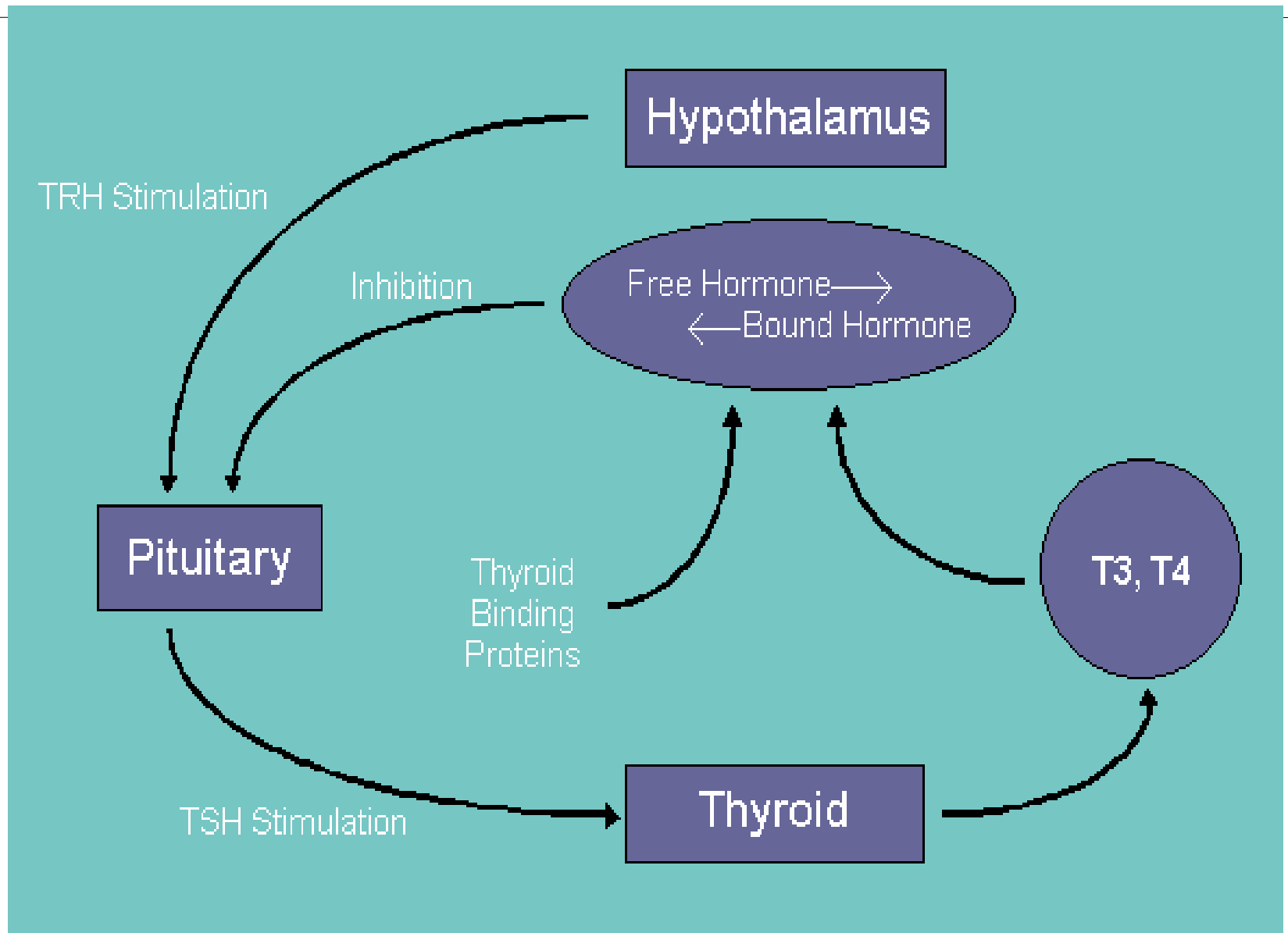
Antidiuretic hormone

- ↓ loss of water by kidneys (ie ↑ reabsorption)
-

# Control of pituitary gland secretions

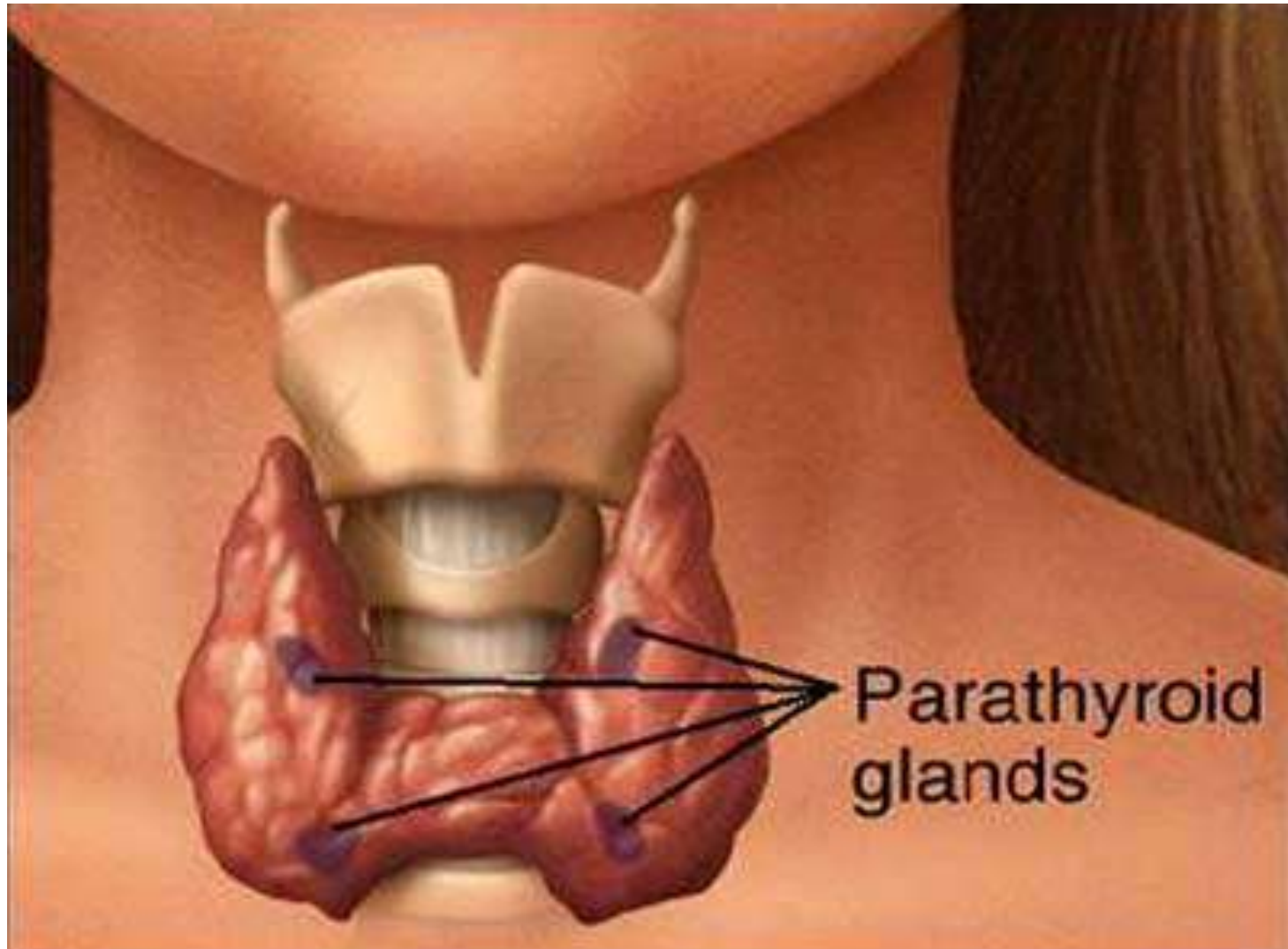
Negative feedback

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# Parathyroid glands



Parathyroid glands

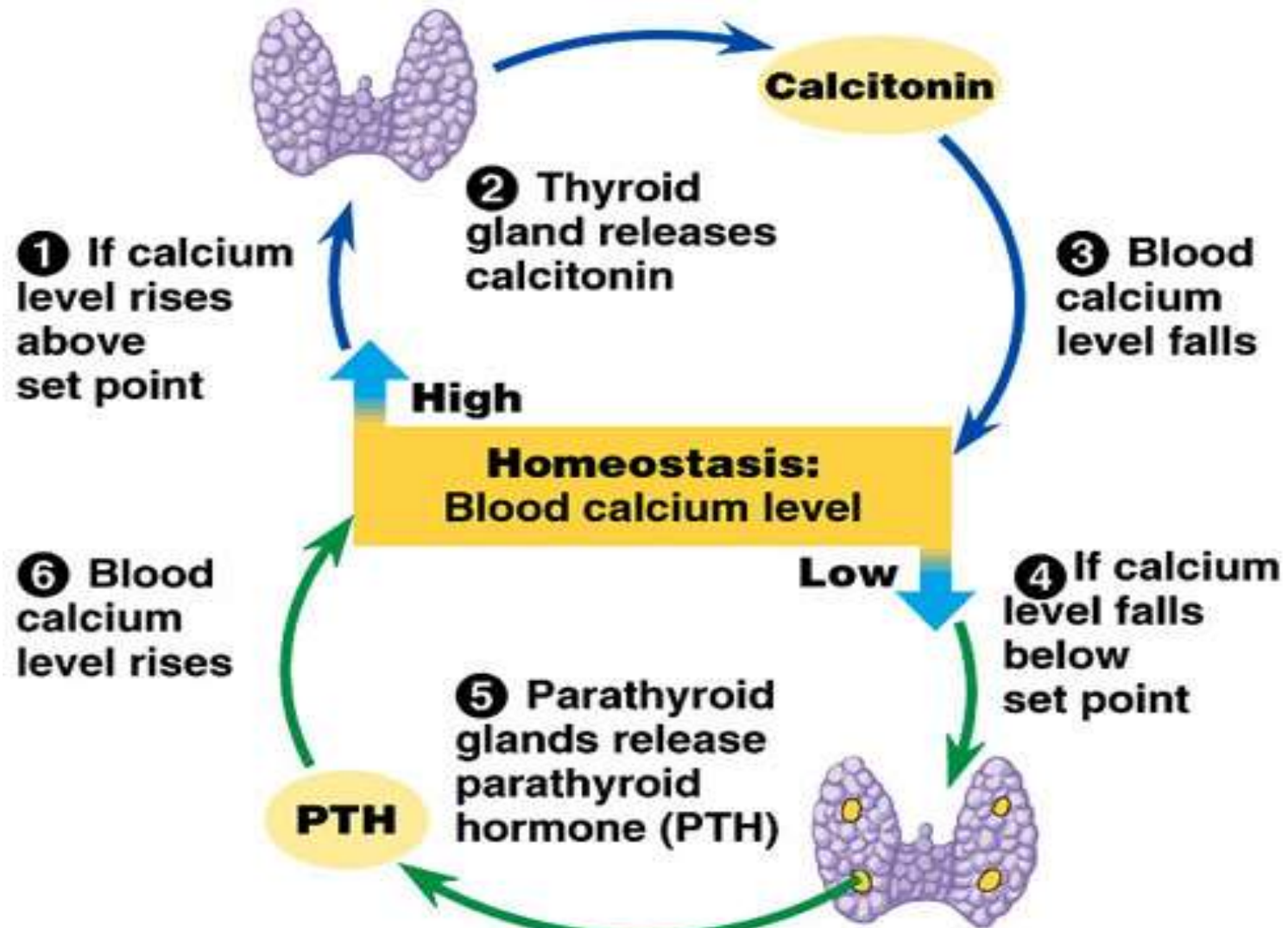
## Parathyroid gland secretions

Calcitonin (released by thyroid gland)

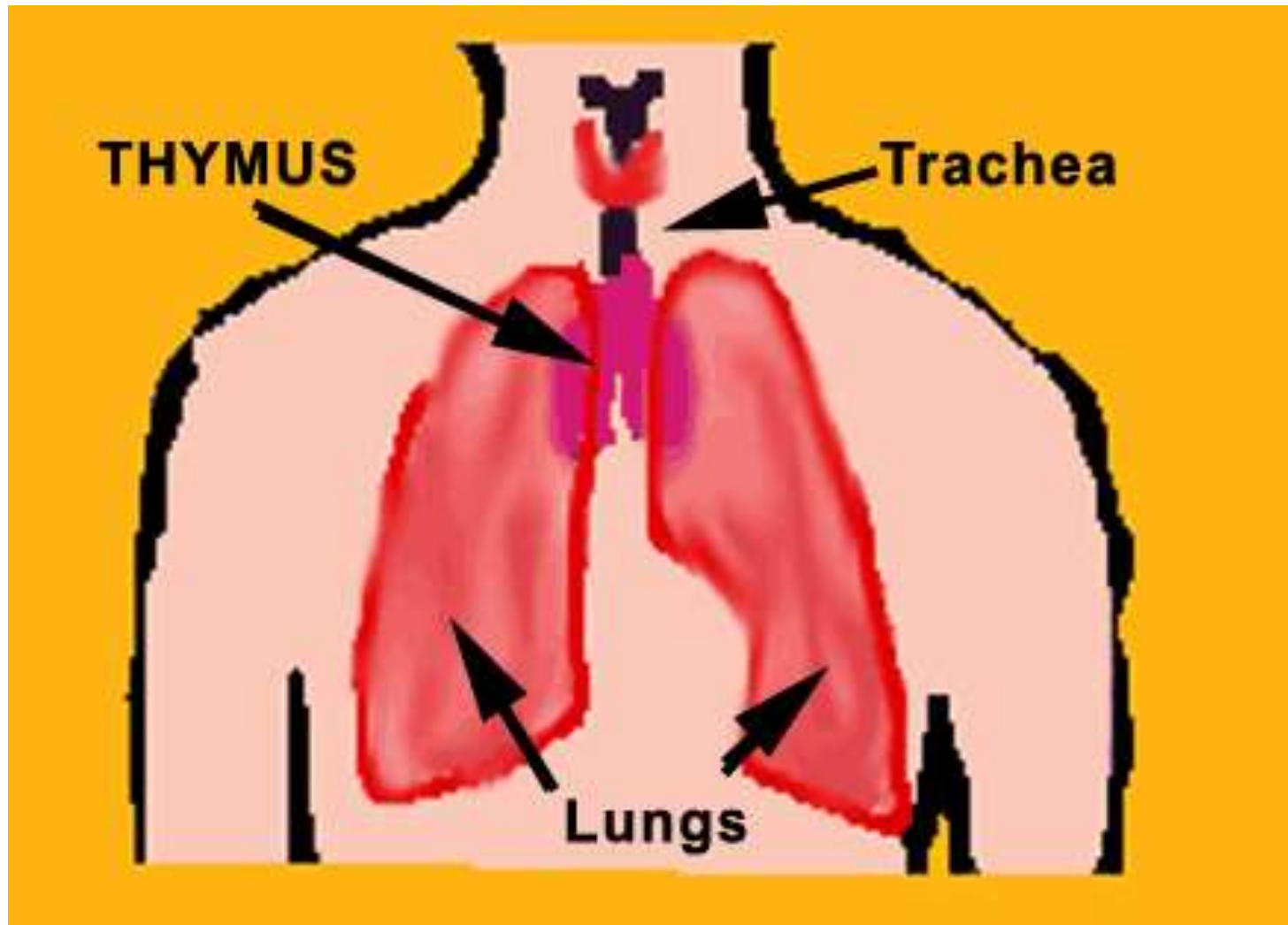
- ↑ calcium reabsorption from the blood (ie ↓ blood calcium levels)

Parathyroid hormone (released by parathyroid glands)

- ↓ calcium reabsorption from the blood (ie ↑ blood calcium levels)
-



# Thymus



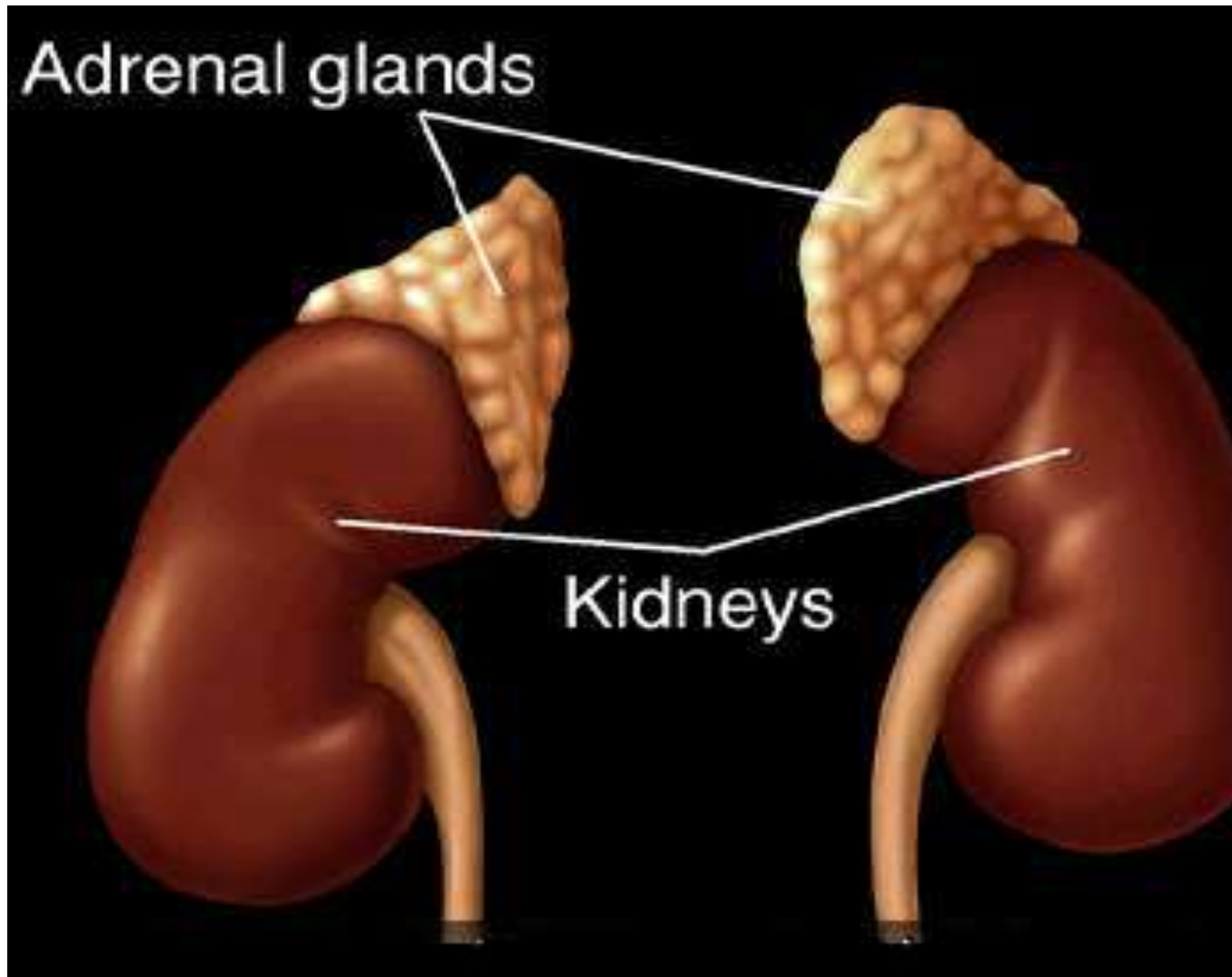
## What do the thymus do?

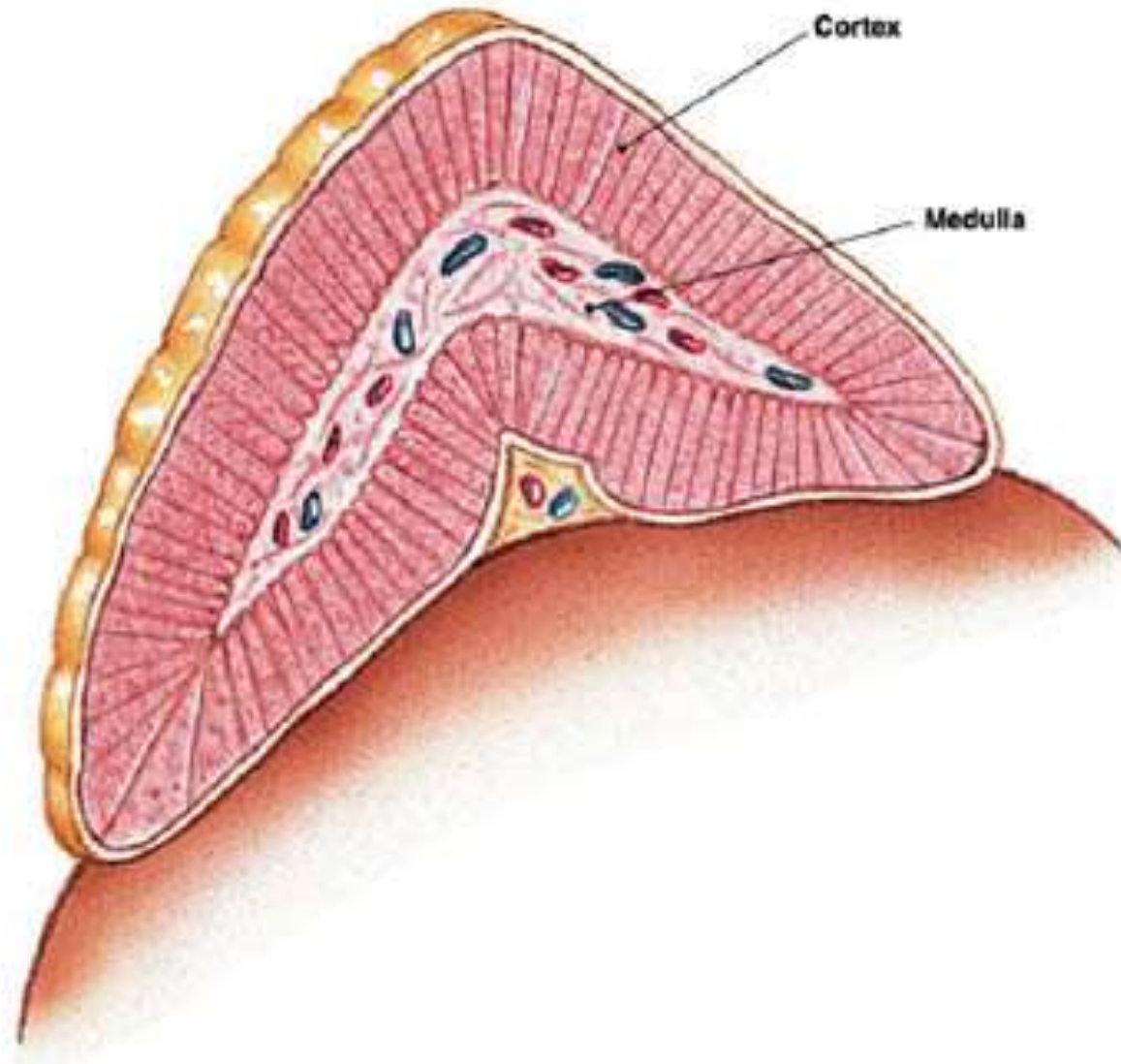
Nobody really knows:

- Shrinks as we develop to maturity
  - May have something to do with the immune system
-

# Adrenal glands







## Adrenal gland secretions

Adrenal cortex:

- Mineralocorticoids
- Glucocorticoids
- Sex hormones
  - Androgens (♂)
  - Oestrogens (♀)

Adrenal medulla:

- Adrenaline (epinephrine)
  - Noradrenaline (norepinephrine)
-

## Adrenaline and noradrenaline

- ↑ heart rate
- ↑ blood pressure

Released in the 'fight or flight reaction'

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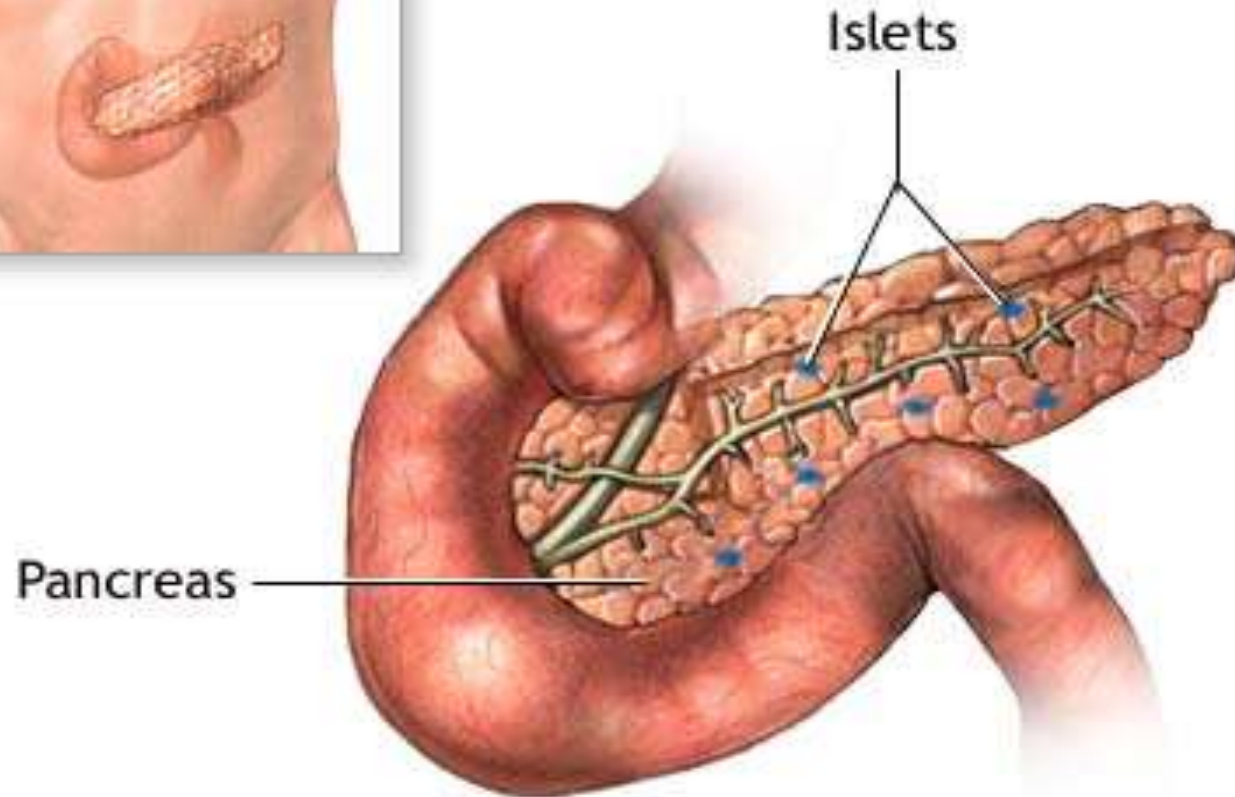






# Pancreas





## **Pancreas**

Exocrine functions:

- Digestive enzymes

Endocrine function:

- Regulates blood sugar levels
-

## Pancreatic secretions

Regulation of blood sugar levels

Islets of Langerhans:

- $\alpha$ -cells

  - Glucagon ( $\uparrow$  blood sugar)

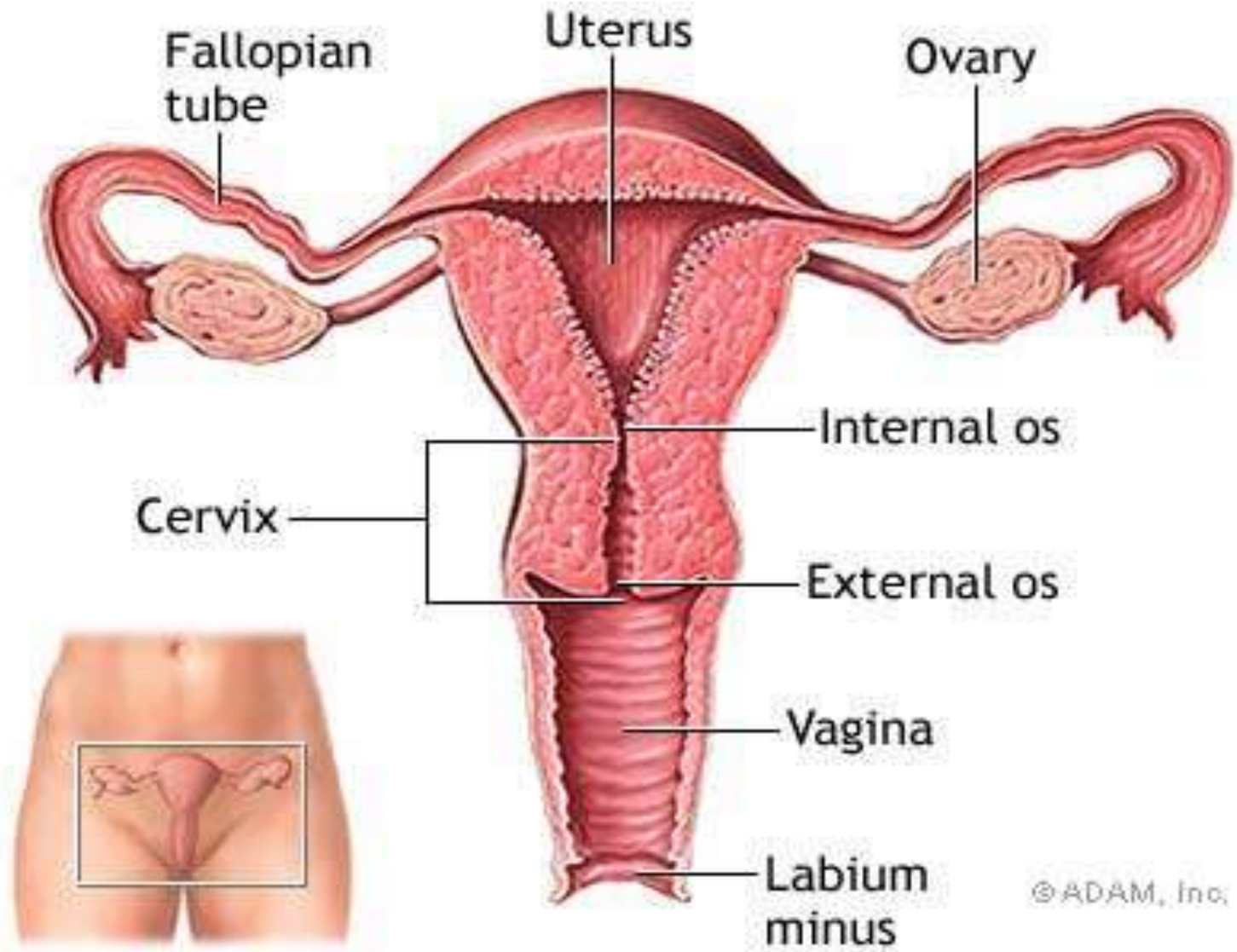
- $\beta$ -cells

  - Insulin ( $\downarrow$  blood sugar)

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# Ovaries and testes

# Ovaries



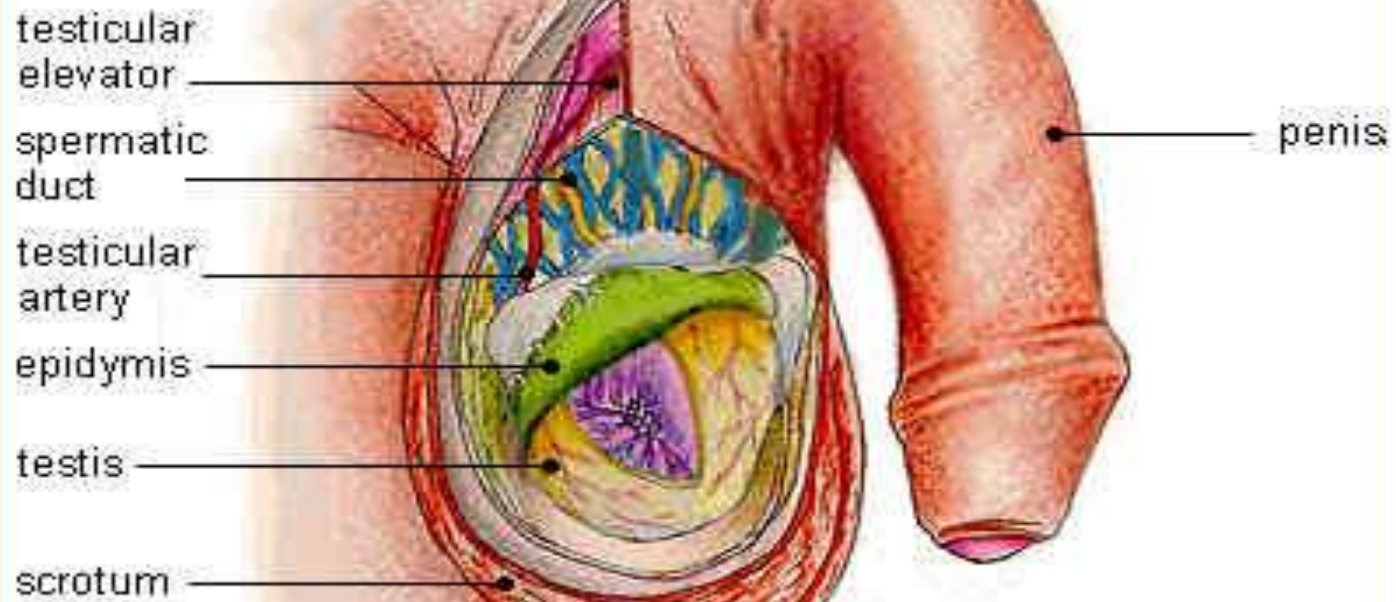
## Ovary secretions

- Oestrogen
- Progesterone
  - Control ovulation and fertility and secondary female sex characteristic development

# Testes



# Testes Structure



## Testes secretions

- Testosterone
  - Muscle, bone and secondary male sex characteristic development

## Endocrine system

The glands of the endocrine system and the hormones they release influence almost every cell, organ, and function of our bodies. The endocrine system is instrumental in regulating mood, growth and development, tissue function, and metabolism, as well as sexual function and reproductive processes.

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## Questions

1. In addition to mood and reproduction name four things that the endocrine system controls.
  2. What do the pineal glands secrete and what three aspects of the body is this secretion related to?
  3. Where is the hypothalamus located; which endocrine gland does it control and in what two ways does the hypothalamus control this gland?
  4. What is the collective name for the two systems that take chemical and nervous signals to the pituitary and what are the three lobes of the pituitary?
-

## Questions

5. In addition to the gonadotrophins name four other anterior pituitary secretions.
  6. What are the two secretions of the posterior pituitary gland and give one function of each.
  7. Give three functions of glucocorticoids and one function of aldosterone.
  8. What is secreted by the thyroid gland, what does it do and what is overproduction and underproduction of this hormone called, respectively?
-

## Questions

9. What hormone is released by the parathyroid glands and what does it do? Which hormone released by the thyroid gland has the opposite effect?
  10. What are the two secretions of the adrenal medulla and name two of their actions.
  11. Name the two secretions of the Islets of Langerhans and what their respective actions are.
  12. Name the female and male gonads and name the secretions of the female gonads.
-

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Four things about...(a simple approach to  
anatomy and physiology)

The endocrine system