

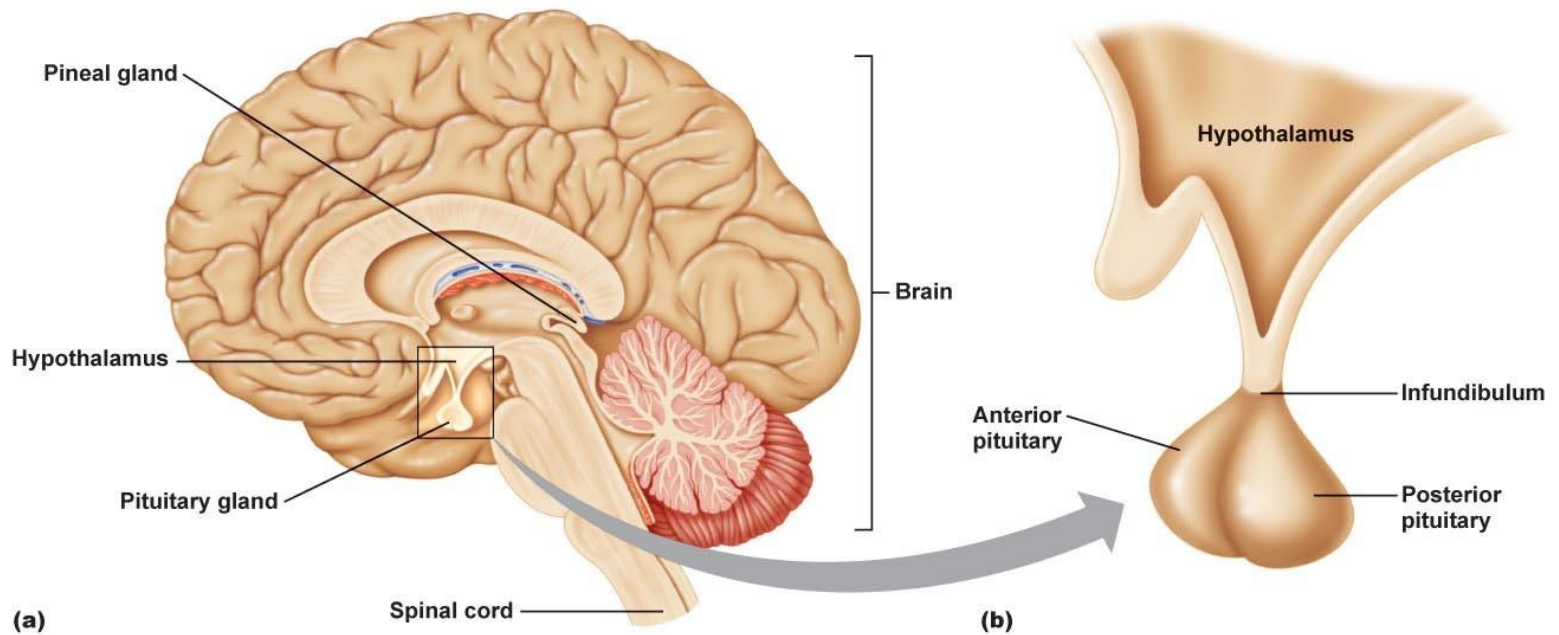
## 9.2 Hormonal Regulation

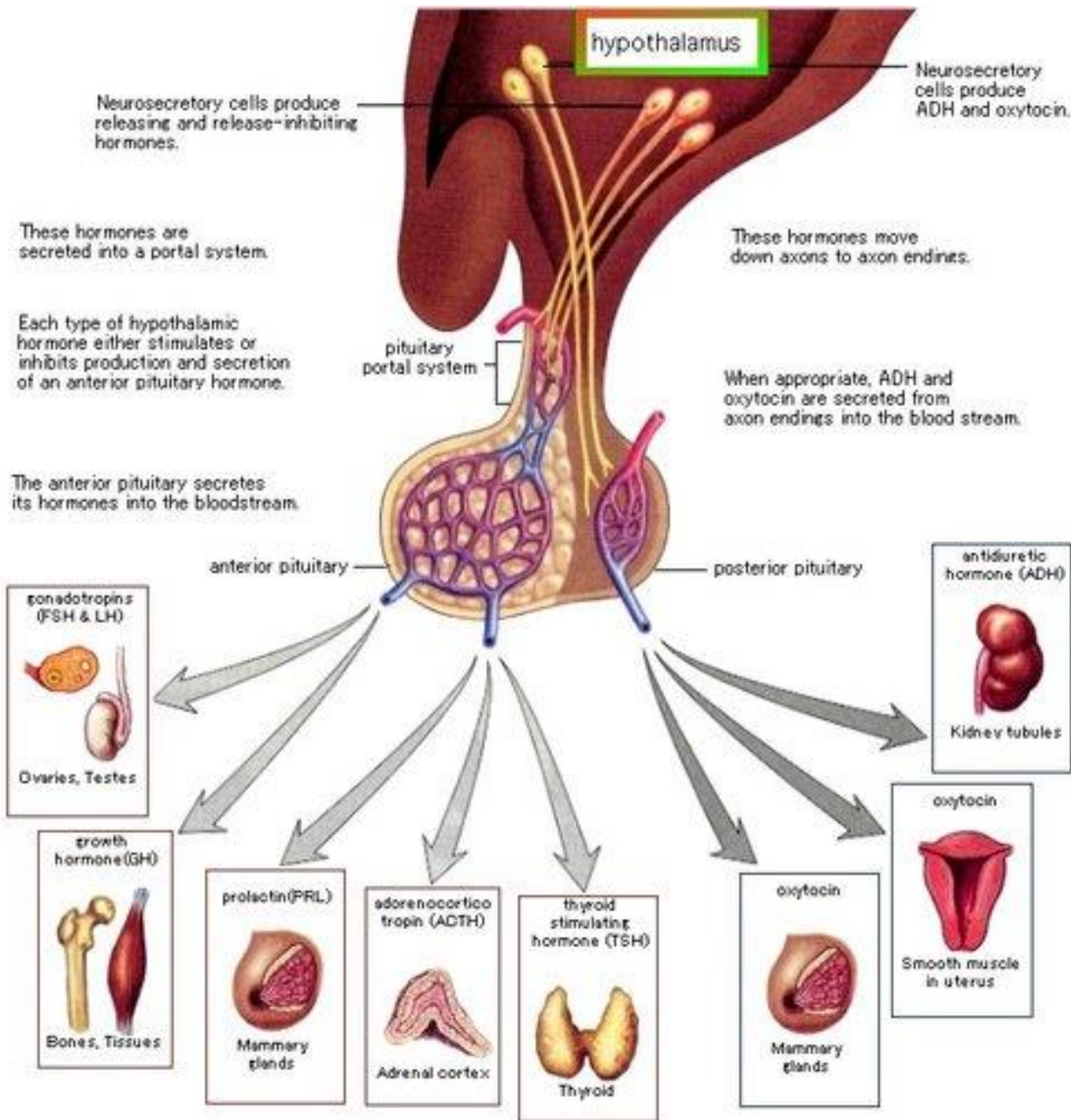
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SBI4U

# The Pituitary Gland

Contains two lobes, the anterior and posterior lobe. Each lobe contains its own hormones resulting in different functions.



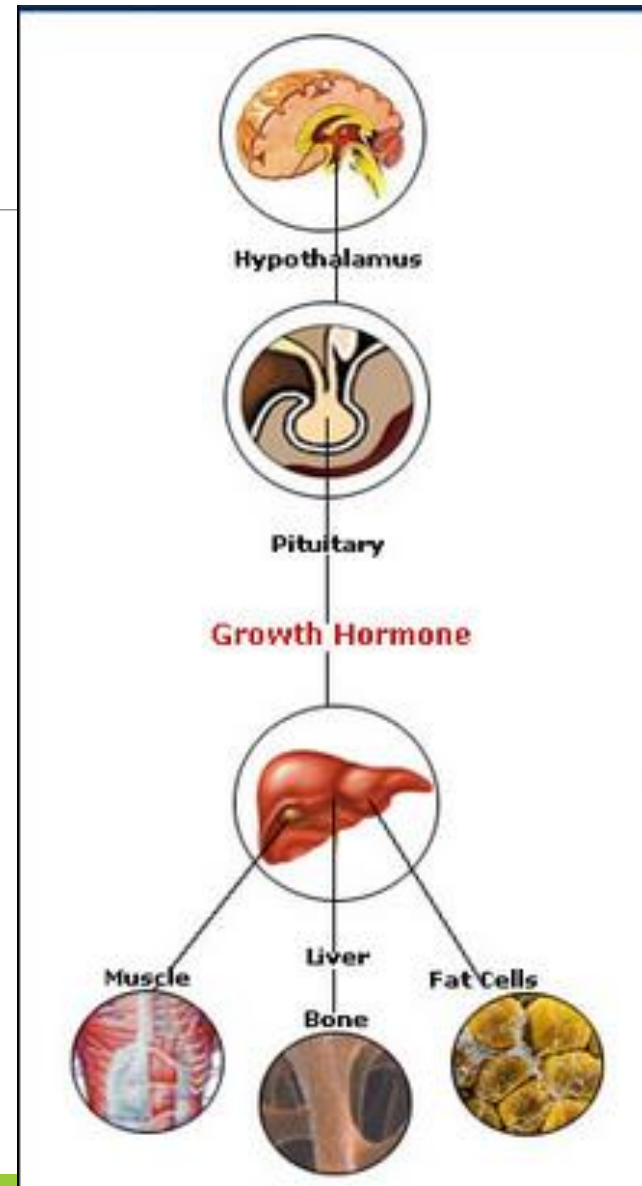


**Posterior pituitary** stores/releases ADH and oxytocin. This is made in the hypothalamus.

**Anterior pituitary** produces and releases 6 hormones (ACTH, PRL, hGH, FSH, LH). The hypothalamus stimulates the release of these hormones.

# Human Growth Hormone

- The anterior pituitary gland produces **human growth hormone (hGH)** which can target tissues directly or indirectly (tropic effect).
- hGH is sent to the liver where more it releases more growth factors.



# Human Growth Hormone

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If there is an excess of hGH released during childhood, it could lead to gigantism.

If there is insufficient hGH released during childhood, it may lead to dwarfism.



# Human Growth Hormone

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If the bones have grown to their full capacity and hGH is still overproduced it may lead to **'Acromegaly'**.

## Typical features:

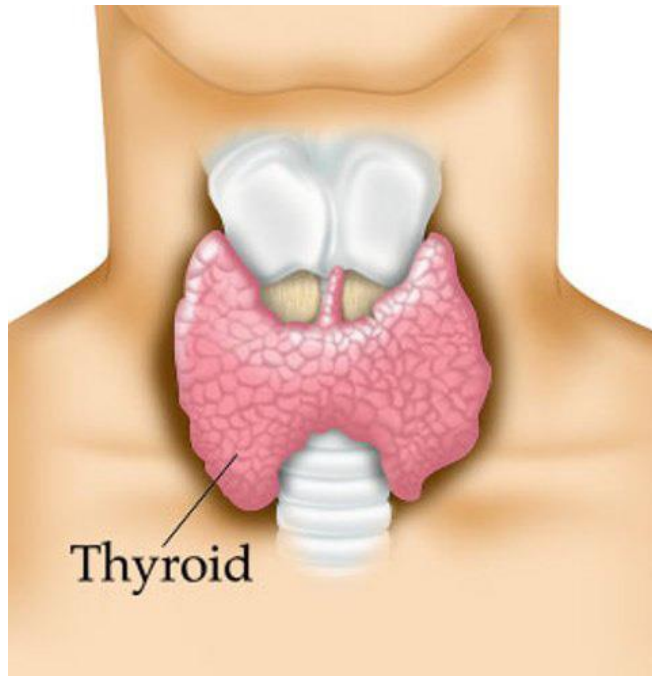
- *Coarse facial features*
- *Enlarged heart, liver, kidneys*
- *Enlarged hands and feet.*



# The Thyroid Gland

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The thyroid gland produces the hormone thyroxine which helps to regulate metabolism.



***Thyroxine ( $T_4$ )** is released from the thyroid gland into the bloodstream. It stimulates the rate of cellular respiration to increase which in turn causes fats, proteins and carbohydrates to be metabolized quicker.*

# Problems with the Thyroid

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- If the thyroid does not develop properly a disorder known as cretinism may develop.
- Not enough  $T_4$  is released which causes hypothyroidism.
- If children are not treated, they may experience some developmental delays.



# Problems with the Thyroid

In adults, **hyperthyroidism** occurs when there is an overproduction of  $T_4$ . This may lead to anxiety, insomnia and weight loss. This may be caused by **Grave's disease**, an autoimmune disease.

*The immune system attacks the thyroid which causes it to enlarge and become overactive.*



Exophthalmos (bulging eyes)



Diffuse goiter

Graves' disease is a common cause of hyperthyroidism, an over-production of thyroid hormone, which causes enlargement of the thyroid and other symptoms such as exophthalmos, heat intolerance and anxiety

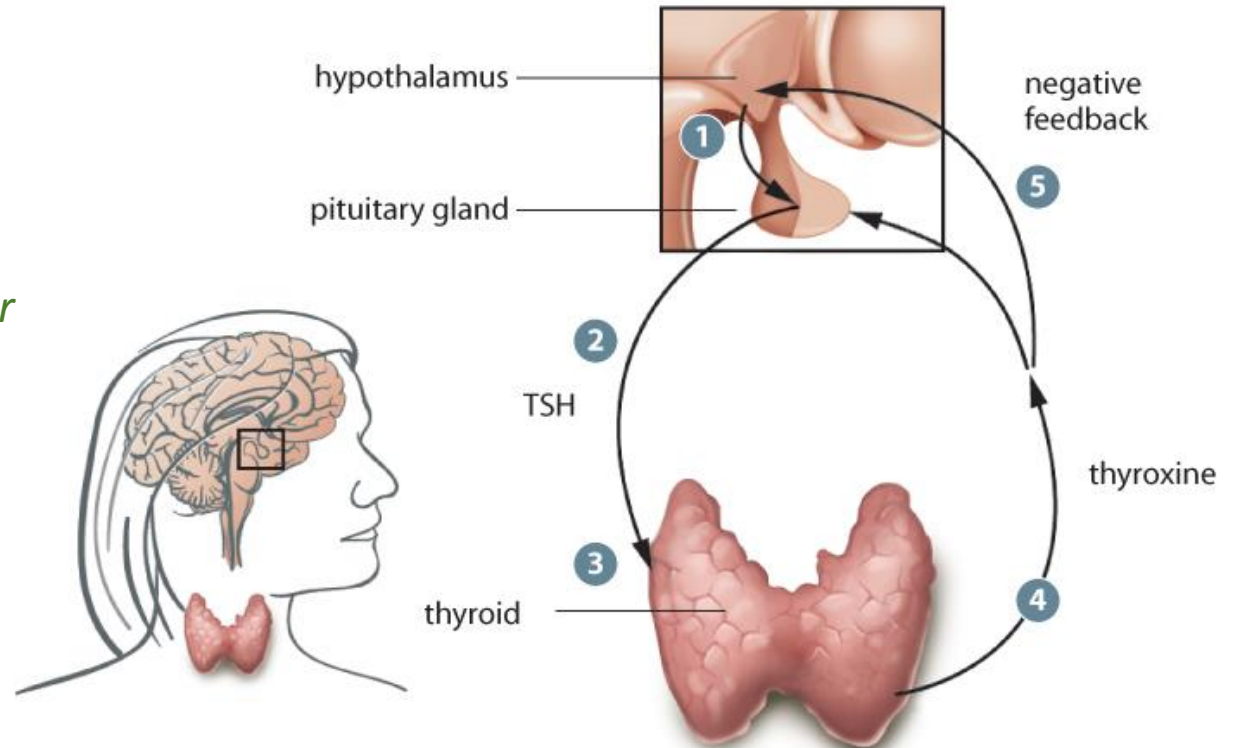
Normal thyroid

Enlarged thyroid

# T4 Regulation

The anterior pituitary gland releases thyroid-stimulating hormone (TSH) to the thyroid causing it release T4.

*If too much T4 is present in the blood, it will suppress the anterior pituitary and prevent it from releasing TSH.*



## T4 Regulation

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Iodine is an essential component and is required in order to produce T<sub>4</sub>. Without iodine, the hypothalamus continues to secrete TSH to the anterior pituitary which causes a **goitre**.

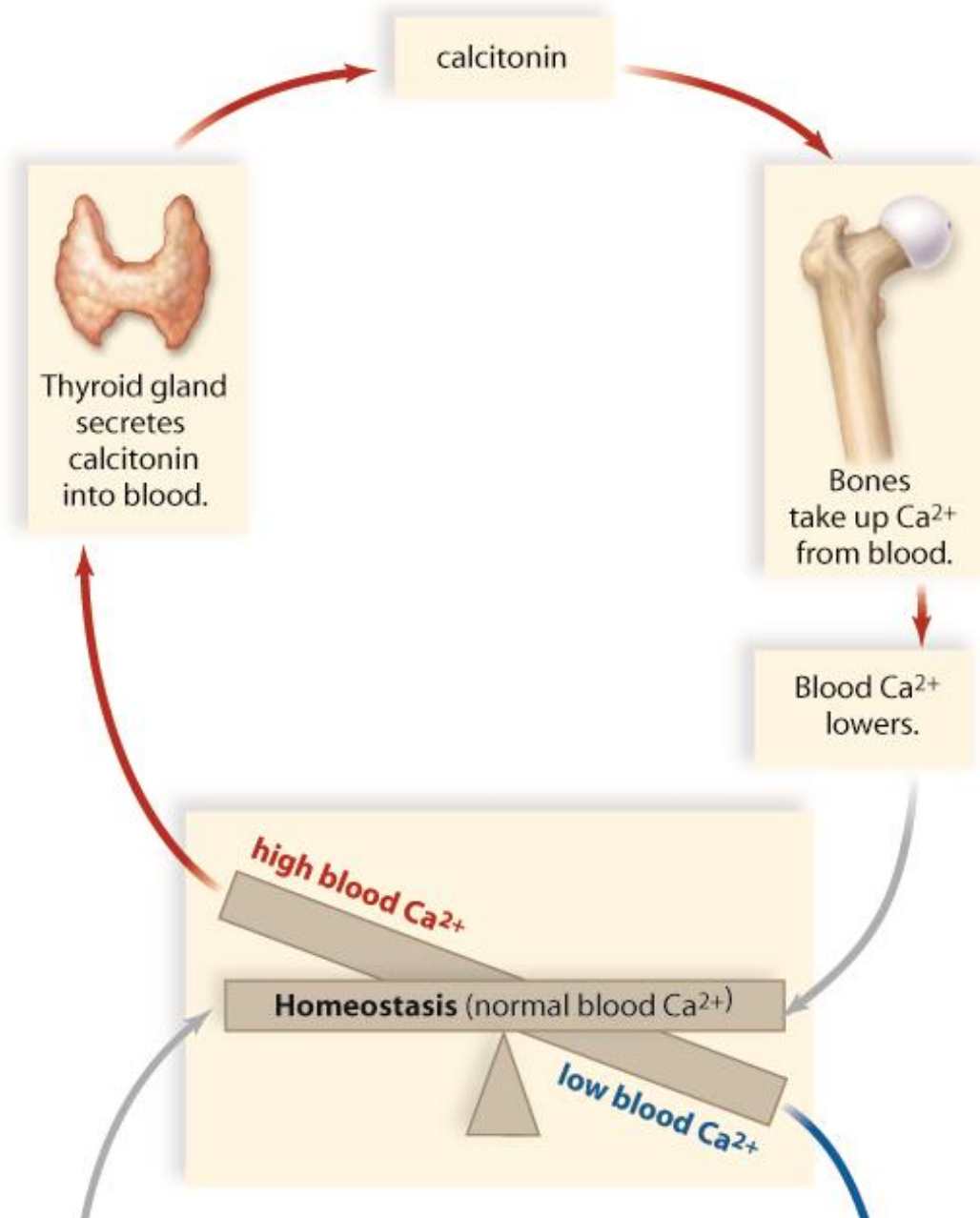
Goitre – enlargement of the thyroid gland which appears as large swelling in the throat.



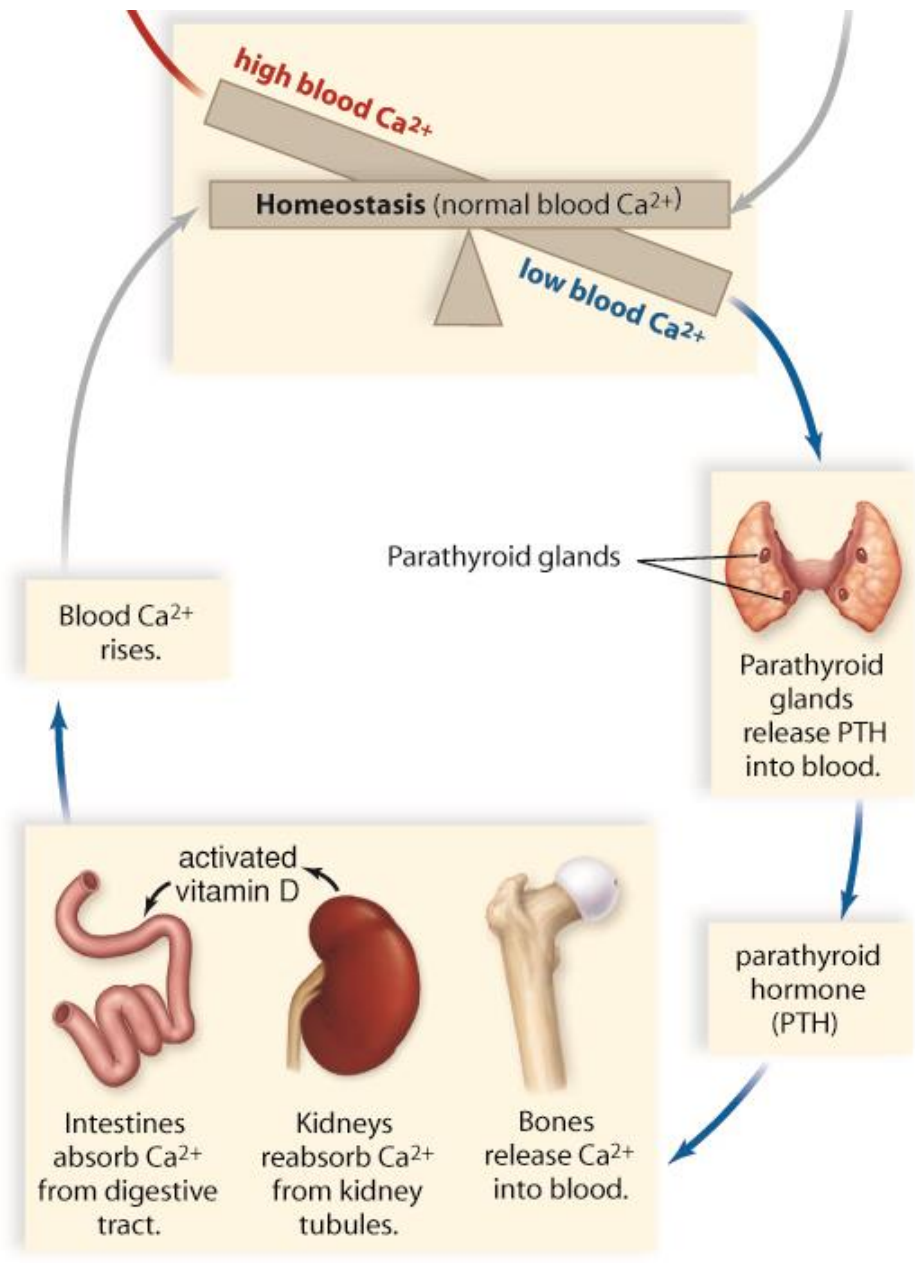
# Thyroid Gland and Calcium

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- The thyroid gland releases hormones (*i.e. parathyroid hormone & **Calcitonin***) that can help control the levels of calcium that circulate in the blood.
- If calcium levels are too high – calcitonin is released
- If calcium levels are too low – parathyroid hormone is released.



*When calcium levels are too high in the blood calcitonin is released from the thyroid gland and stimulates the bones to uptake the excess calcium.*



*PTH causes the bones to break down the calcium, the kidneys to reabsorb calcium from the urine and the intestines to absorb more calcium during the process of digestion.*

# Homework

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Textbook: p. 403 # 2, 3, 4 & 8