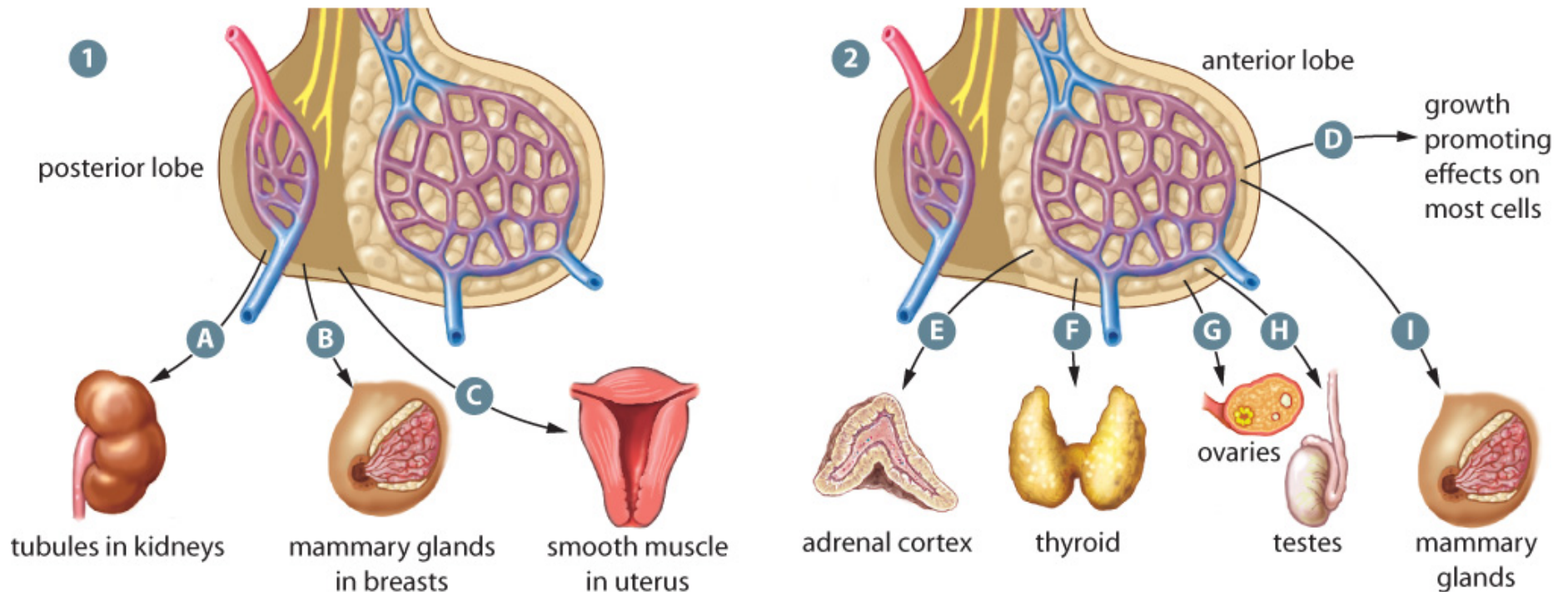


Pituitary Hormone Review



A: ADH

B: Oxytocin

C: Oxytocin

D: hGH

E: ACTH

F: TSH

G: FSH & LH

H: FSH & LH

I: PRL

How to Remember the Pituitary Hormones:

Posterior pituitary { GH
Oxytocin
ADH
TSH
FSH
LH
ACTH
PRL (prolactin)

Homework:

- Page 477
– #1 - 7

TARGET GLANDS

- 1) Thyroid gland
- 2) Parathyroid gland
- 3) Adrenal gland

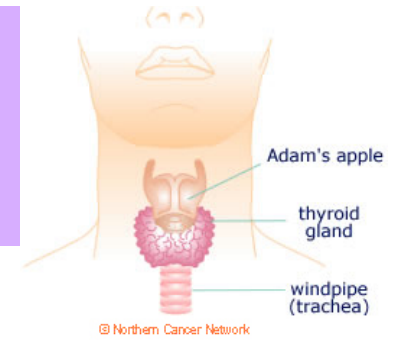
THYROID GLAND

- Located at the base of the **neck**, in front of the trachea
 - Stimulated by **TSH** from the **anterior pituitary**
 - Produces 2 important hormones:
 - **Thyroxine (T⁴)** and **calcitonin** (and Triiodothyronine (T³), but you do not have to know this one)
- 1) Thyroxin **increases metabolism** (how fast we **burn calories**)
 - 2) Calcitonin (rhymes with **calci-bone-in**) lowers blood calcium by putting **calcium into bones**



THYROID GLAND

Thyroxine (T₄)



Target: the **body cells**

Function: increases rate of **metabolism**, which is the rate at which the body converts glucose into energy
= **cellular respiration**

oxygen + glucose → carbon dioxide + water + ATP

****Would thyroxine increase or decrease blood glucose?**

It would **decrease** it because it is converting it into ATP!!!

THYROID GLAND- DISORDERS

Thyroxine (T₄)

Affects tissues
behind the eye

- **Hypersecretion:** **Hyperthyroidism** – high metabolic rate, can't sit still, always warm, and tend to be thin , **Grave's** disease



Grave's Disease: a severe state of **hyperthyroidism** that results when the body's immune system attacks the thyroid. Antibodies attach to TSH receptors on thyroid cells, causing the thyroid gland **to produce too much thyroxine.**

- **Some symptoms include:** anxiety, irritability, heat sensitivity, weight loss, goiter, bulging eyes

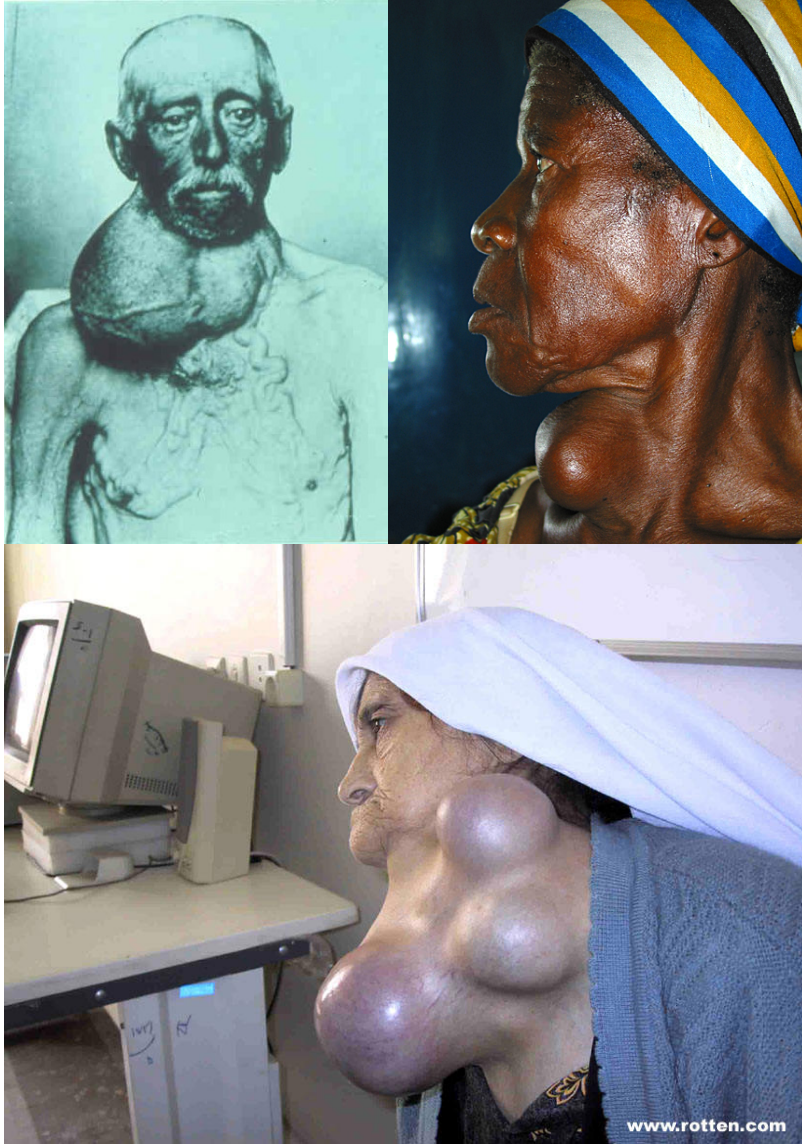
- **Hyposecretion:** **Hypothyroidism** – low metabolic rate, less energy, intolerant of cold, dry skin and gain weight, **goiter**

<http://www.mayoclinic.com/health/graves-disease/DS00181>



THYROID GLAND

Disorder: Goiter (insufficient dietary iodine)



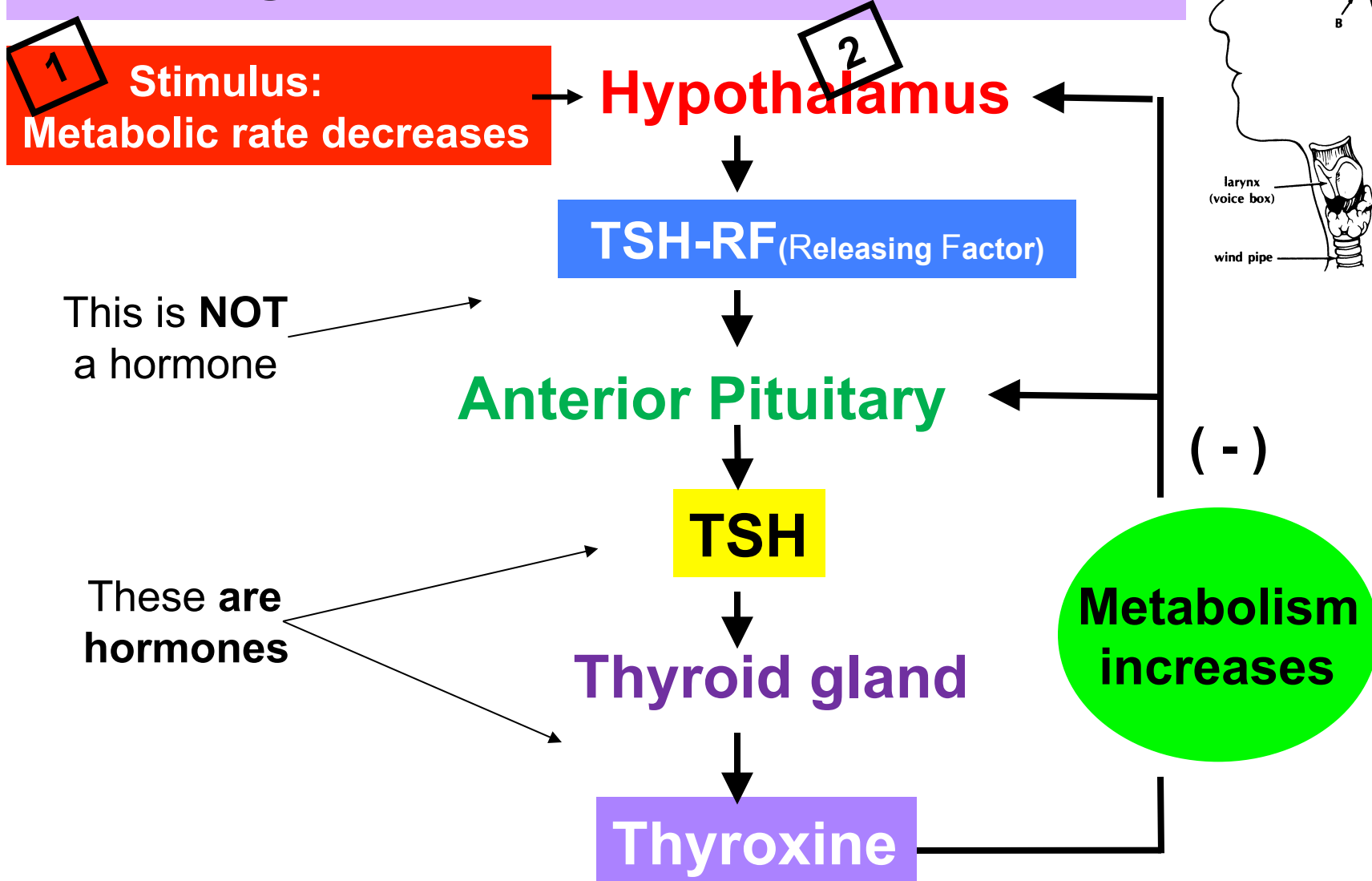
- The body uses iodine to make **thyroxine**
- Iodine is found in fish and salt
- **Goiter** = enlargement of the thyroid gland due to **no thyroxine** being produced
- The pituitary continues to make TSH so that thyroxine can be produced

TSH buildup is what causes the thyroid to enlarge

- In this case, the negative feedback system is not working properly

THYROID GLAND

Negative feedback for TSH





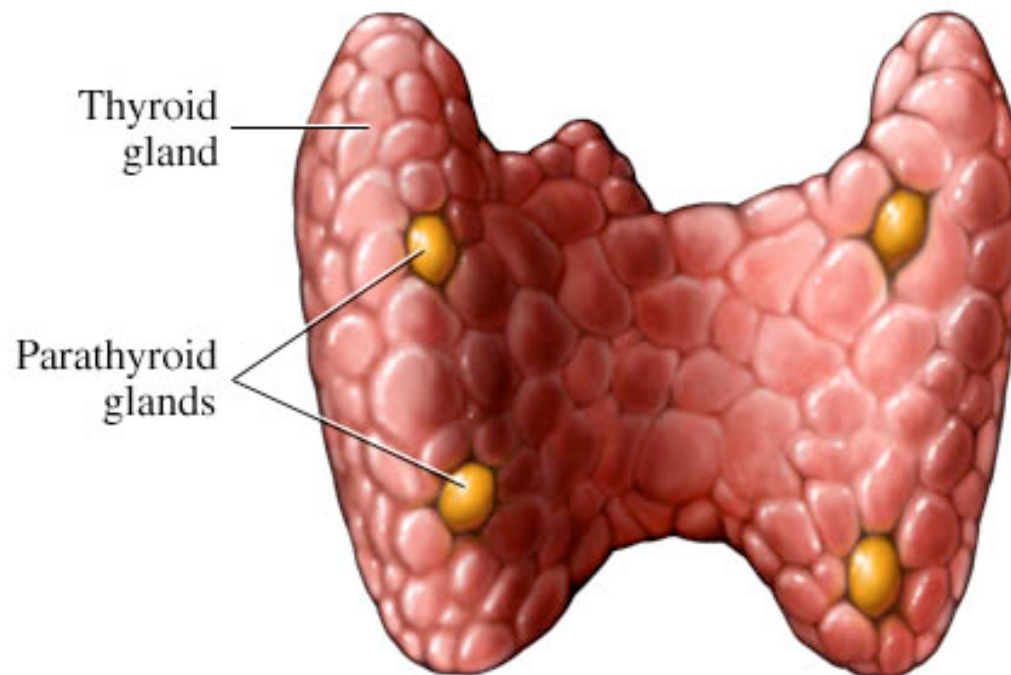
If Ava is missing half her thyroid gland, how would this affect her thyroxin levels?

What about her TSH levels?

- a. Thyroxin levels would be not as high
- b. TSH levels would go up because of not enough thyroxin being produced

THYROID and PARATHYROID GLAND

- The thyroid gland is also involved in regulating **calcium** levels in the blood
- The **thyroid** and **parathyroid** gland are separate structures that function closely together to control calcium



Control of Calcium

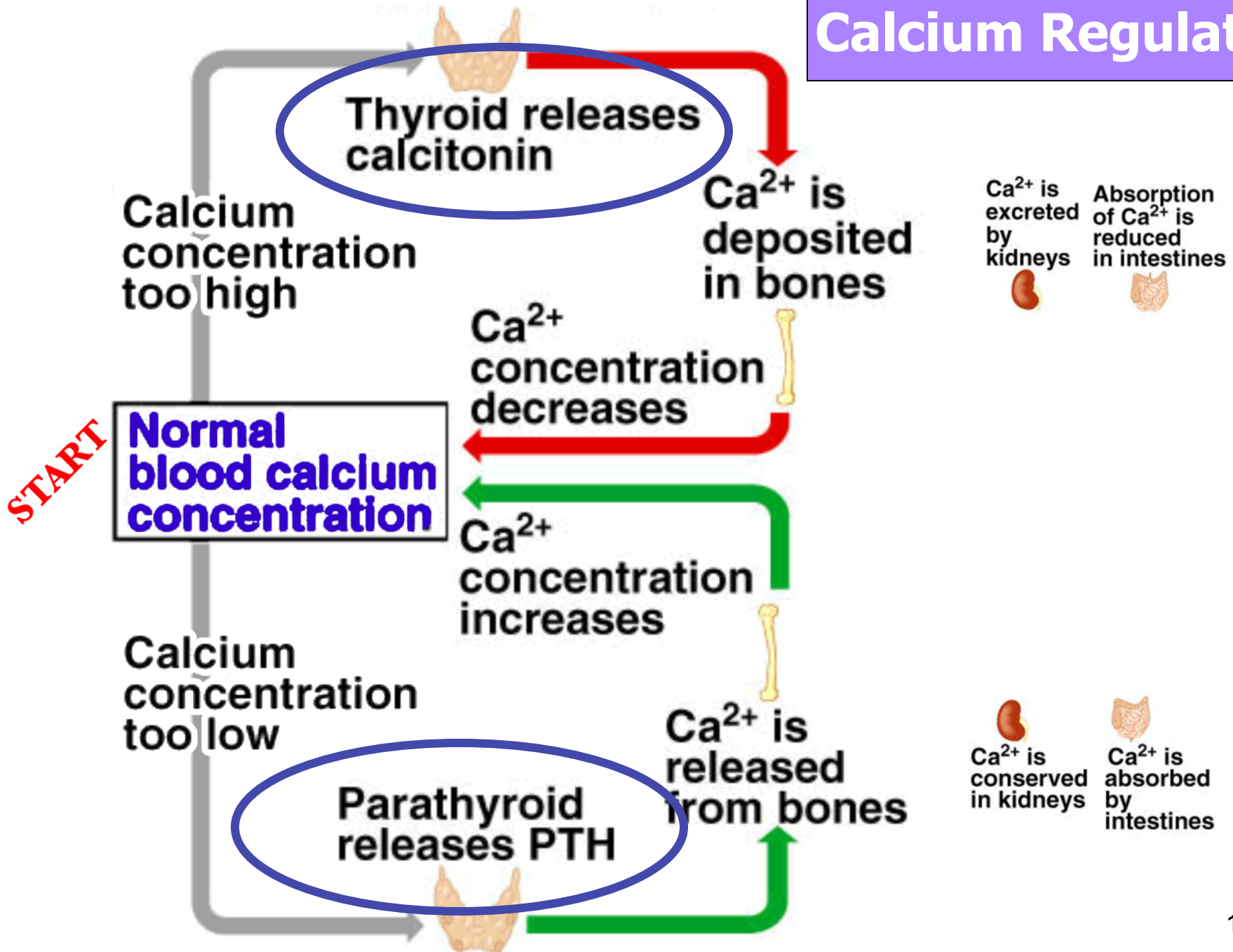
Calcitonin

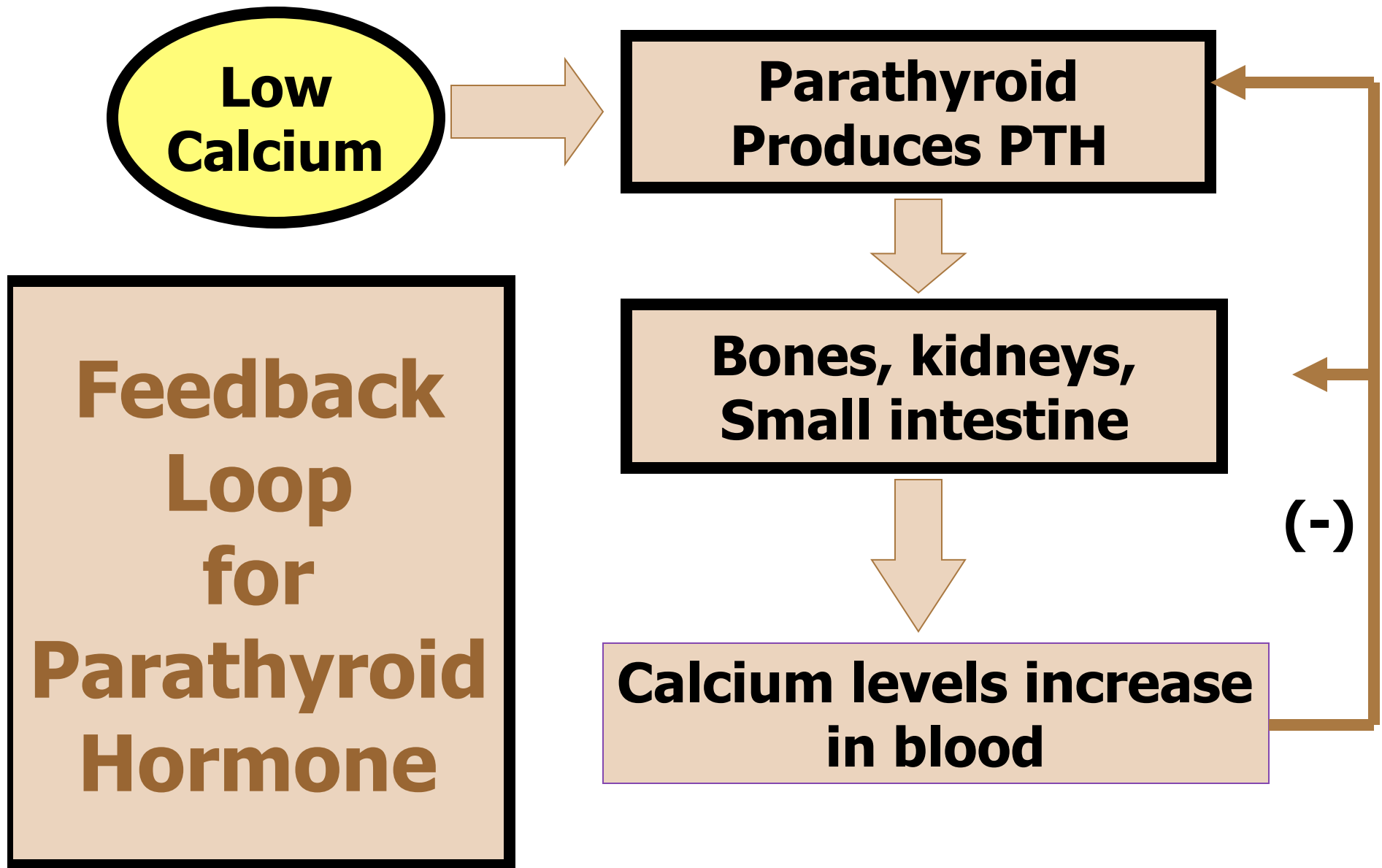
- Production site: thyroid gland
- Targets: bones, kidneys and small intestine
- Function: decreases blood calcium by depositing calcium in bones
- Excess Ca^{2+} is excreted in urine

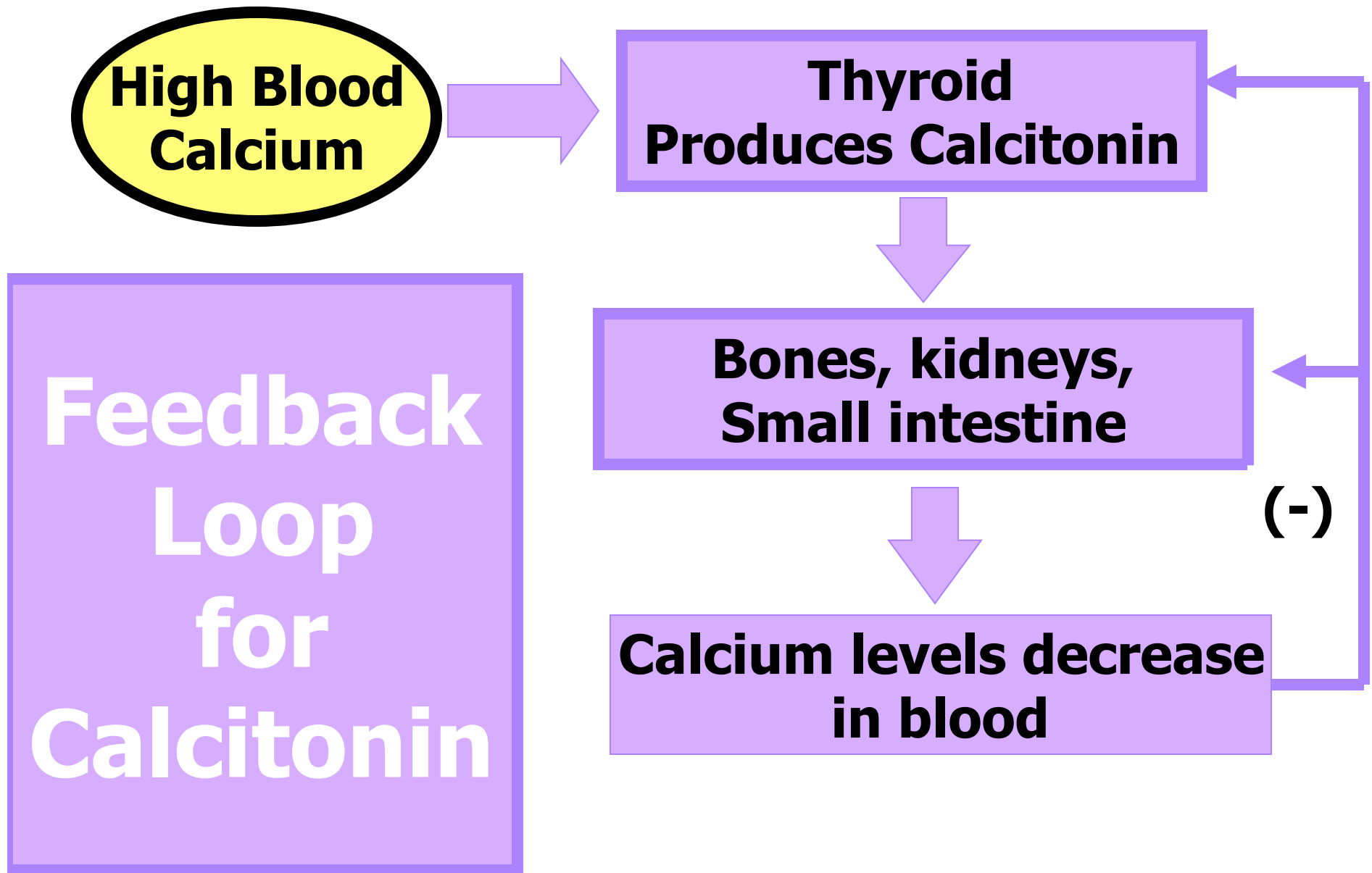
(PTH) Parathyroid hormone

- Production site: parathyroid gland
- Targets: bones, kidneys and small intestine
- Function: increases blood calcium by removing calcium from bones
- Lactation stimulates the release of PTH

Calcium Regulation





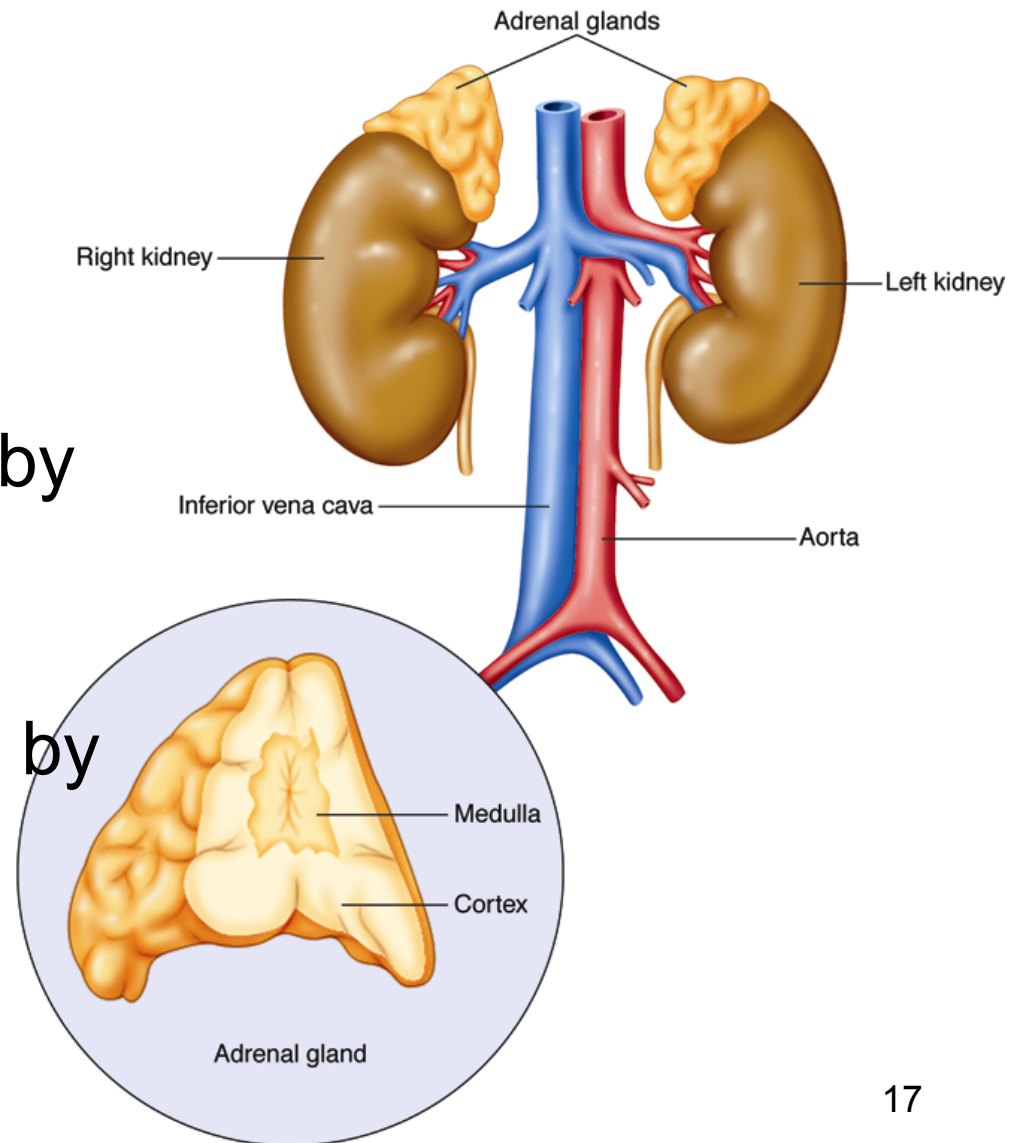


Low levels of calcium ions in the blood cause

- A. decreased secretion of PTH and increased deposition of calcium in the bones
- B. decreased secretion of calcitonin and increased deposition of calcium in the bones
- C. increased secretion of PTH and movement of calcium from the bones to the blood**
- D. increased secretion of calcitonin and movement of calcium from the bones to the blood

THE ADRENAL GLAND

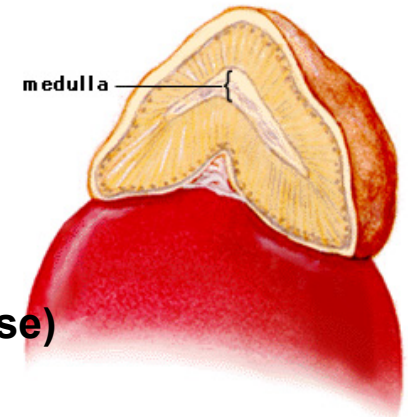
- Above each **kidney**
- The adrenal gland is made up of **2 glands**
 - **Adrenal medulla** (middle) – regulated by the **nervous system**
 - **Adrenal cortex** (outside) – regulated by **hormones**



Adrenal MEDULLA

- activated by the **sympathetic nervous system**
- Adrenal medulla produces 2 hormones during **immediate stress** (initiates the fight-or-flight response)
- 1) **Epinephrine** (adrenaline)
- 2) **Norepinephrine** (noradrenaline)

The Adrenal Gland



Short term Stress

- Increase blood glucose by converting **glycogen to glucose**
- Increase **heart rate**
- Increase **breathing rate**
- Blood vessels **dilate** (get bigger)
- Pupils **dilate**

Adrenal CORTEX

Aldosterone

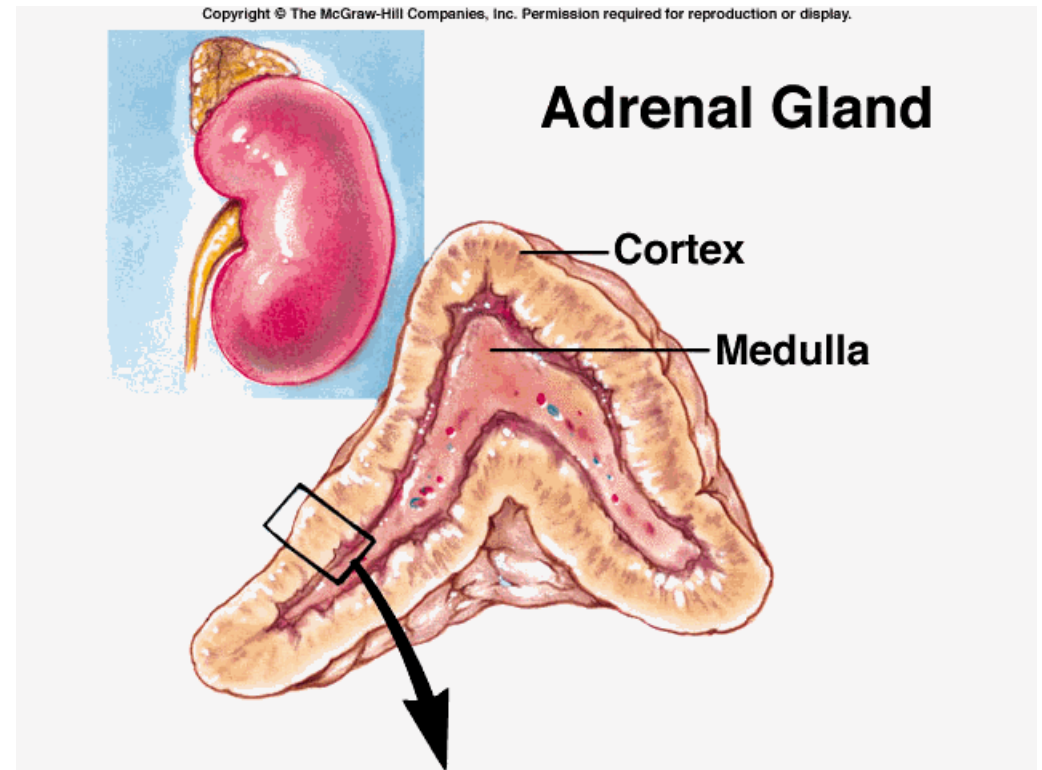
Cortisol

-Activated by the pituitary

Adrenal CORTEX produces
2 hormones

- 1) **Aldosterone**
- 2) **Cortisol**

Stimulated by **ACTH** from the
anterior pituitary



Adrenal CORTEX

-Cortisol-

Long term stress

- Targets: **Liver and muscles**
- Function: increases levels of **amino acids** which are then converted to glucose by liver = **more energy**

****Does cortisol increase or decrease blood glucose?
It increases it.**

Hyposecretion: **Addison's disease**

Hypersecretion: **Cushing's Syndrome**

Can Stress Actually Kill You?

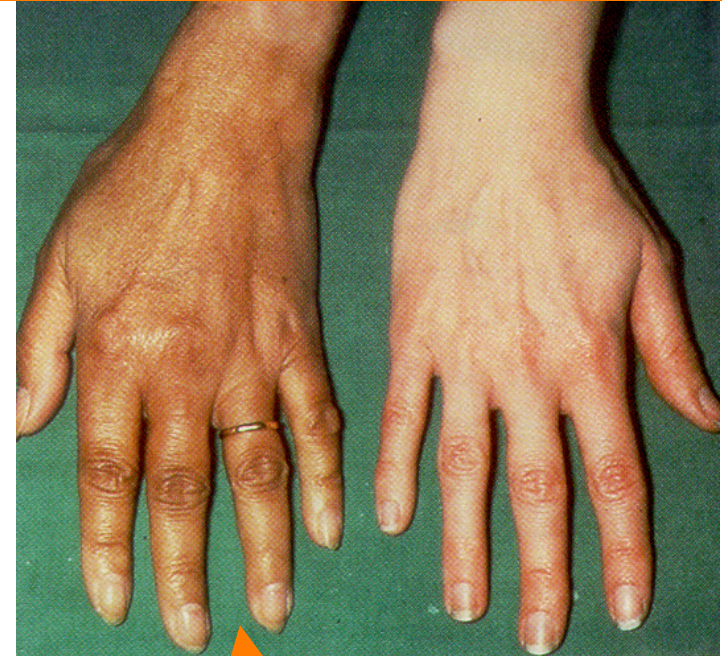
http://www.youtube.com/watch?v=vzrjEP5MOT4&safety_mode=true

Adrenal CORTEX

Too little Cortisol: Addison's Disease

Symptoms:

Weight loss, low energy, low blood pressure, occasionally areas of hyper-pigmentation



Bronzing of the skin

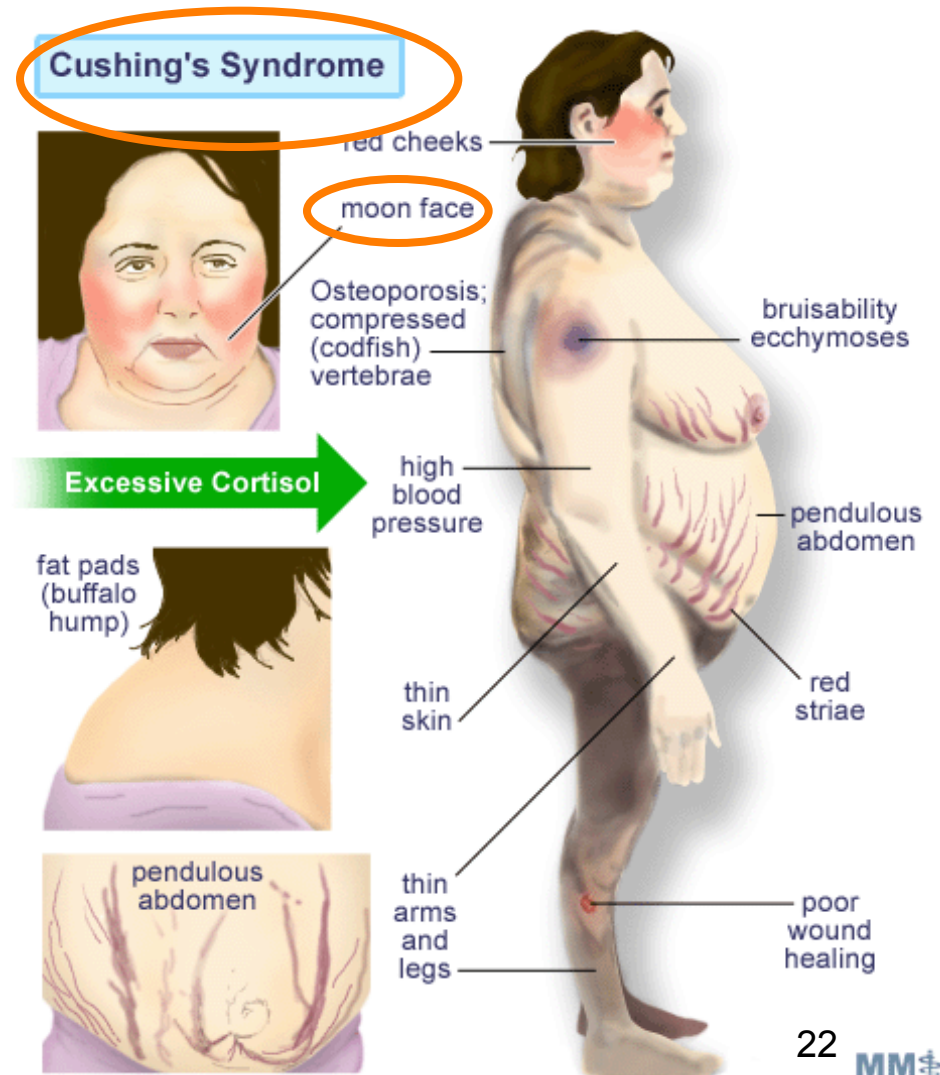
Adrenal CORTEX

Long term stress

Too much Cortisol: Cushings Syndrome

Symptoms :

- moon face,
- osteoporosis,
- pendulous abdomen,
- bruise easily



Adrenal CORTEX

Too much Cortisol: Cushing Syndrome

Due to hypersecretion of cortisol in the adrenal cortex



Moon face

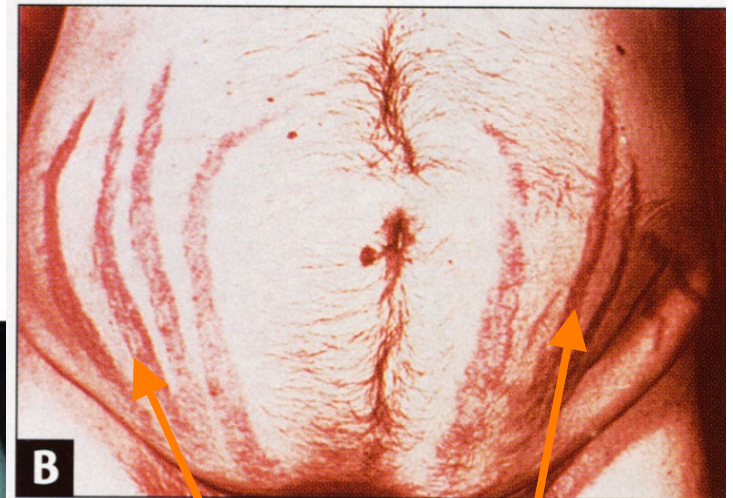
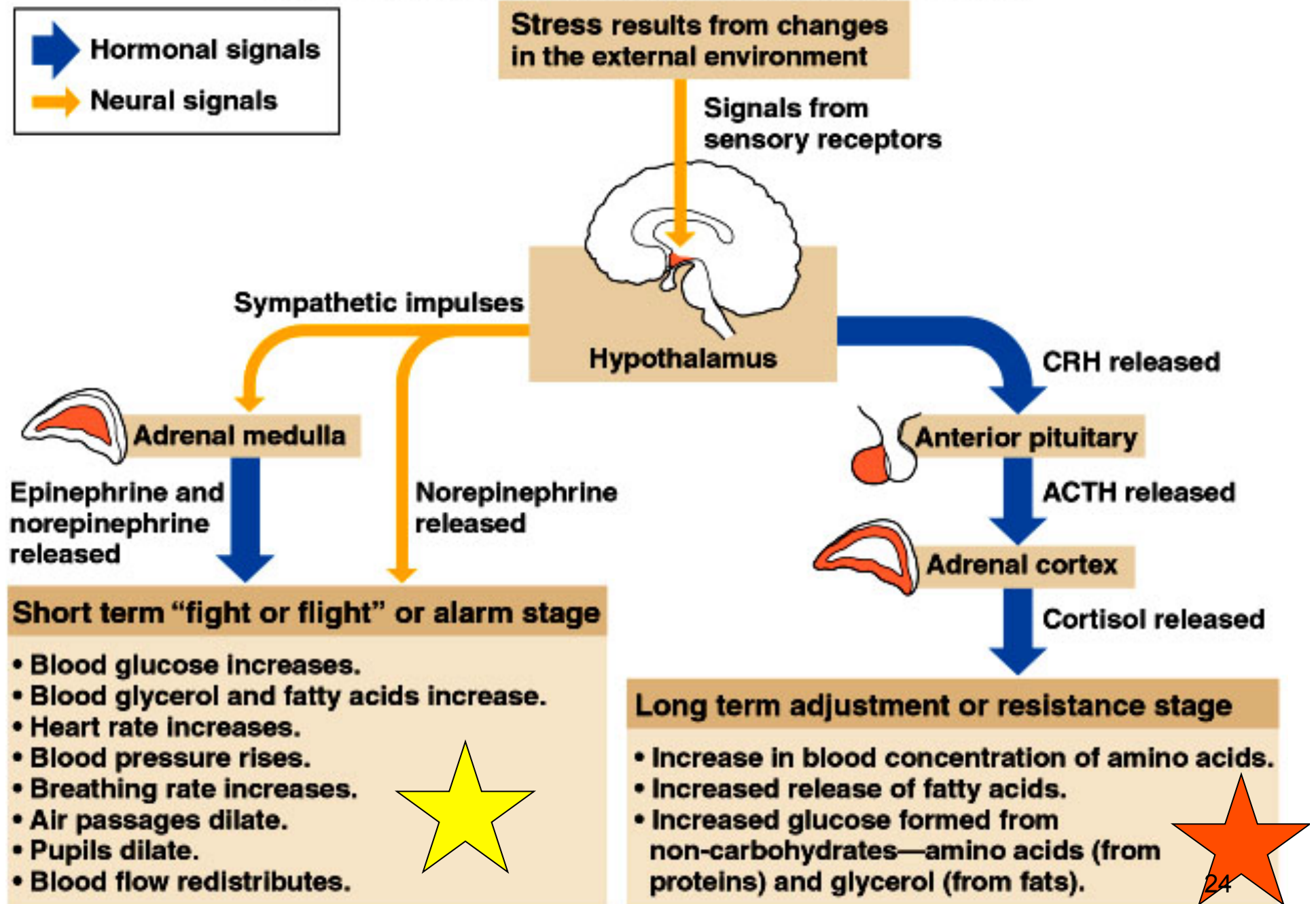
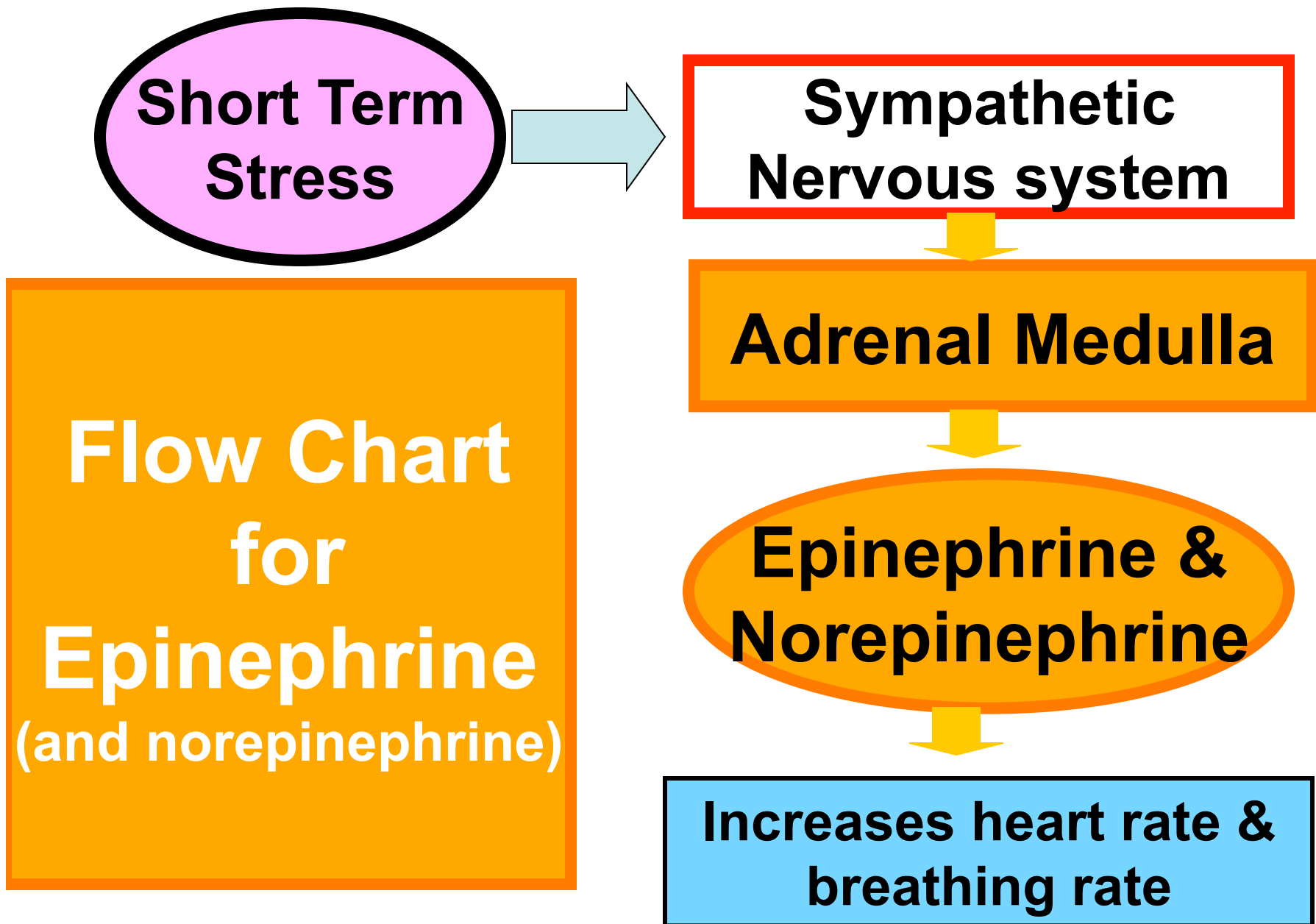
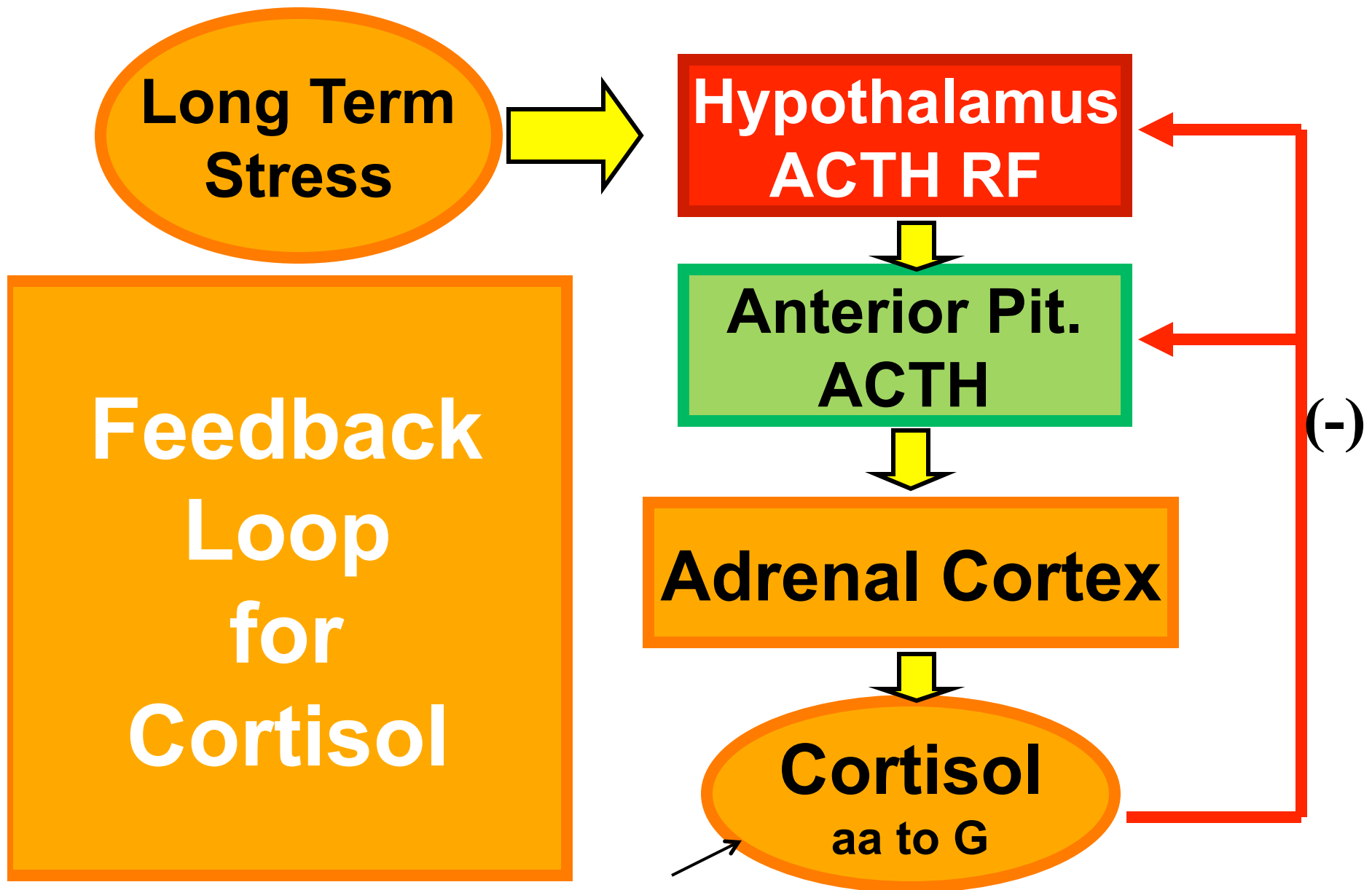


Figure 4-18B, Page 4.10

Red striae

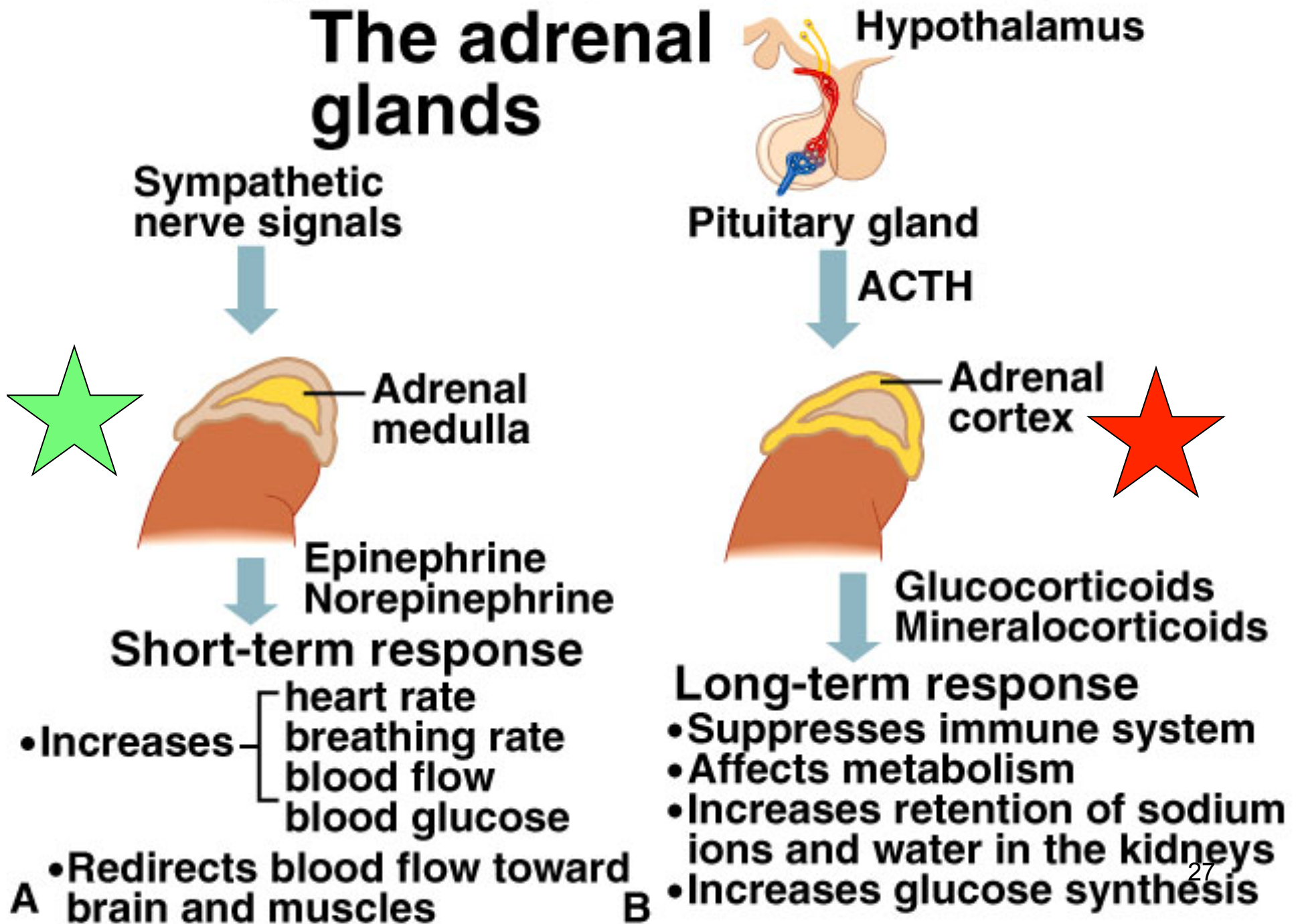






Increases Amino acids in blood, which goes to liver to be converted to glucose

The adrenal glands

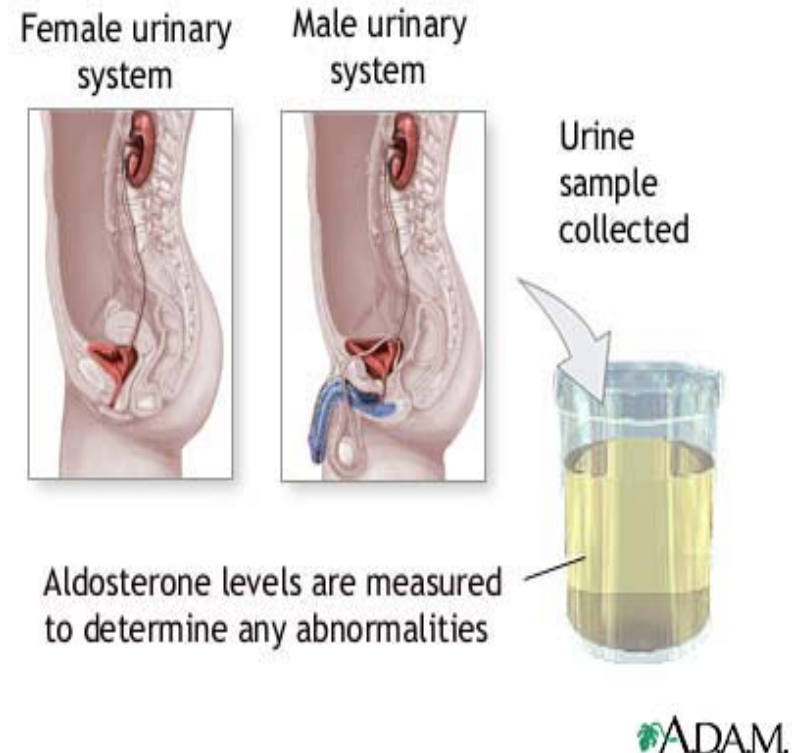


Adrenal CORTEX

-Aldosterone-

WATER RETENTION

- Production site: adrenal cortex
- **Target: the kidneys**
- **Function:** increases **sodium** (Na^+) retention and with it water through **osmosis**
- -essentially increases blood volume and therefore blood pressure
(similar to ADH → Increases blood pressure)
- **Hyposecretion: water loss or dehydration**
- **Hypersecretion: increased water retention**



Aldosterone vs. ADH

ADH released in response to
dehydration.

Aldosterone is released in response to
low **blood pressure.**

What happens if you stop drinking water?

http://www.youtube.com/watch?v=zCheAcpFkL8&safe=active&safety_mode=true

e

Which of the following rows identifies the source of cortisol, the hormone that stimulates the release of cortisol, and an effect of cortisol?

Row	Source	Hormone	Effect
A.	Adrenal gland	ACTH	Increased conversion of amino acids to glucose
B.	Pituitary gland	ACTH	Increased protein synthesis
C.	Adrenal gland	ADH	Increased conversion of glycogen to glucose
D.	Pituitary gland	ADH	Increased water reabsorption

Use the following information to answer the next two questions.

Thyroid cancer can develop slowly over many months or even years. Because the symptoms are frequently overlooked, diagnosis is often delayed. However, thyroid cancer is usually treated successfully with a combination of surgery, radioactive iodine, and thyroid medication.

Surgical removal of the thyroid gland results in

- A. a decrease in thyroxine levels and TSH levels
- B. an increase in thyroxine levels and TSH levels
- C. an increase in thyroxine levels and a decrease in TSH levels
- D.** a decrease in thyroxine levels and an increase in TSH levels

The release of thyroxine from the thyroid is directly regulated by

- ☒ A. TSH
- ☐ B. TRH
- ☐ C. iodine
- ☐ D. thyroxine

A characteristic symptom of hyperthyroidism is

- ☐ A. lethargy
- ☒ B. weight loss
- ☐ C. intolerance to cold
- ☐ D. slowed mental processes