



03c – HOMEOSTASIS

Negative Feedback

Thermo & Chemo Regulation



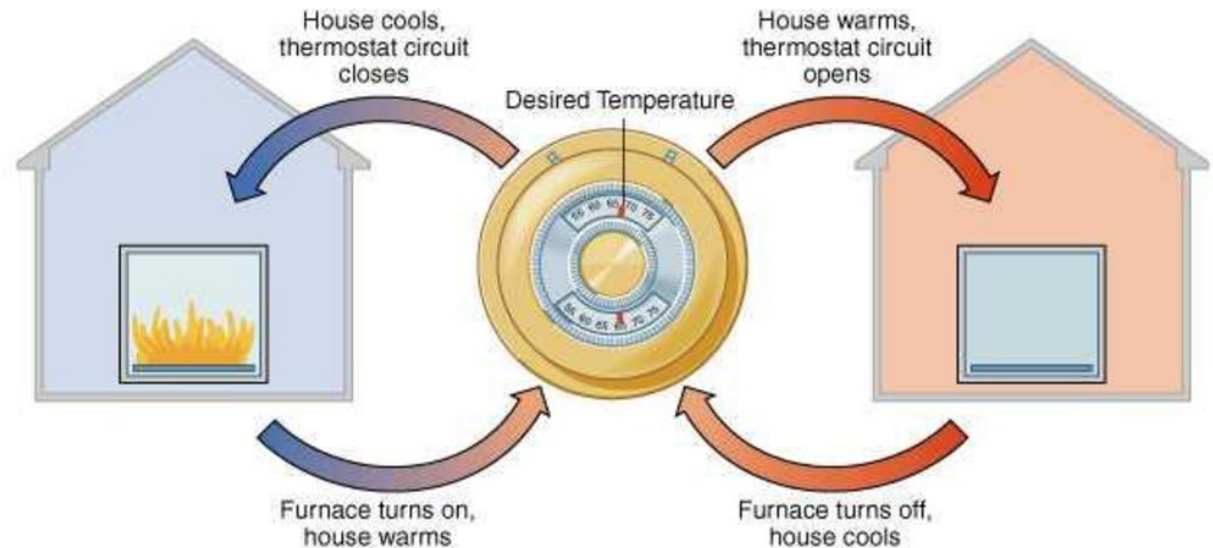
Negative Feedback

A key mechanism/process for homeostasis - to stay within tolerance range.

How it works:

1. A **stimulus** causes your body to go out of tolerance range.
2. Your body **detects** this.
3. Your body **responds** (nervous + endocrine).
4. Result = **reverses** the effect of the stimulus.

Negative Feedback



Example: thermostat

Thermoregulation

Temperature	Consequence
Below tolerance limit	The rates of enzyme-catalysed metabolic reactions are too slow to maintain the life processes in the cell.
Above tolerance limit	The structures of the active sites of enzymes are altered which decreases the rates of enzyme-catalysed metabolic reactions.

Endotherms

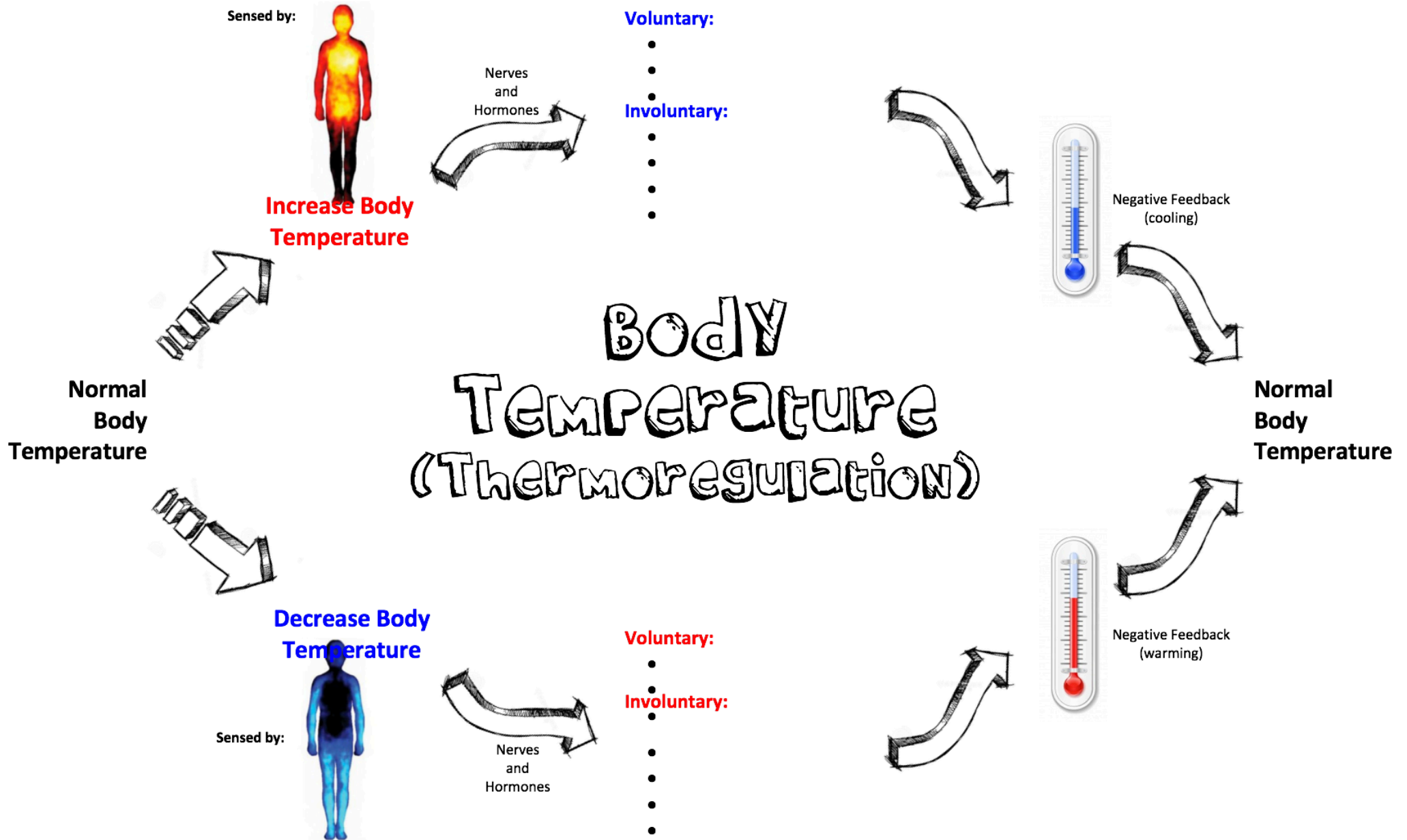
- respond to environmental temperature by altering internal respiration levels and physical actions (sweating, shivering, etc)

Ectotherms

- regulate body temperature by changing location

Body Temperature

Body Temperature (Thermoregulation)

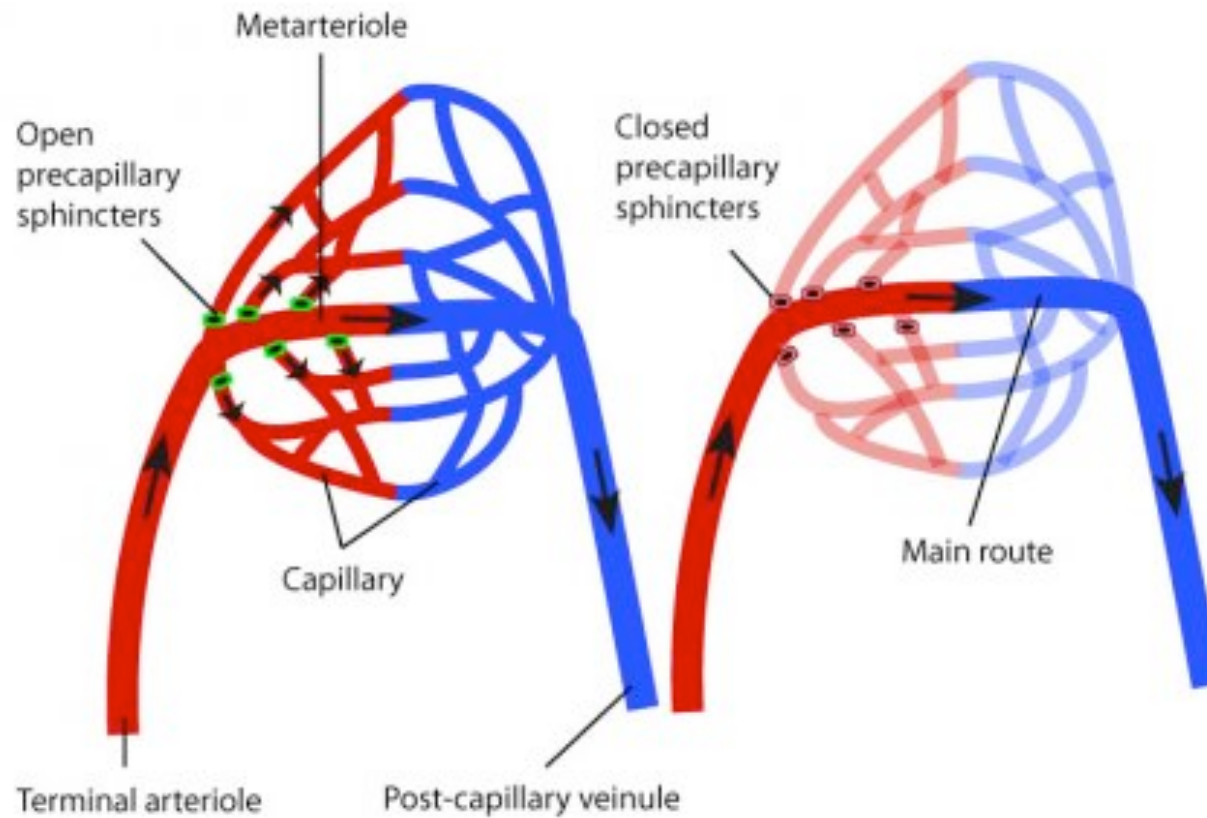


Body Temperature Regulation

Shunting of Blood

when hot

when cold

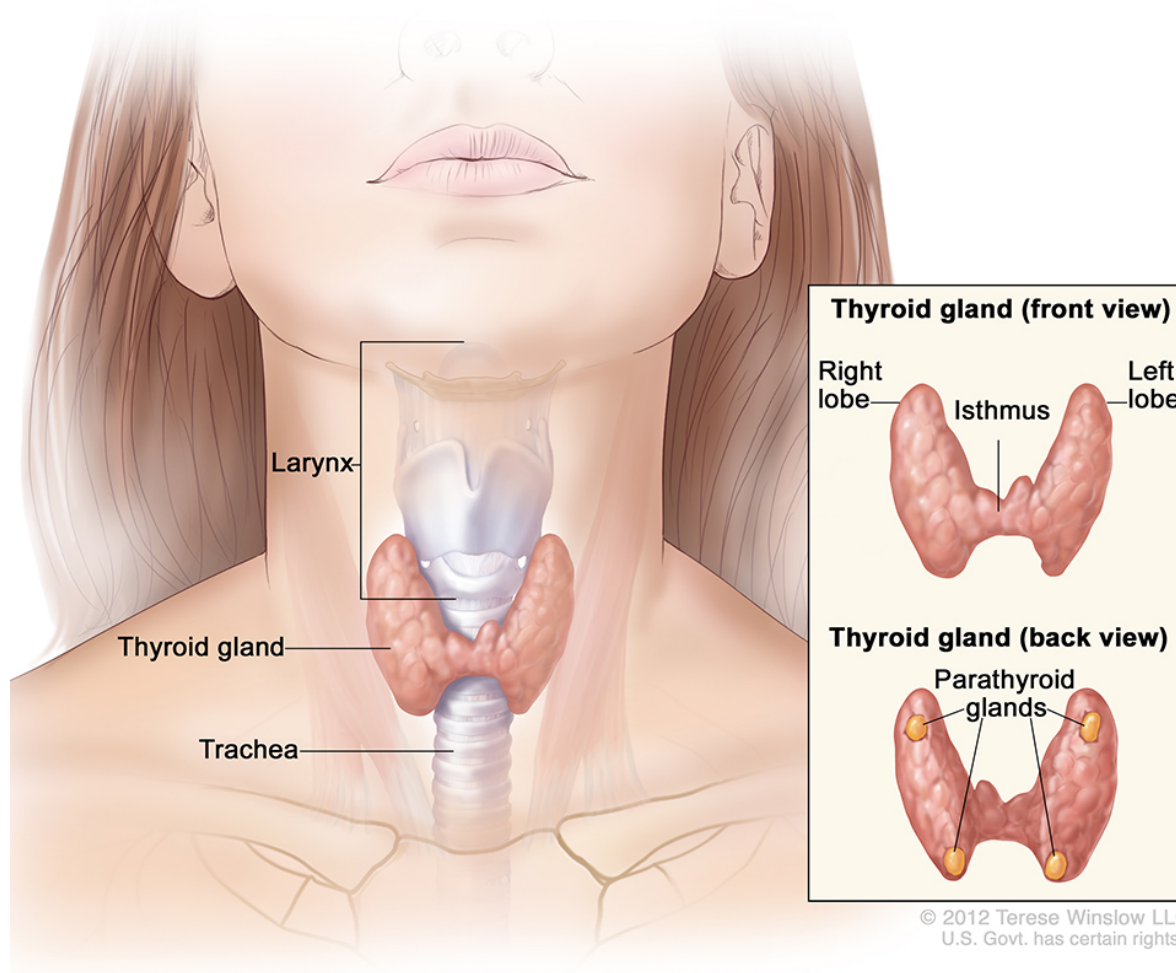


Website Animation:

http://objetoseducacionais2.mec.gov.br/bitstream/handle/mec/13714/lsp07_int_heatexchange.swf?sequence=13

Role of THYROXINE

Anatomy of the Thyroid and Parathyroid Glands



Thyroid Stimulating Hormone & Thyroxine



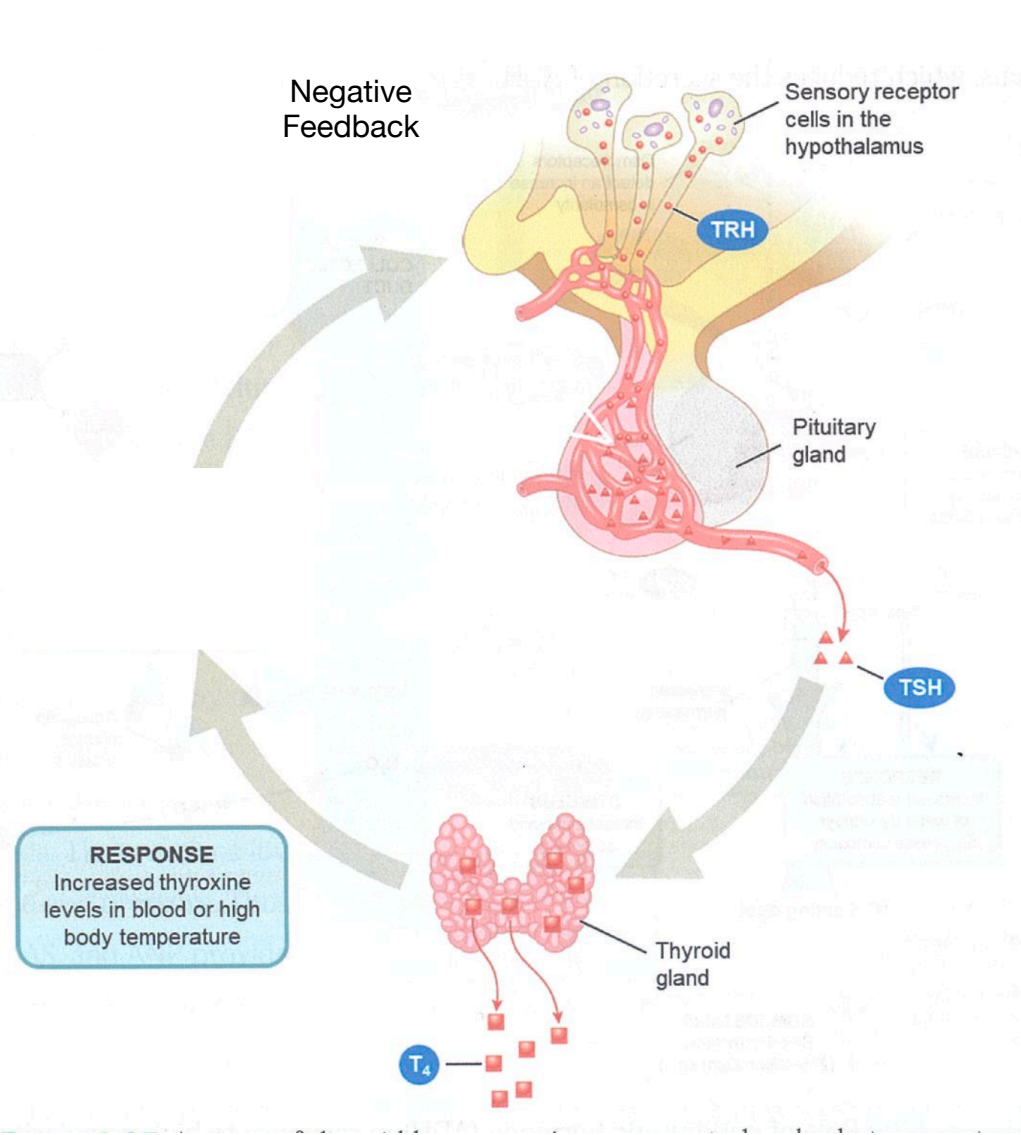
3.3.3 Hormones can alter the metabolism of target cells, tissues, or organs.

- Describe the action of thyroid stimulating hormone and thyroxine in metabolism.

3.3.4 Hormonal responses can be stimulated by either the nervous system or other hormonal messages.

- Describe the role of thyroid-stimulating hormone in the production of thyroxine.

Thyroid Stimulating Hormone & Thyroxine



TRH = thyrotropin-releasing hormone

TSH =

T₄ =

Thyroid Disorders



3.3.3 Hormones can alter the metabolism of target cells, tissues, or organs.

- ☑ Describe the action of thyroid stimulating hormone and thyroxine in metabolism.

Disorder	Cause	Symptoms
Hypothyroidism	Insufficient production of thyroid hormones by the thyroid gland.	Poor ability to tolerate cold Poor memory and concentration Feeling tired
Hyperthyroidism	Excessive production of thyroid hormones by the thyroid gland.	Poor ability to tolerate heat Rapid heartbeat Irritability and difficulty sleeping

Chemoregulation

Carbon Dioxide Levels (pH)

You don't breath out all of your carbon dioxide!

*** 5-10% stays as CO₂ in blood**

*** 90-95% converts to carbonic acid (H₂CO₃) and then into H⁺ + HCO₃⁻**

CO ₂ concentration	Consequence
Below tolerance limit	A condition called hypocapnia develops due to the decrease in concentration of carbon dioxide in the blood. A condition called respiratory alkalosis develops due to the decrease in concentration of hydrogen ions in the blood.
Above tolerance limit	A condition called hypercapnia develops due to the increase in concentration of carbon dioxide in the blood. Breathing rate increases to remove excess carbon dioxide from the body. A condition called respiratory acidosis develops due to the increase in concentration of hydrogen ions in the blood.

Chemoregulation - CO₂ Levels (pH)

