

Homeostas is

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Homeostasis

Homeostasis: is keeping the internal body environment constant.
Whether its physical or chemical composition to be optimum for cellular function.

- The internal body environment refers to the fluids that bathes the cells which is **the ECF and the blood.**
- Disturbances of homeostasis lead to cellular dysfunction or even death.

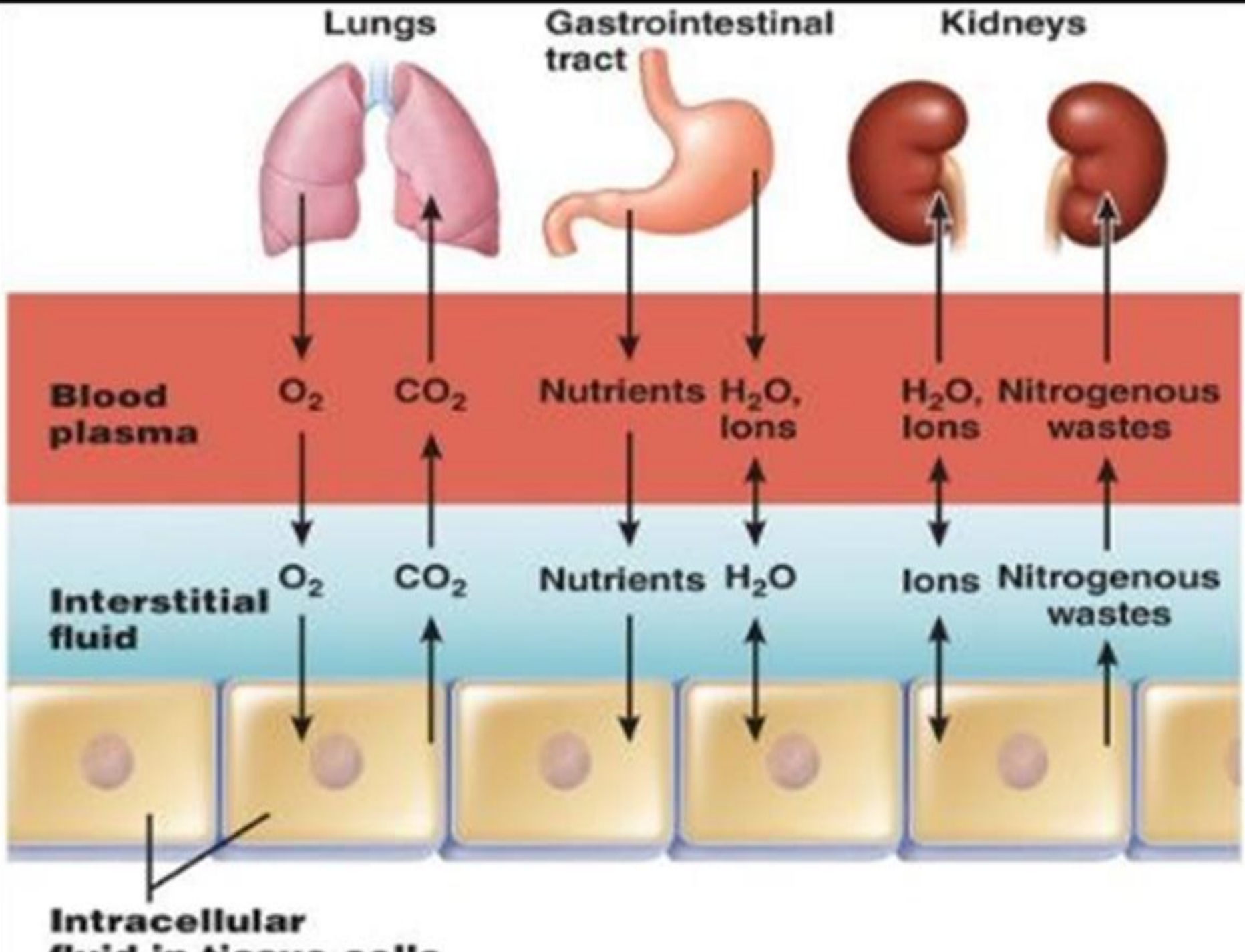
Homeostasis is an **active process**, and all body systems contribute in homeostasis.



*** Examples:**

- **Oxygen and nutrients**
- **CO₂ and waste products**
- **body temperature**
- **blood pH**
- **waste products**
- **Plasma osmolarity**
- **The endocrine and nervous system regulate various body functions**



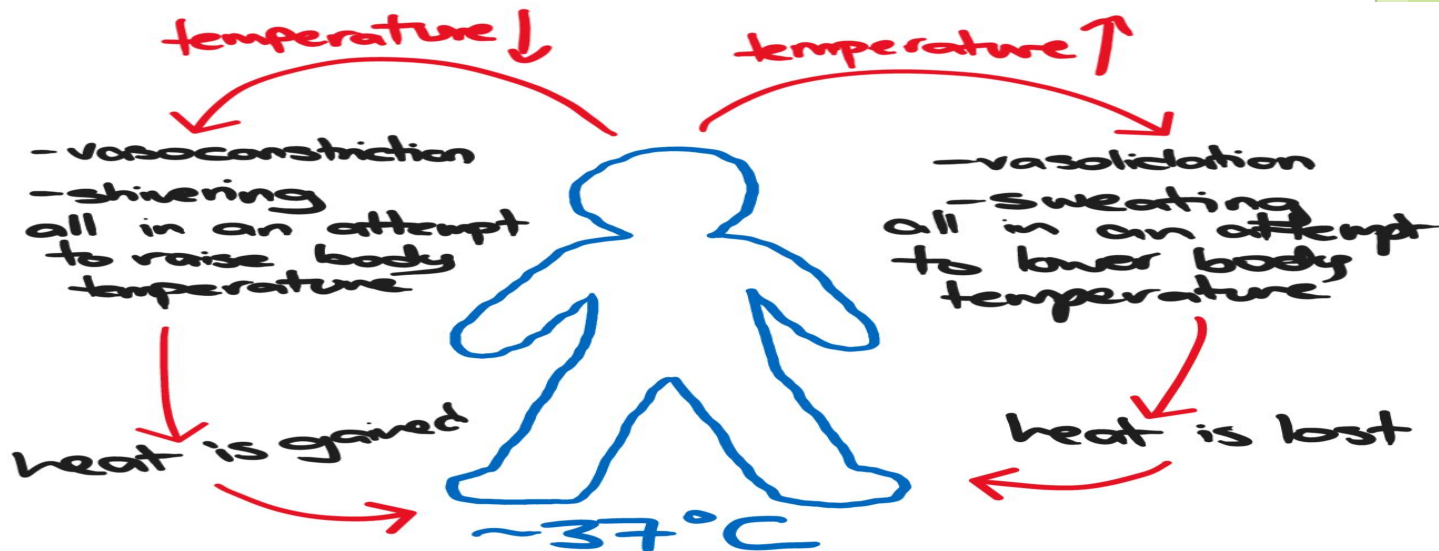


The cells use oxygen to oxidize nutrients to give energy.

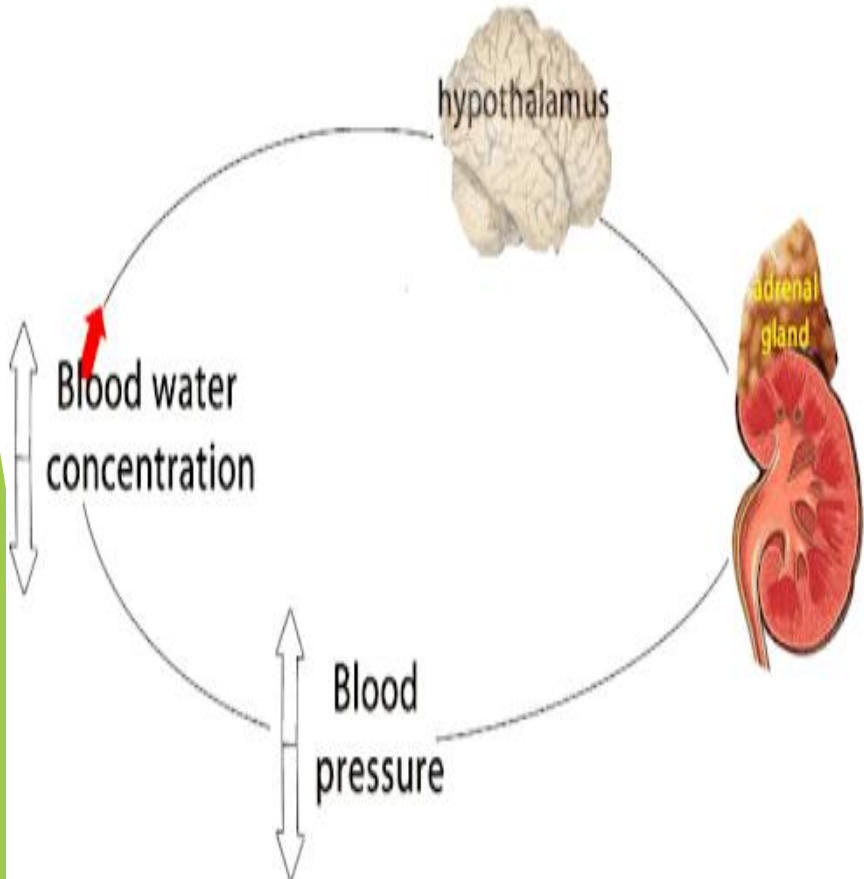
This energy is used to do a certain work, but **part of this energy is converted into heat.**

This heat if not lost, the body temperature will rise (disturbance of homeostasis)

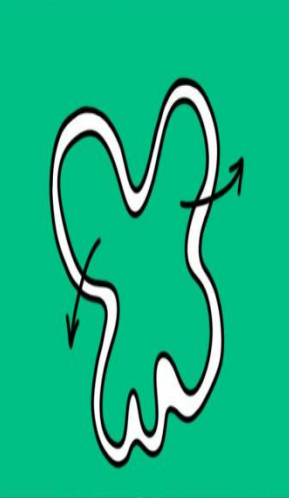
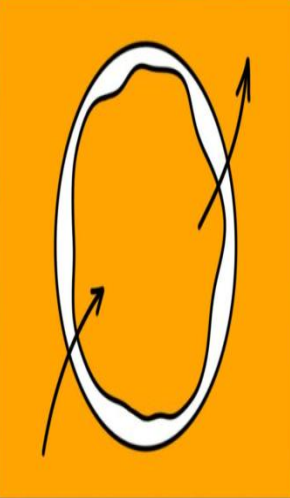
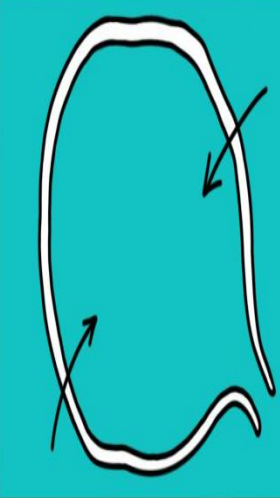
but our body temperature is kept constant at 37 °C by **heat regulating systems** to preserve enzymatic activity and cellular function.



The ionic composition and osmolarity of interstitial fluid and blood are kept constant at 290-300 mosmol/L (isotonic).

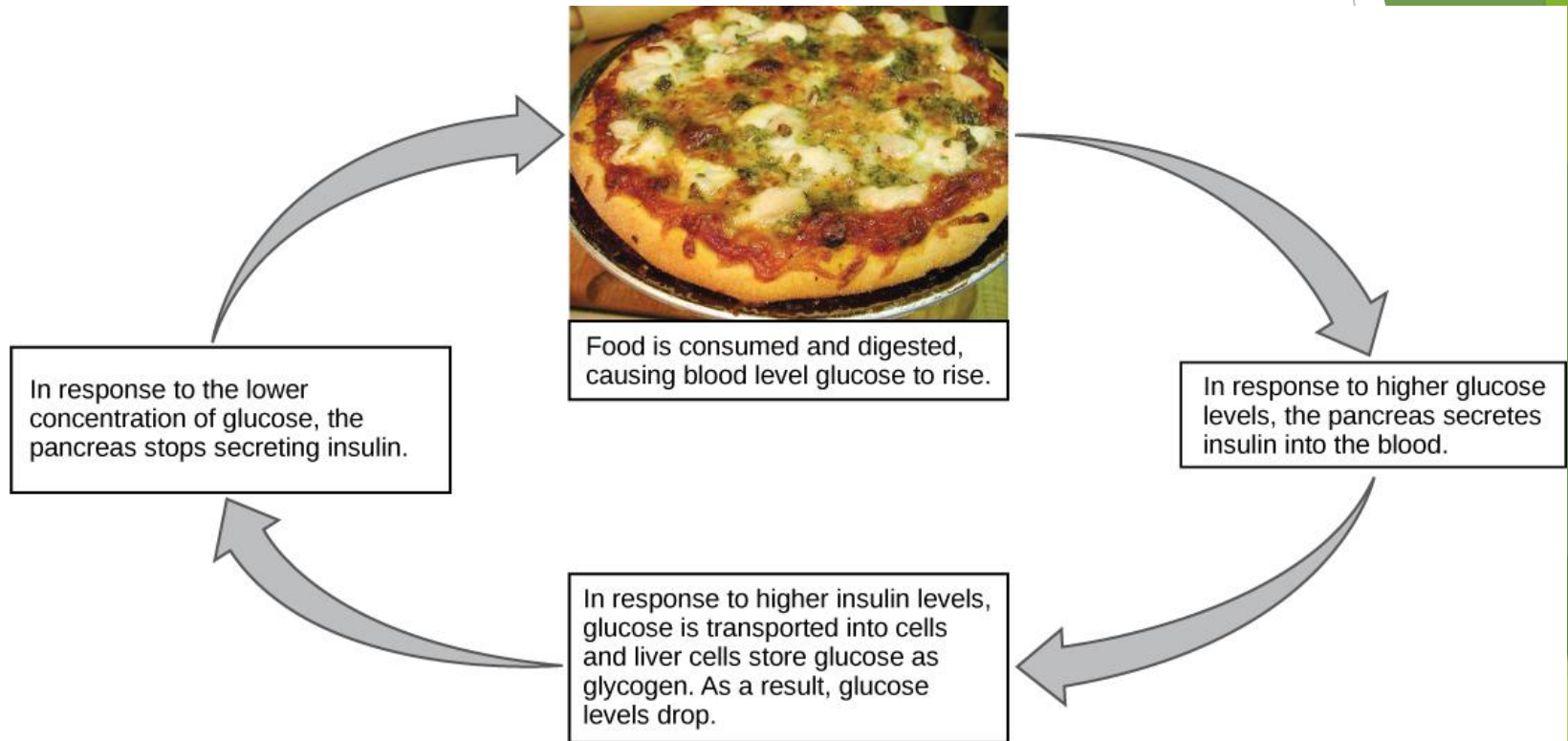


The Importance of Osmoregulation

		
<p><u>Hypertonic Solution</u></p> <p>The solution outside of the cell is more concentrated than the inside of the cell. Water will move out of the cell by osmosis, causing it to shrink.</p>	<p><u>Isotonic Solution</u></p> <p>The solution inside the cell has the same concentration as the outside of the cell. Water will move in and out of the cell at an equal rate.</p>	<p><u>Hypotonic Solution</u></p> <p>The solution outside of the cell has a lower concentration than the inside of the cell. Water will move into the cell by osmosis, sometimes causing it to burst.</p>



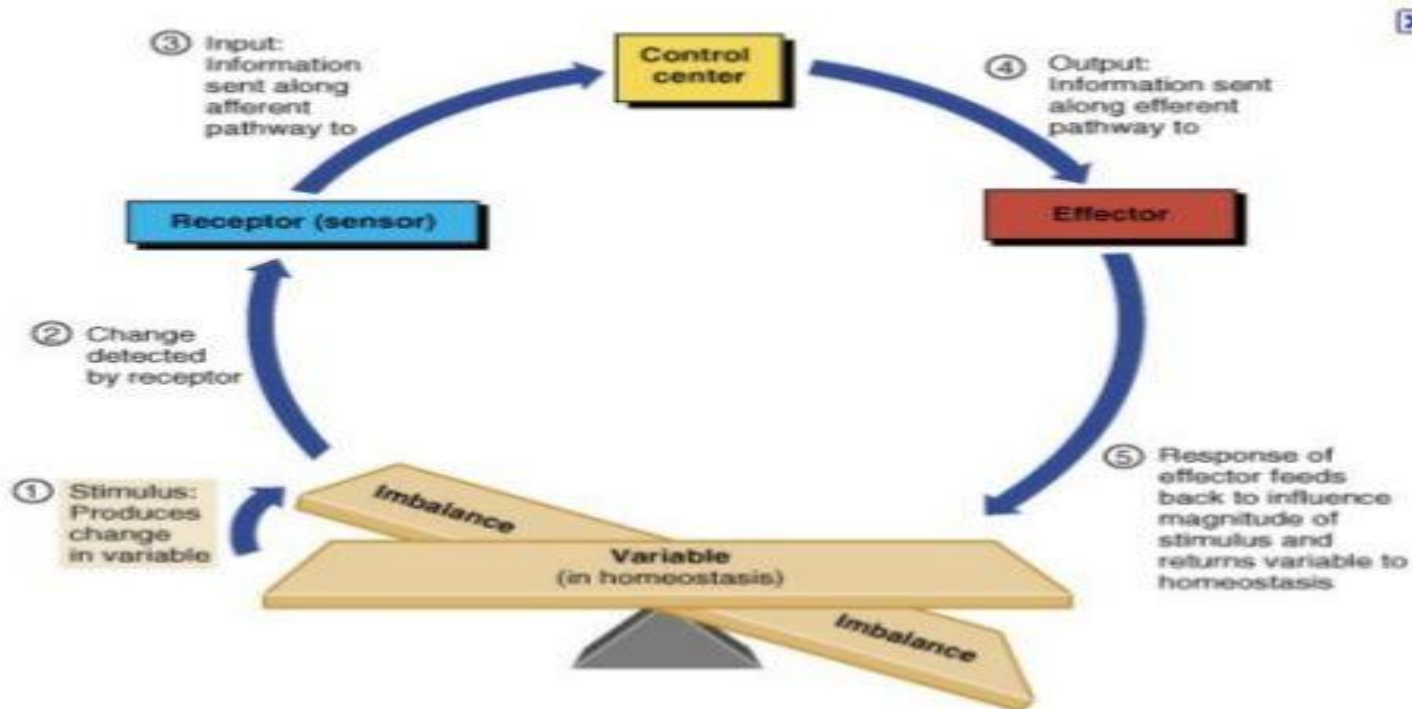
The locomotor system contributes by moving the person to the site of food.



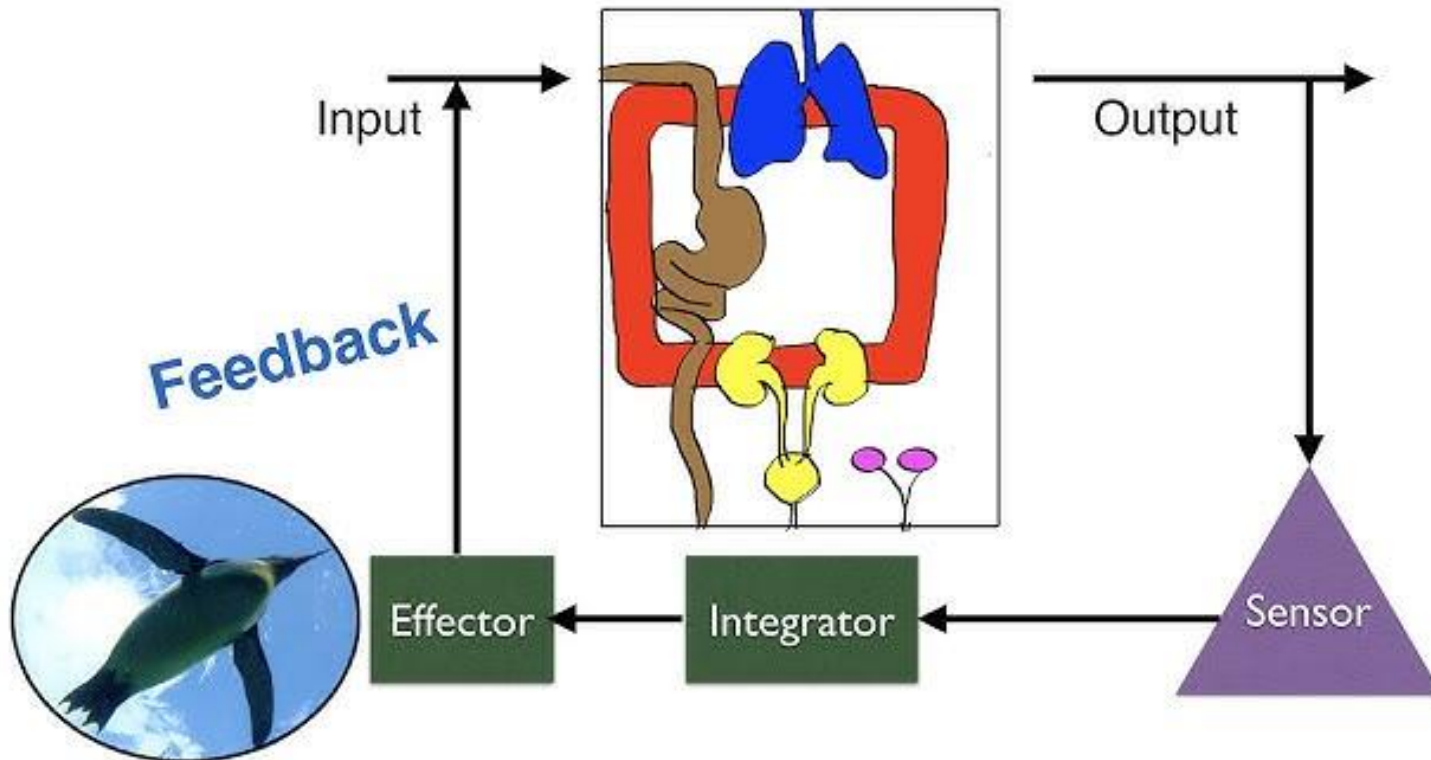
Homeostatic Control Systems

These are Network of body components that operate to maintain a given factor (variable or parameter) in the internal environment relatively constant around an optimal level.

Homeostatic Control System



Homeostasis and Feedback



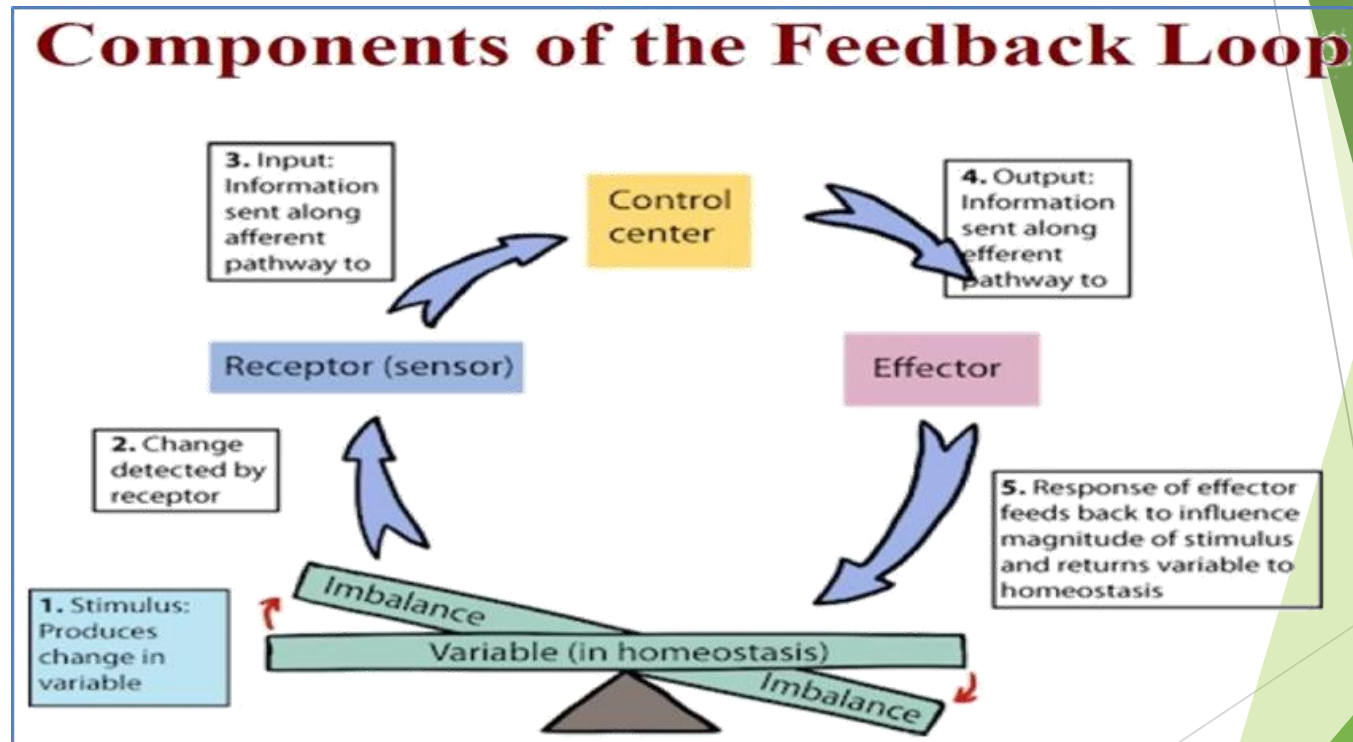
The control system must include:

- 1. Sensors (detectors or receptors):** that detect in change of the variable (which is termed an error). These sensors send the information detected through **an afferent to a control center**.
- 2. Control center:** which recognize the error and integrate multiple information to find an appropriate response. Then send corrective signals (orders) through an **efferent to effectors**.
- 3. Effectors:** these are the organs that respond to the orders of the control center to correct the error.



Control systems operate by two mechanisms:

- Negative feedback (main).
- Positive feedback.

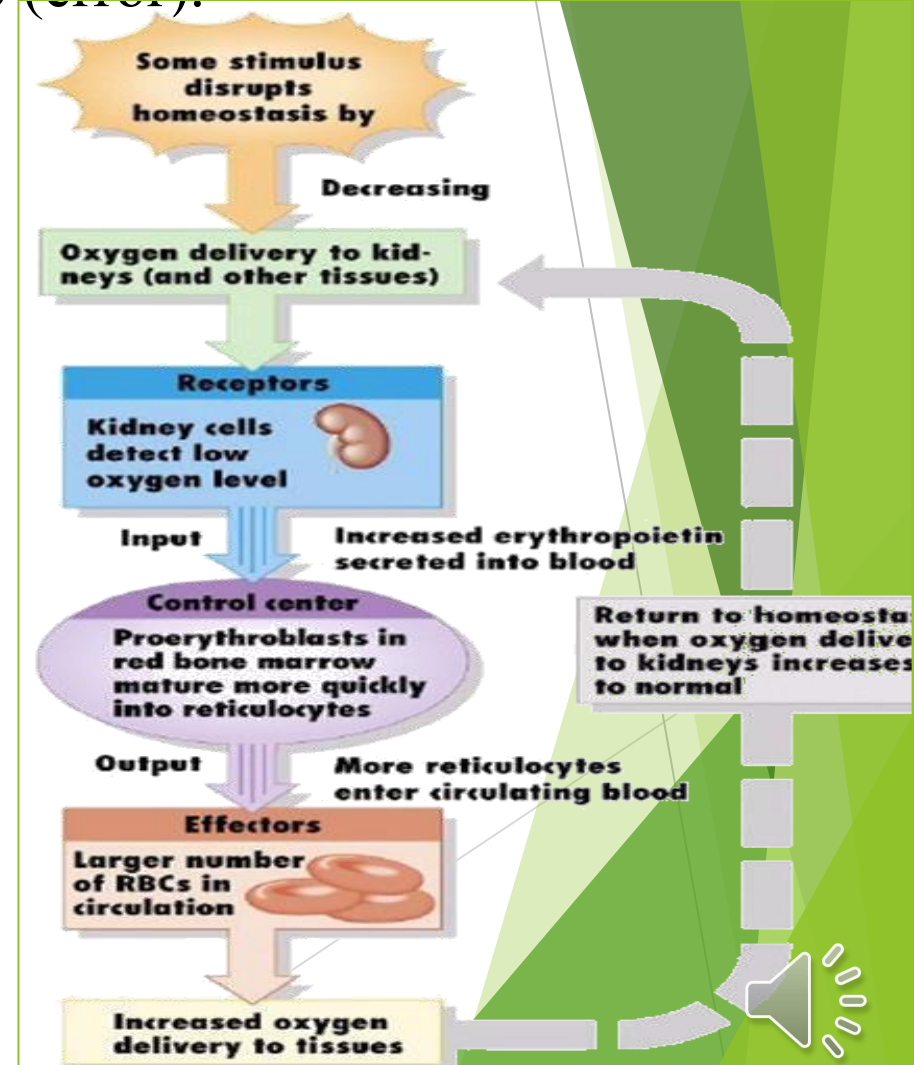


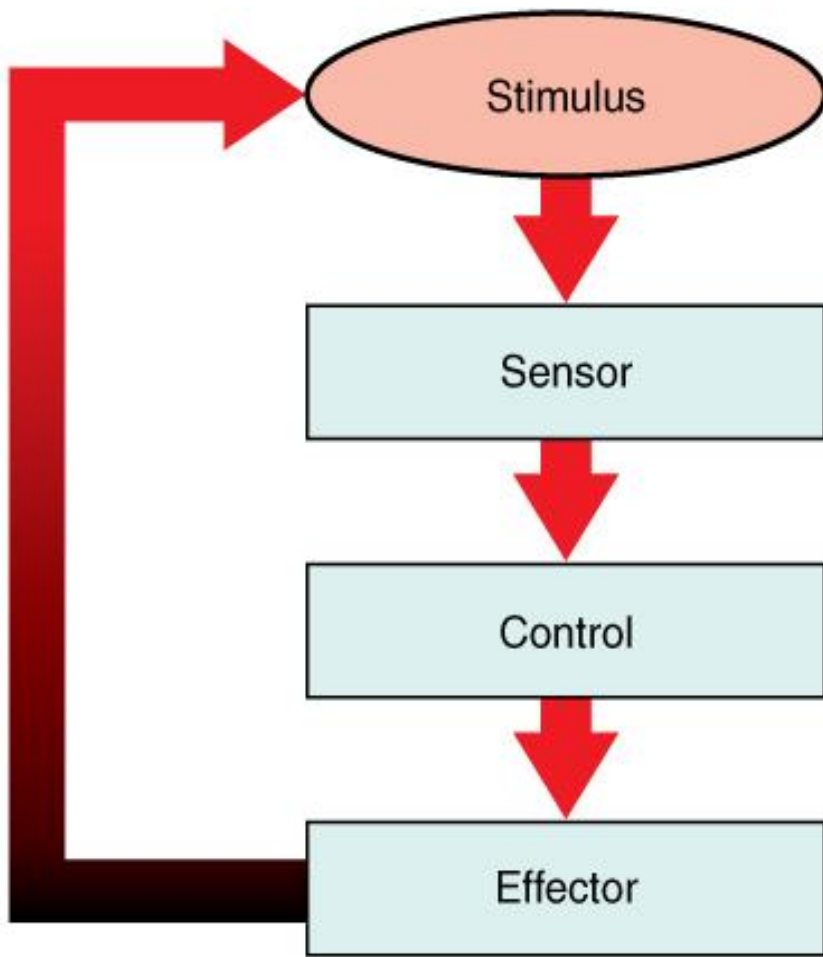
Negative Feedback

Refers to the mechanism by which the response of the control system is in the opposite direction of the change (error).

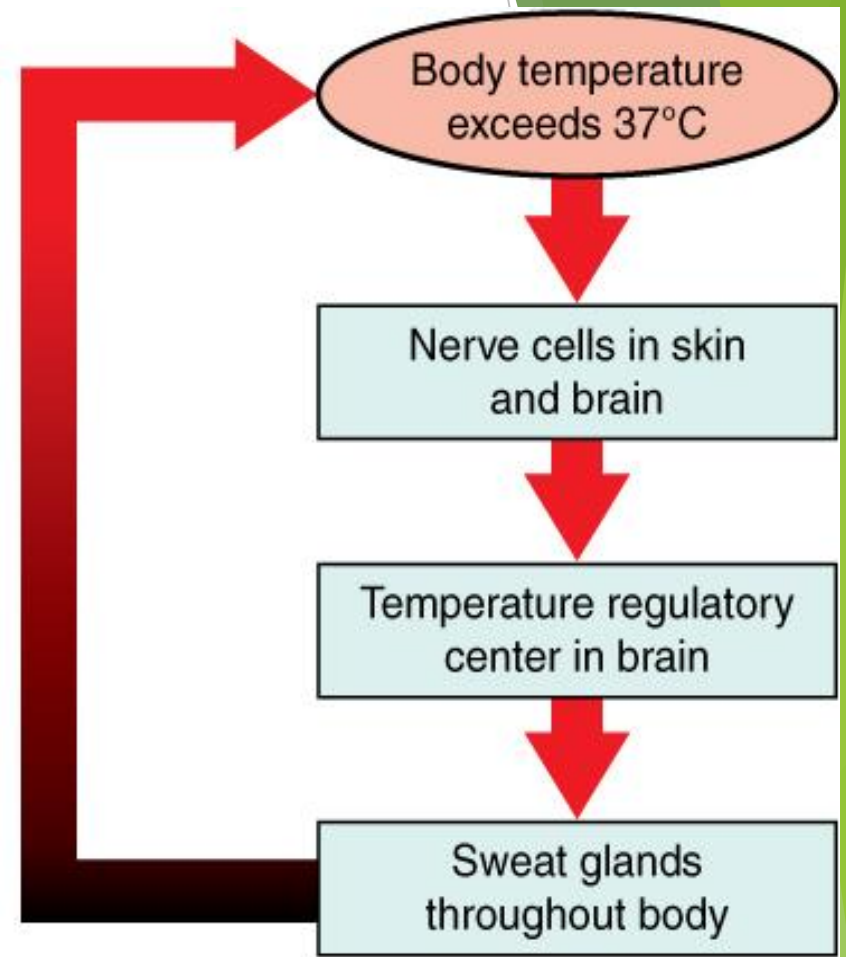
* For example:

- 1- Regulation of body temperature
- 2- Regulation of blood glucose level
- 3- Regulation of RBCs number





(a) Negative feedback loop



(b) Body temperature regulation

Positive Feedback Mechanisms

Refers to the mechanism by which the response of the control system is in the same direction of the change (error).

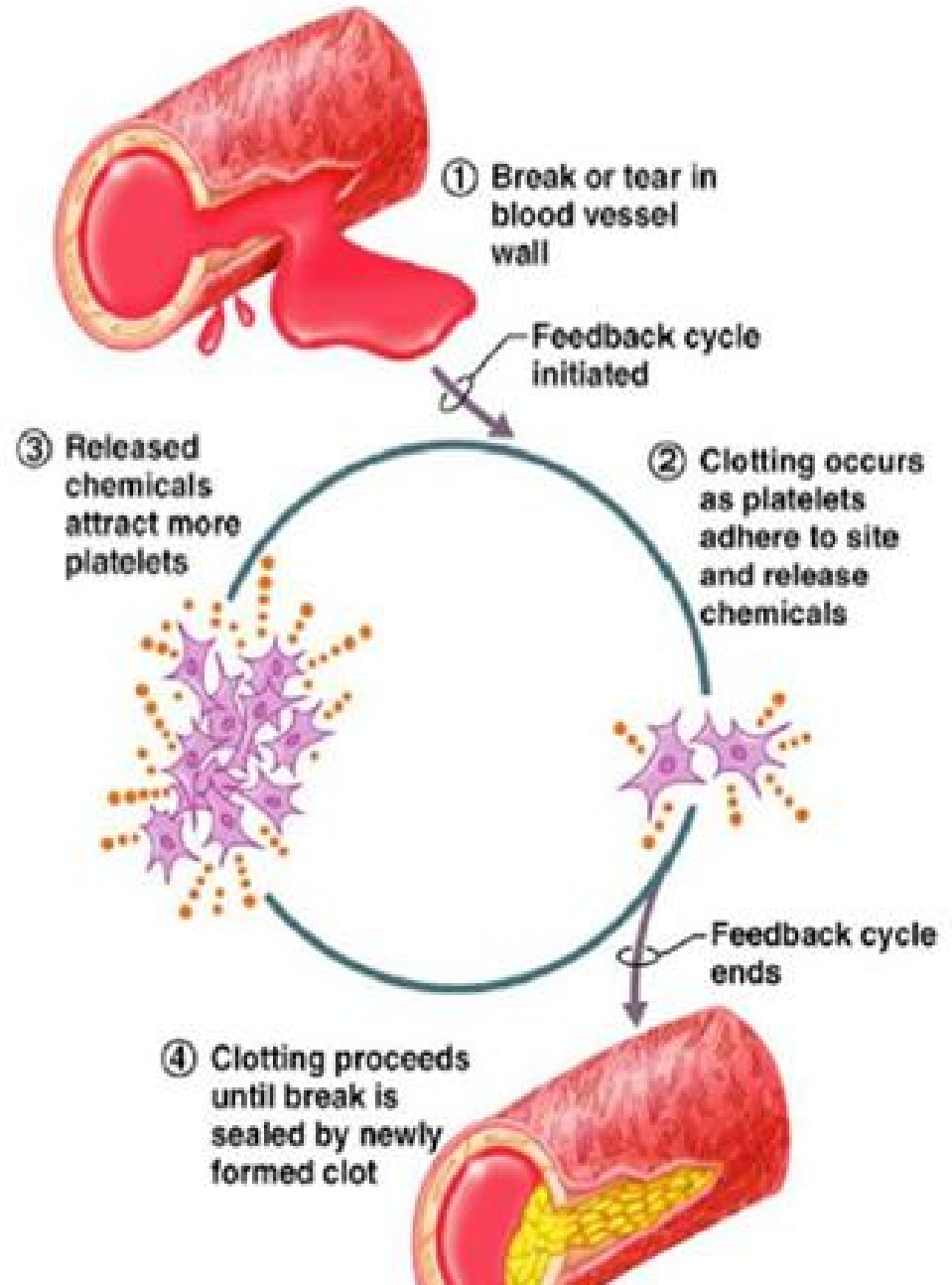
So, the controlled variable moves in one direction, Continues increasing or decreasing to a certain level.

* Examples:

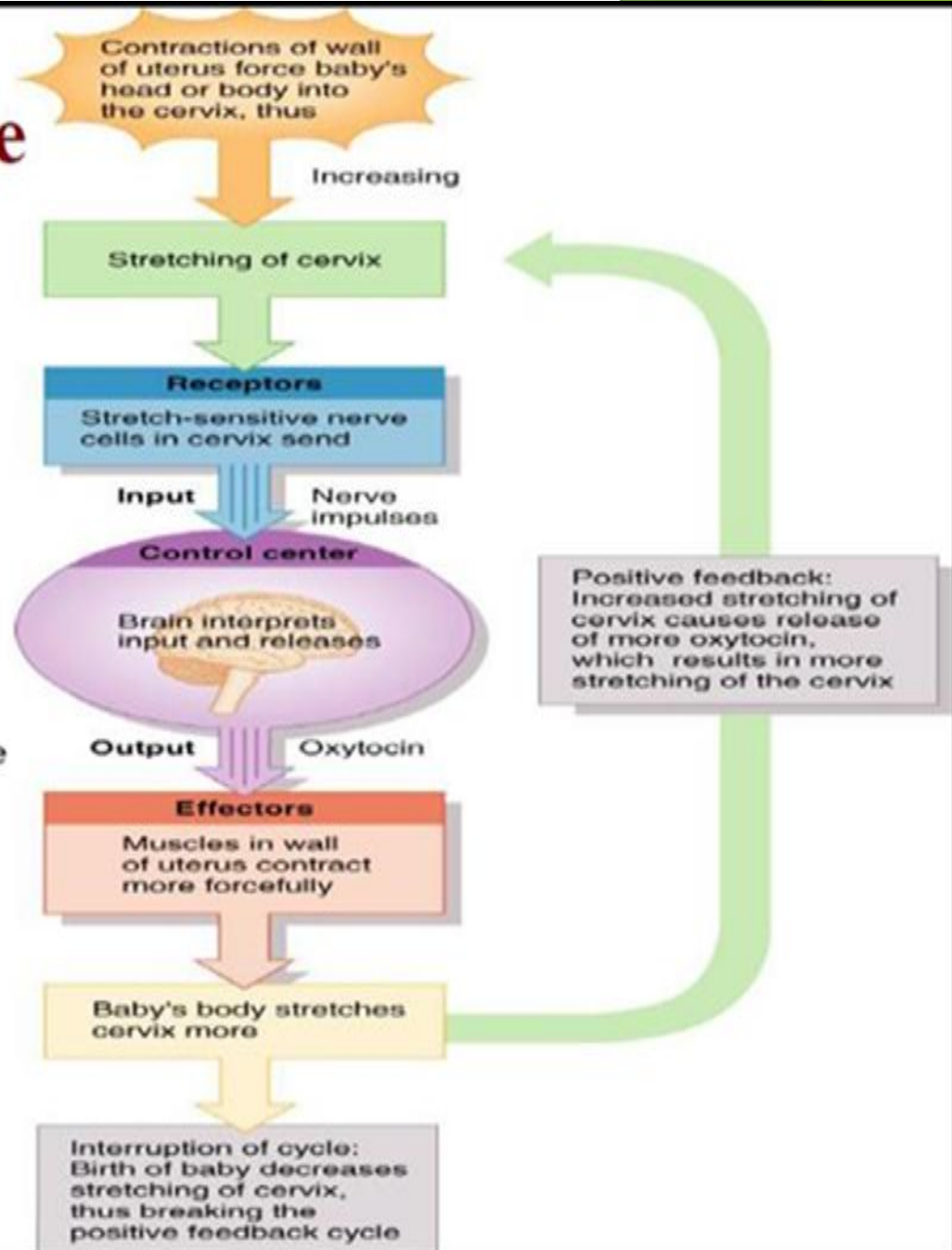
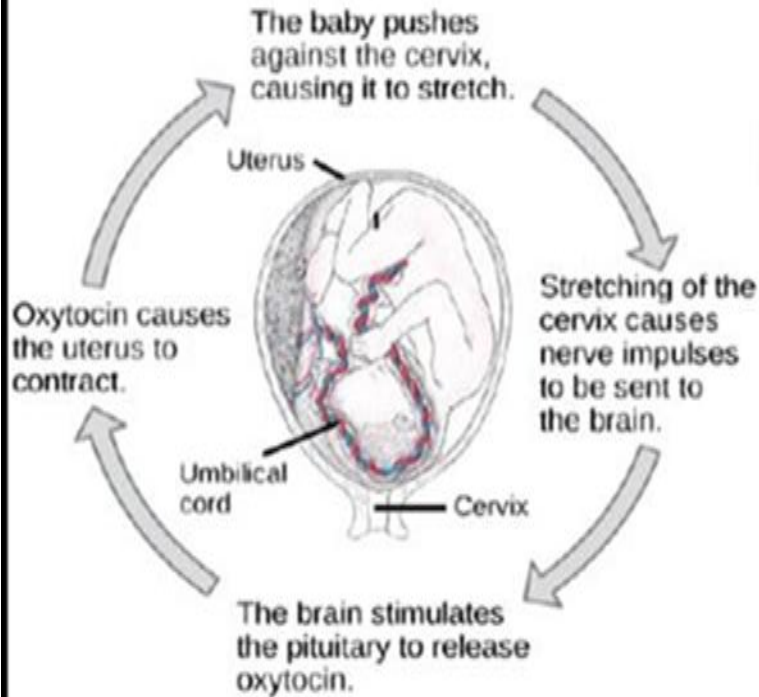
1. Uterine contractions at the time of labor.
2. The process of blood coagulation and platelet aggregation.



Regulating Blood Clot Formation



Regulating Uterine Contraction



Thank you

The image features the words "Thank you" in a 3D, blocky font. The letters are light yellow with blue outlines and are arranged in two rows: "Thank" on top and "you" below it. The text is set against a light pink background and casts a soft red shadow. Scattered around the text are several colorful, five-pointed stars in shades of cyan, yellow, and purple, each with a red shadow underneath.