SNS COLLEGE OF ALLIED HEALTH SCIENCE

Affiliated to The Tamil Nadu Dr MGR Medical University, Chennai

DEPARTMENT OF CARDIOPULMONARY PERFUSION CARE TECHNOLOGY

COURSE NAME: Physiology

UNIT I – Cell

TOPIC: Homeostatic Mechanism

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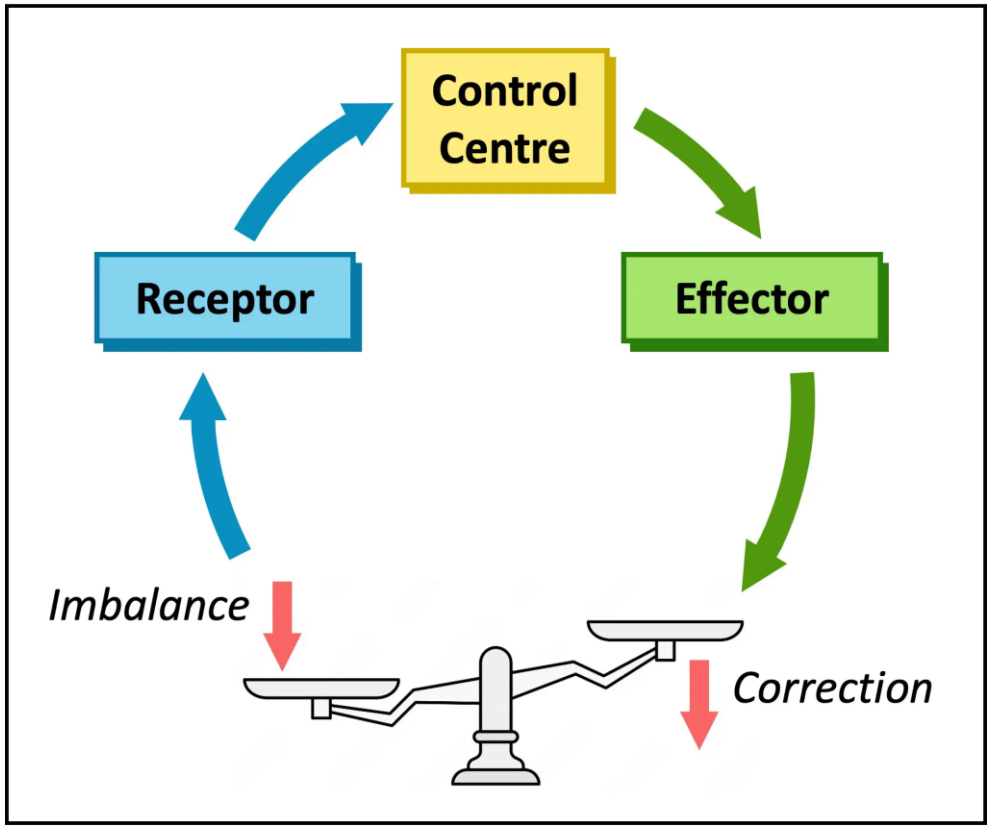
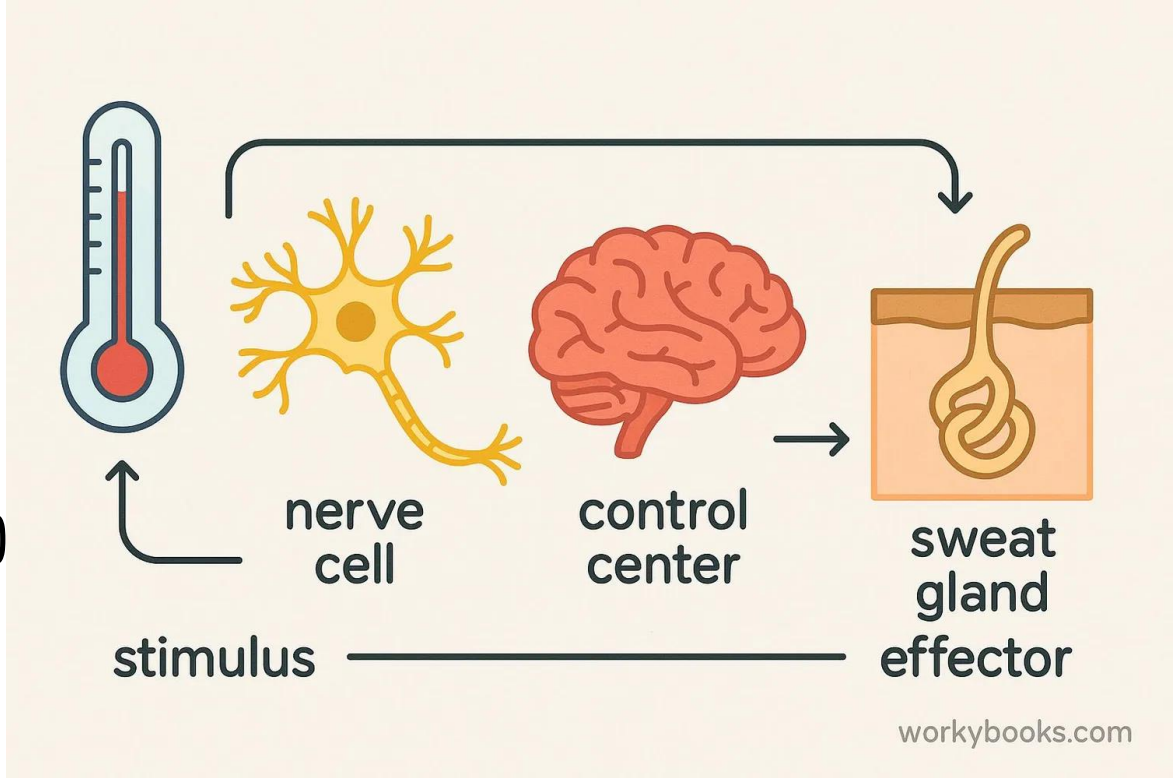
Definition of Homeostasis (Empathize)

- Homeostasis is defined as the maintenance of the consistency of the internal environment of the body.
- Coined by Walter Cannon (1929).
- Claude Bernard introduced the idea: “stability of the internal environment is a condition for free life.”



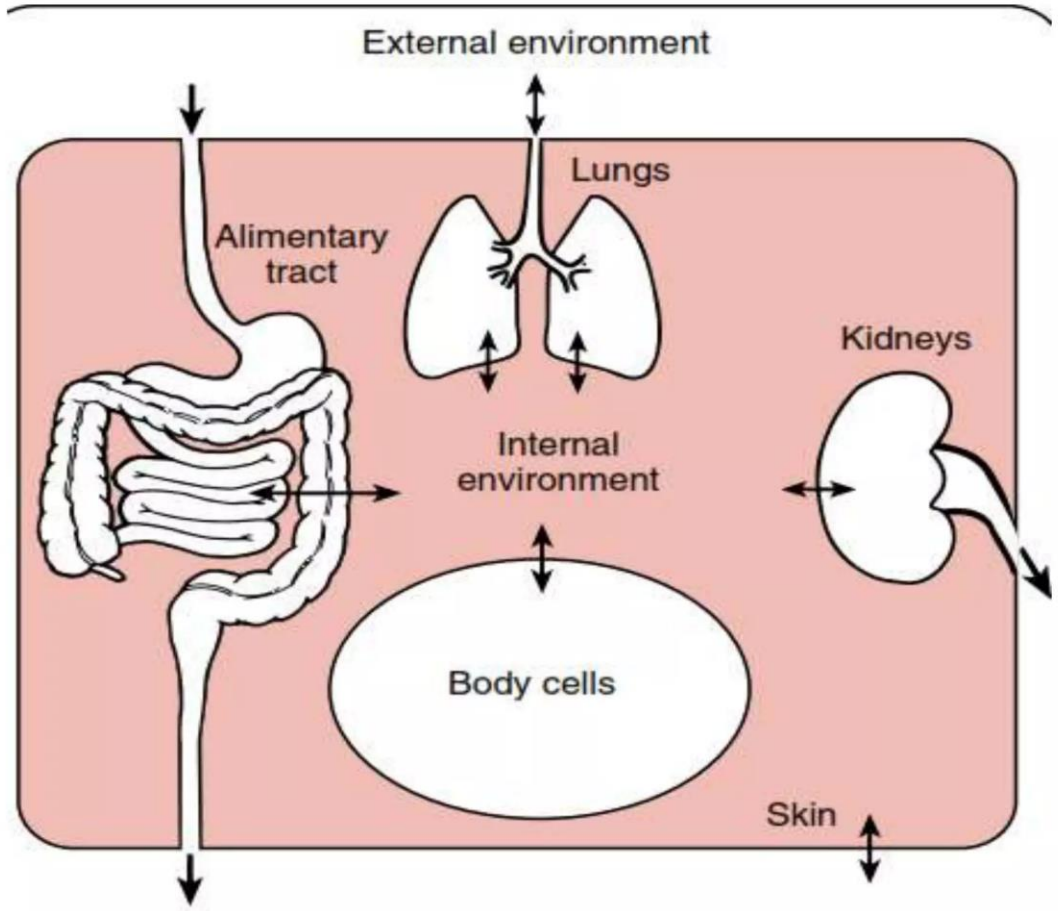
Components of Homeostasis (Define)

- **Receptor:** senses change (stimulus)
- **Control center**: processes information (usually nervous/endocrine system)
- **Effector**: brings about a response
- **Example**: skin (receptor), brain (control center) glands (effector)



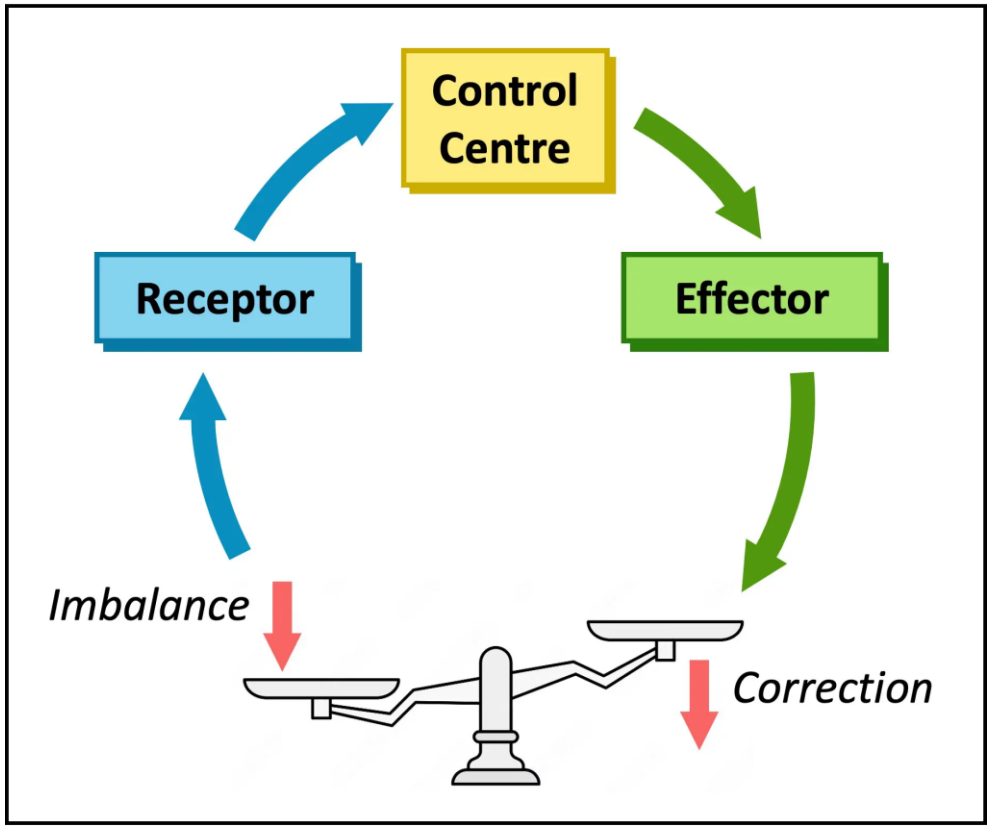
The Internal and External Environment

- The body's **internal environment** is the fluid and cellular surroundings that are regulated to maintain a stable state for cell function.
- The internal environment refers to the fluid that surrounds the cells, known as **the extracellular fluid (ECF)**
- The **external environment** includes all outside conditions like temperature, air, and stimuli.



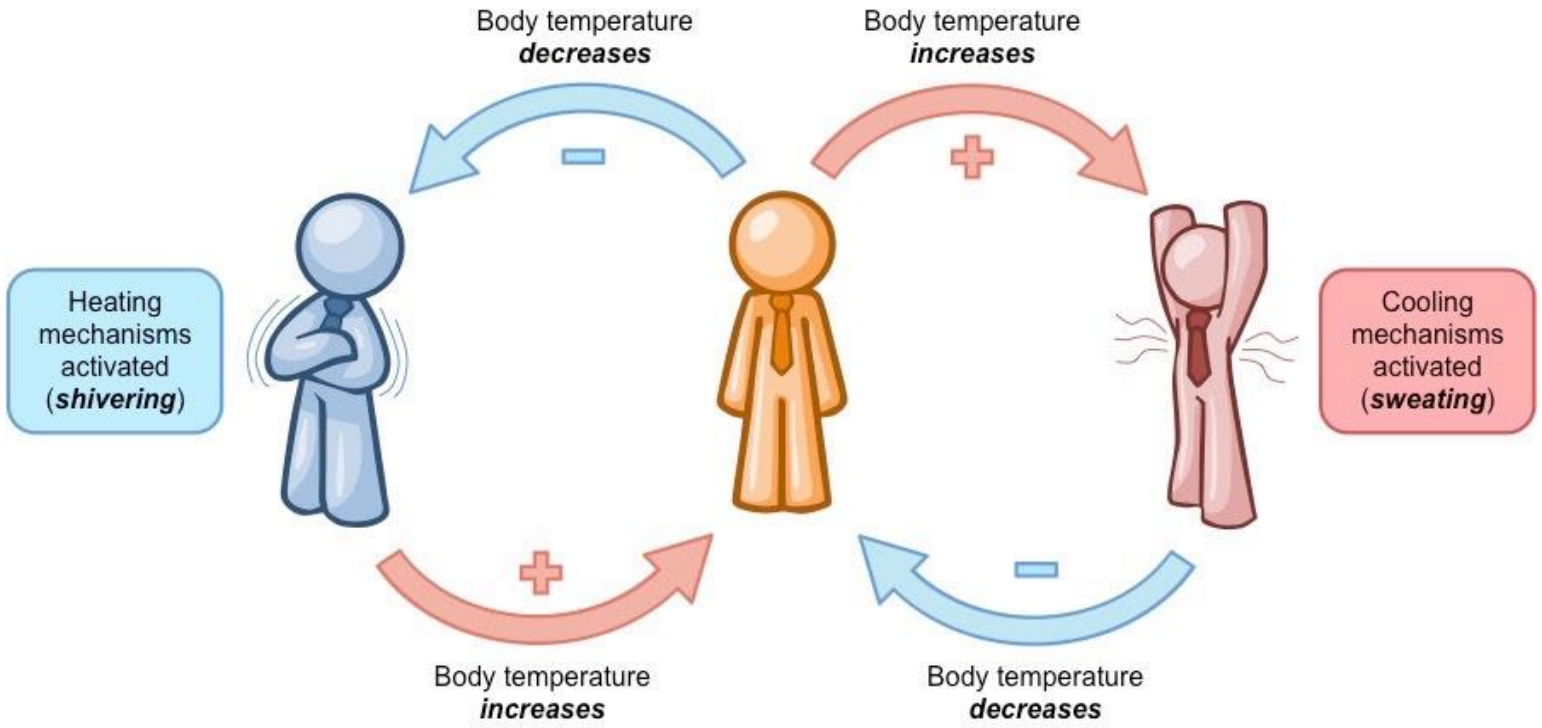
Homeostatic Mechanisms (Ideate)

- Mechanisms involve negative and positive feedback
- **Negative feedback:** most common, reverses a change to keep internal conditions stable.
- **Positive feedback:** amplifies a process, temporary (e.g., blood clotting)



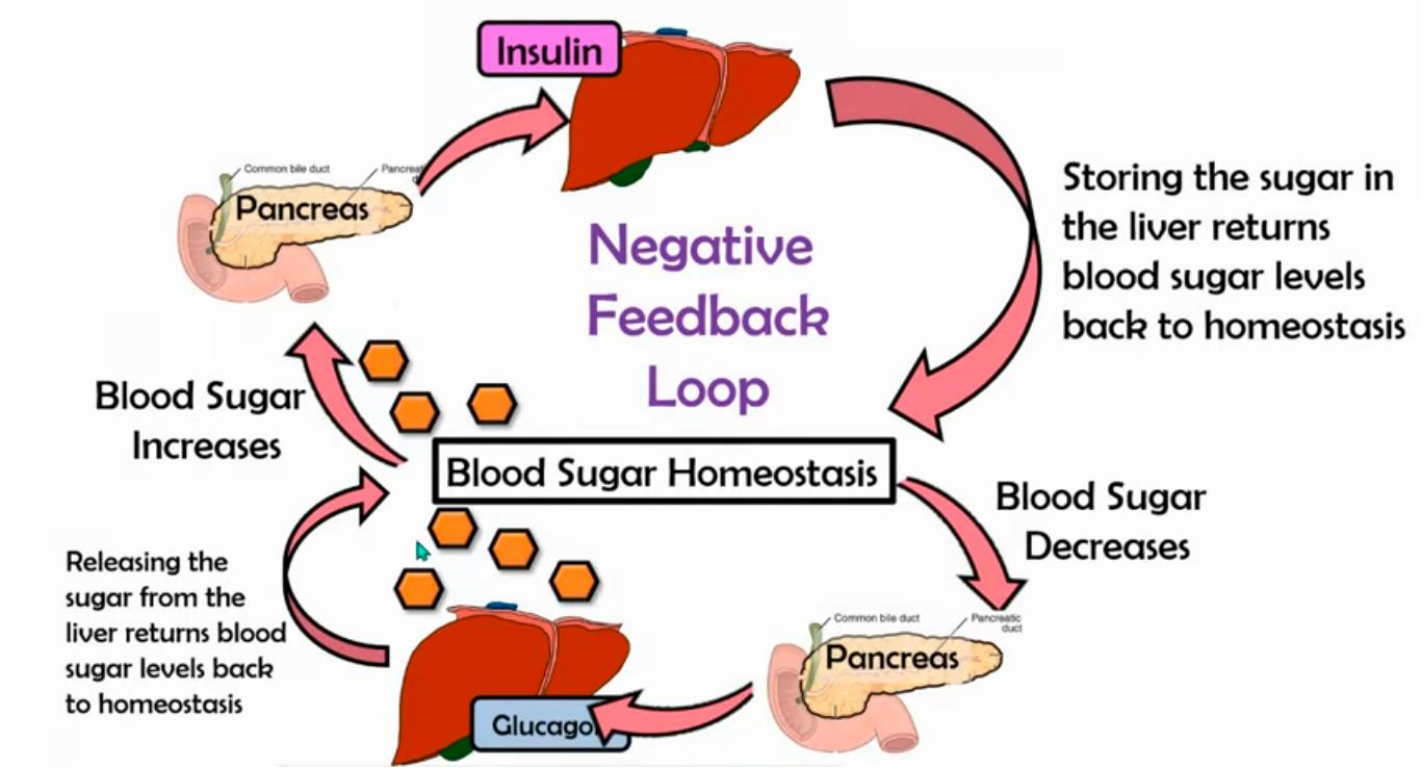
Negative Feedback - Regulation of Body Temperature (Test)

- **Stimulus:** change in external temperature
- **Receptors:** thermoreceptors
- **Control center:** hypothalamus
- **Effectors Organs:** sweat glands, blood vessels, muscles (shivering)
- Negative feedback brings temperature back to set point



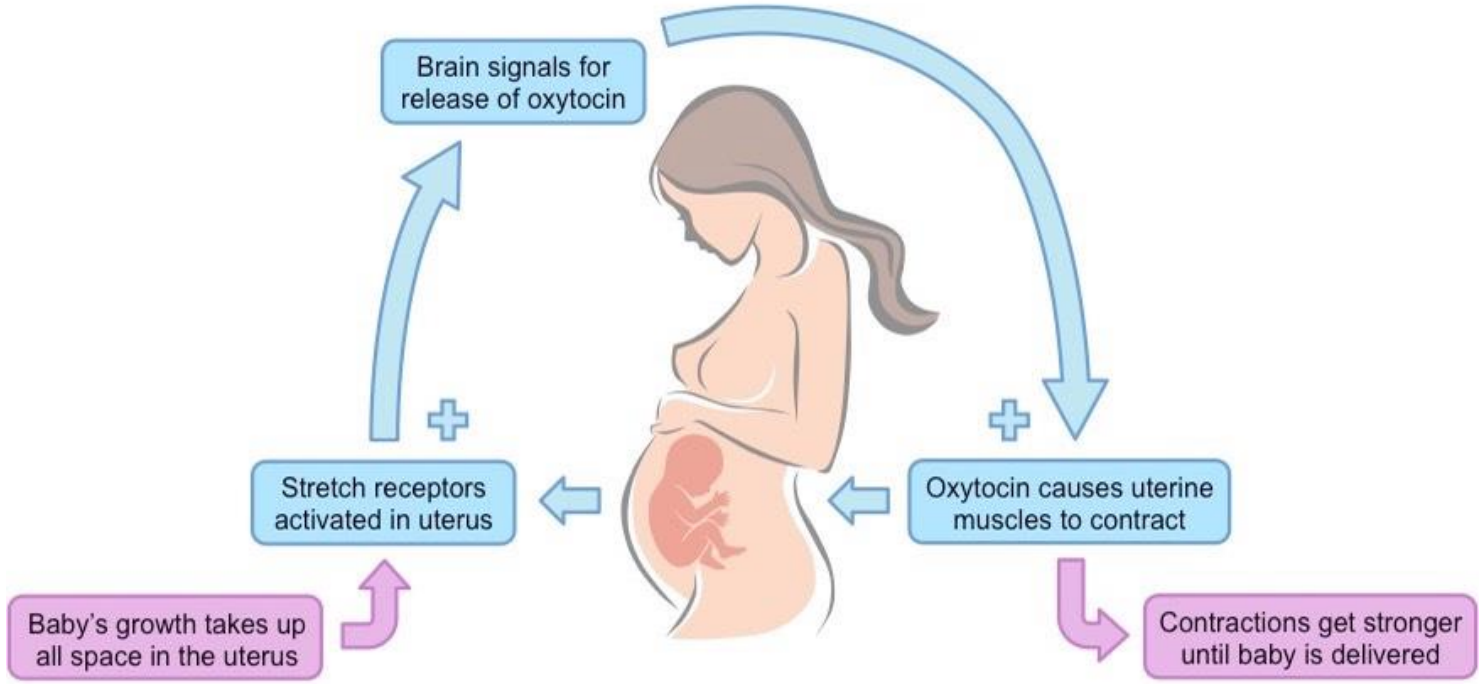
Negative Feedback - Regulation of Blood Glucose (Test)

- **High blood glucose** detected by pancreas
- **Pancreas secretes insulin**, promoting glucose uptake by cells
- Lowers blood glucose — negative feedback restores set point
- Opposed by glucagon if levels drop too low

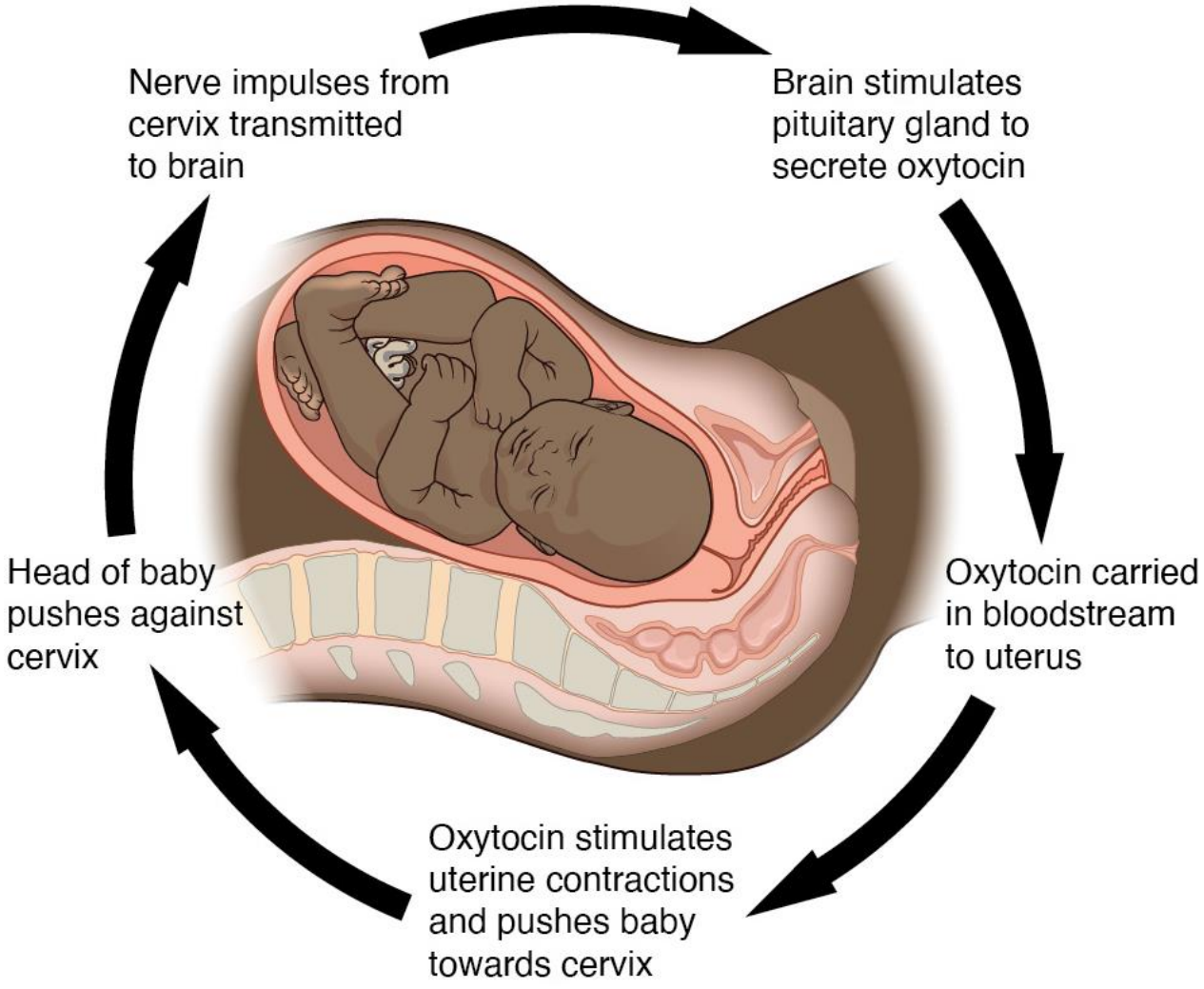


Positive Feedback

- A **positive feedback loop** is a process in the body where a change causes more of that same change to happen, making the initial effect stronger and stronger until a specific goal is achieved.
- They do not promote homeostasis
- Example: Childbirth, Ovulation and Lactation



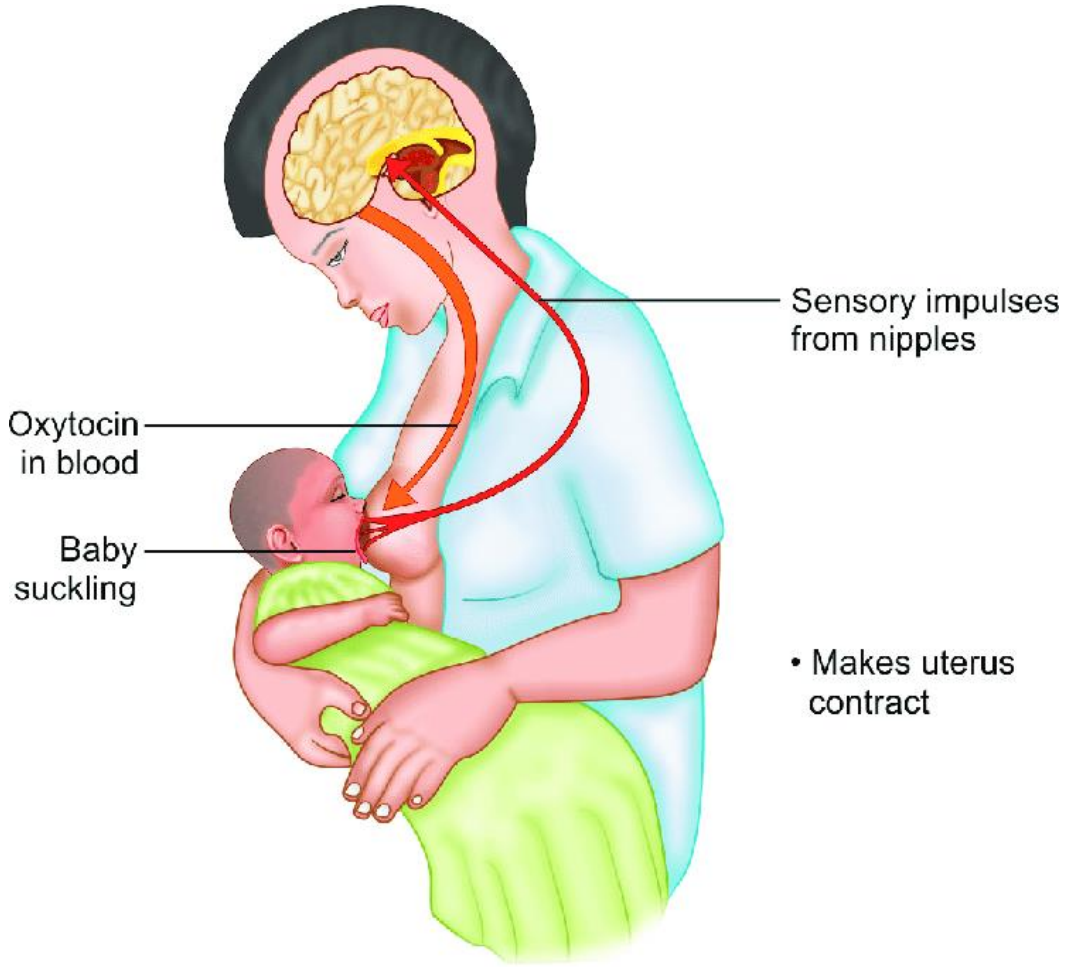
Positive Feedback - Child Birth (Test)



Childbirth – stretching of uterine walls cause contractions that further stretch the walls (this continues until birthing occurs)

Positive Feedback - Lactation (Test)

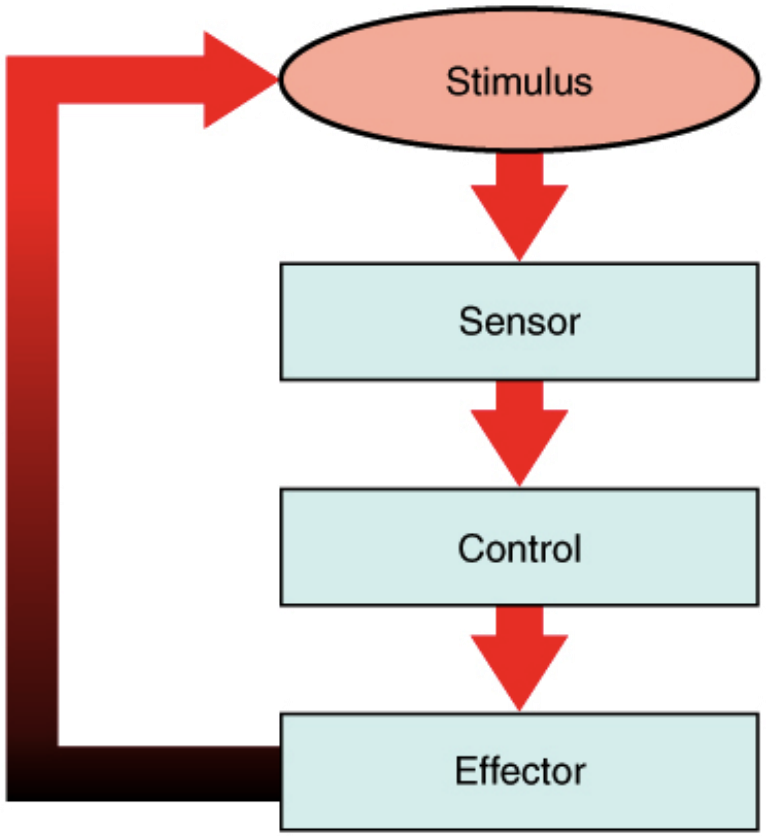
Lactation – the child feeding stimulates milk production which causes further feeding (continues until baby stops feeding)



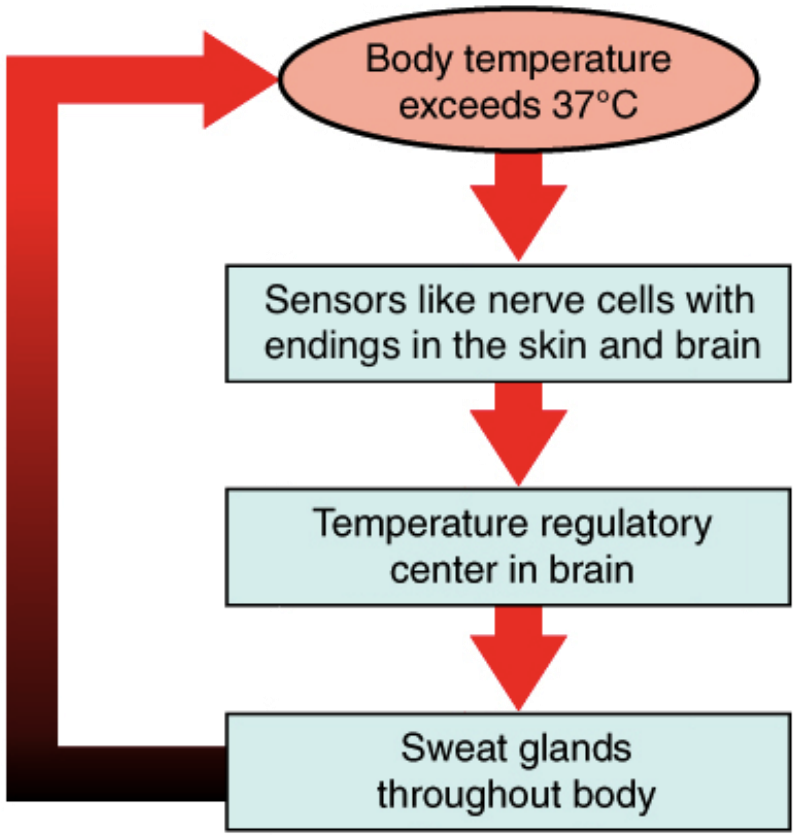
Physiological Importance of Homeostasis

- Ensures stable metabolic environment for all cells
- Failure leads to disease (e.g., diabetes, dehydration, acidosis/alkalosis)
- Example: kidneys regulate fluid/electrolyte balance

Summary



Negative feedback loop



Body temperature regulation

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THANK YOU