# Understanding Homeostasis: The Body's Balancing Act

Principles, Mechanisms, and Real-World Applications

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# Objectives

Define homeostasis and its significance.

Explain key components: receptors, control centers, effectors.

Compare negative and positive feedback loops.

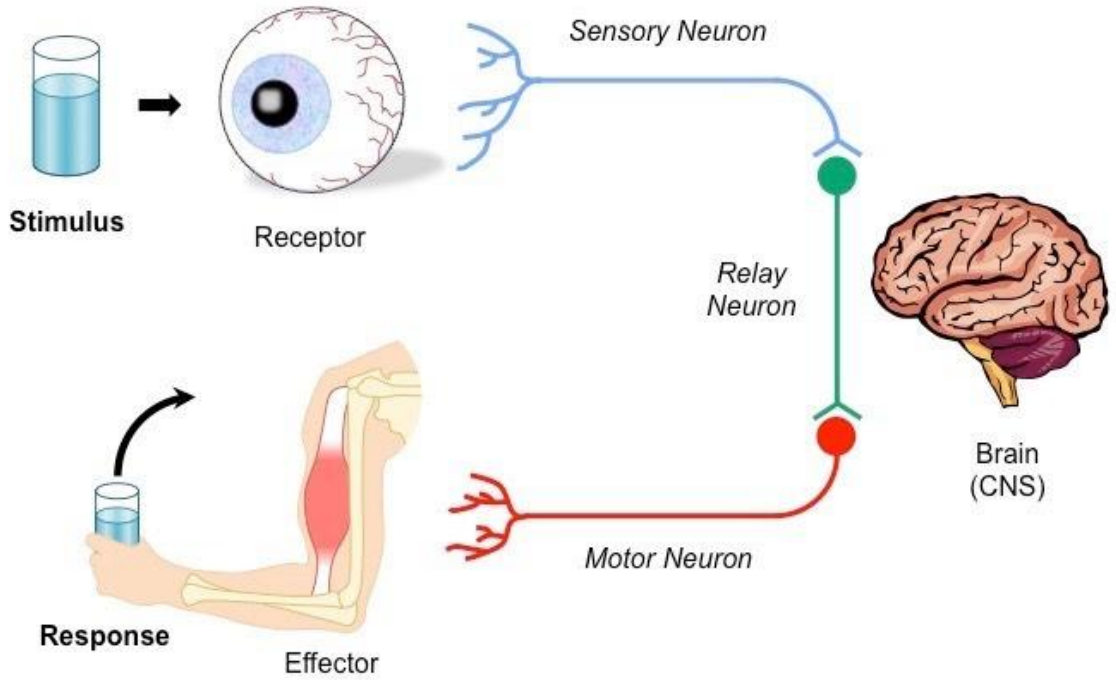
Apply concepts to real-life scenarios (e.g., diabetes, thermoregulation).

# What is Homeostasis?

**Definition:** Maintenance of a stable internal environment despite external changes.

**Examples:** Body temperature (37°C), blood glucose (~90 mg/dL), pH balance.

**Visual:** Simple flowchart showing stimulus → response.

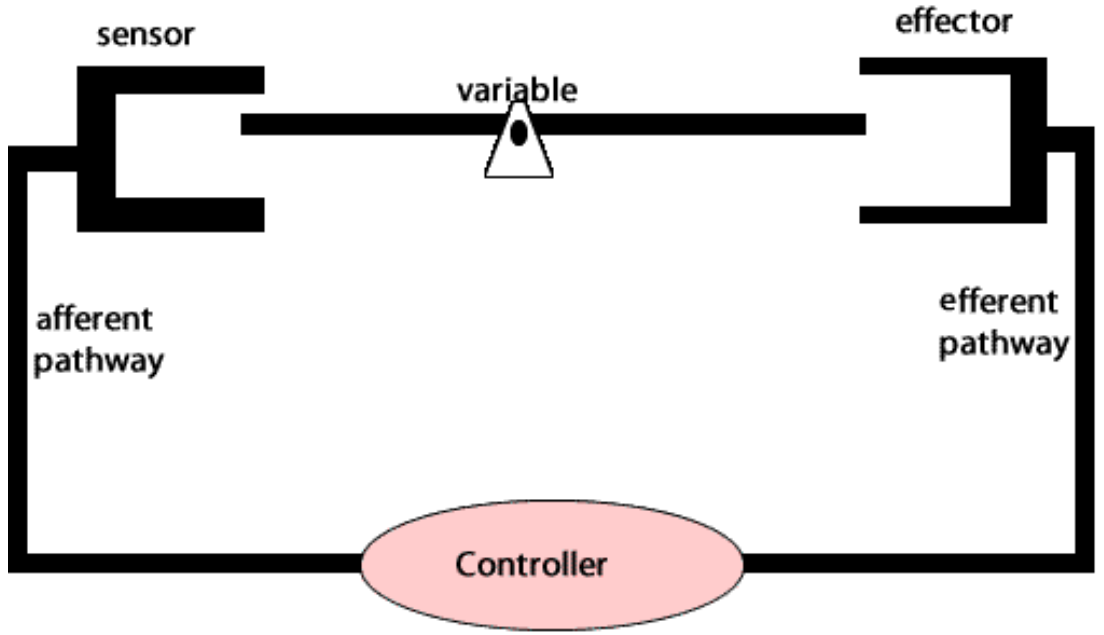


# Core Principles

**Walter Cannon’s Contributions:** "Fight or Flight" and homeostasis terminology.

**Key Components:**

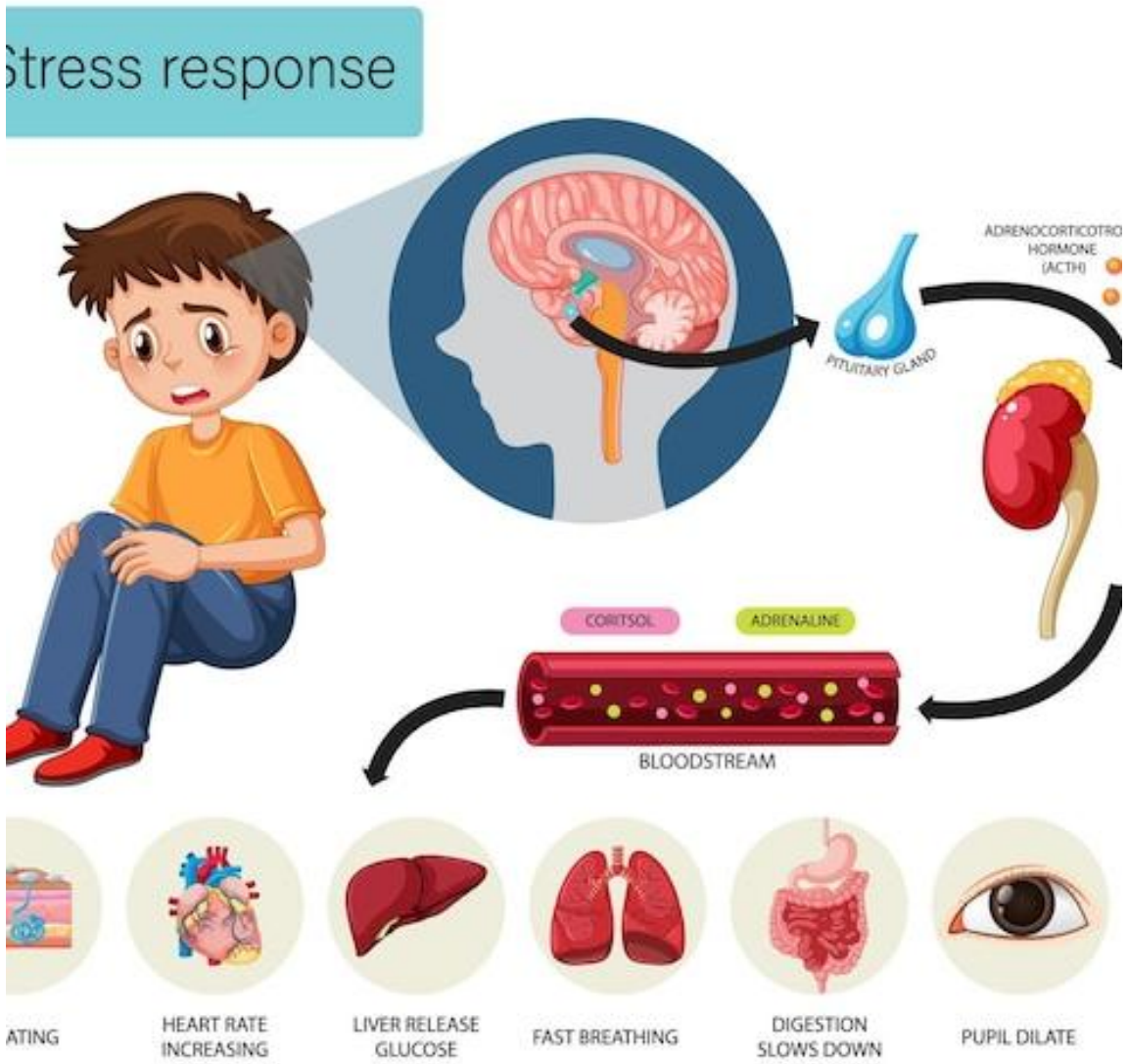
- **Receptors** (detect changes).
- **Control Center** (processes info, e.g., hypothalamus).
- **Effectors** (execute responses, e.g., muscles, glands).



# Fight or Flight Response - Examples

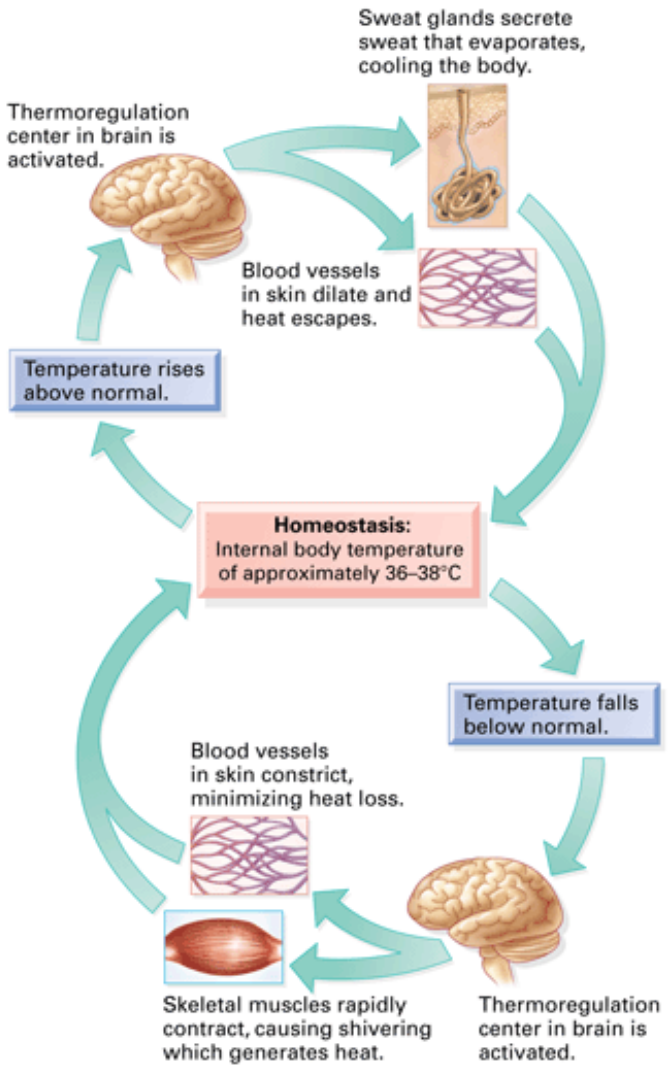
Stressor -> pituitary gland -> ADH hormone -> Adrenal Gland -> Cortisol and Adrenaline -> Response ( like sweating, heart rate increasing, fast breathing)

Stress responses (e.g., exams) trigger similar pathways to "fight or flight."



# Homeostasis - Examples

Temperature rises -> Thermoregulation center in brain -> blood vessels dilate and sweat glands produce sweat -> temperature returns back to normality



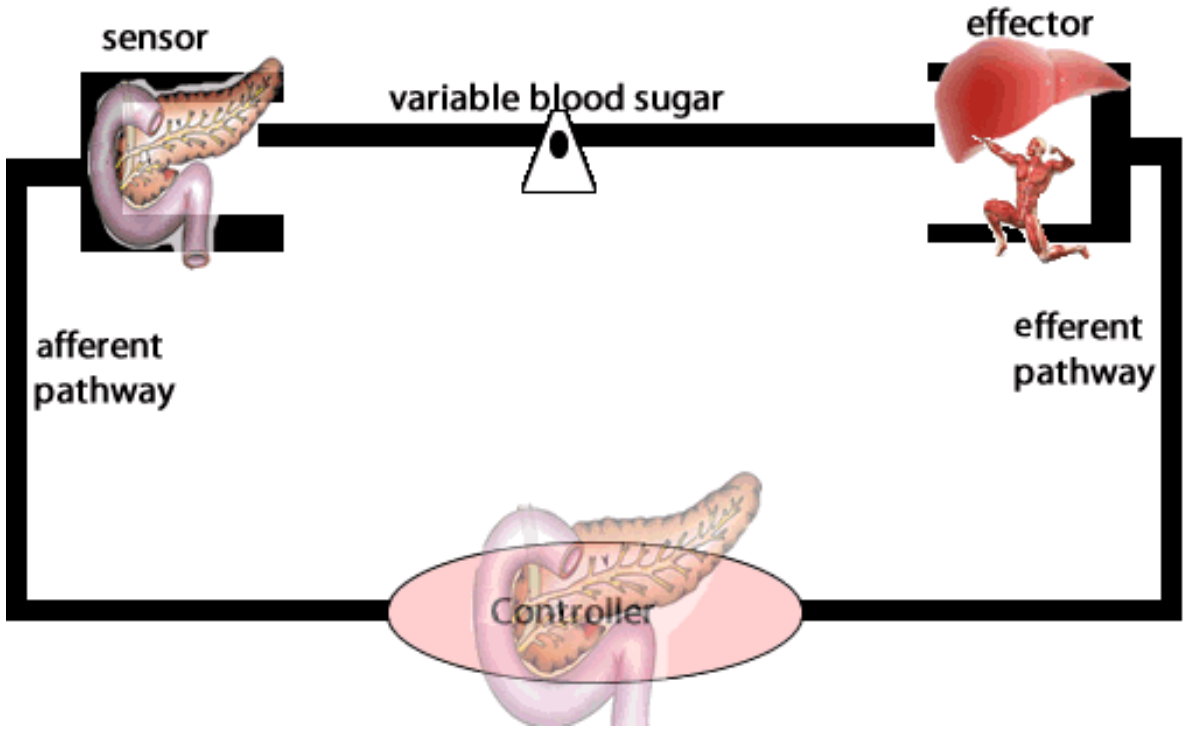
# Negative Feedback Loops

**Definition:** Reduces deviations from set points (most common).

**Example:** Blood sugar level

**Stimulus:** High blood sugar level → sensor in pancreas.

**Response:** Sugar level drops → Normal bood sugar level.



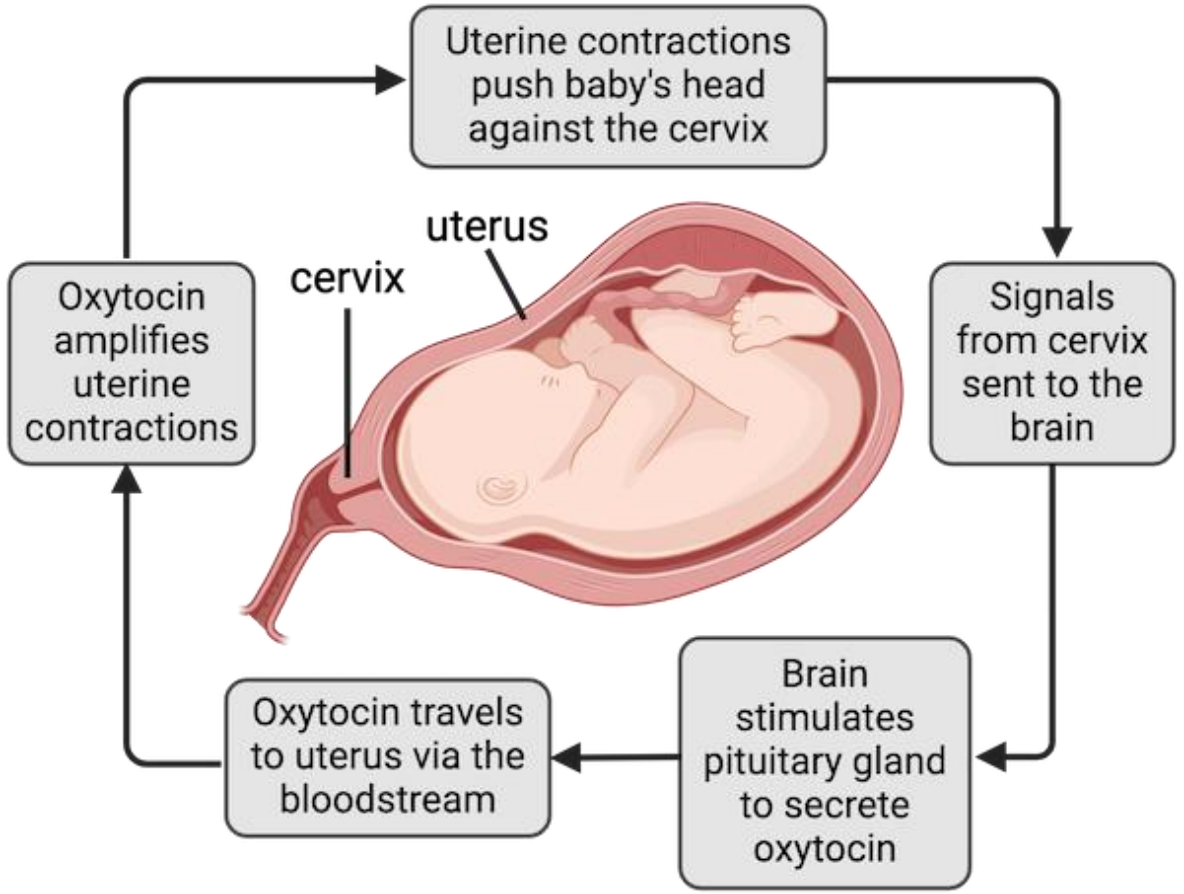
# Positive Feedback Loops

**Definition:** Amplifies changes to complete a process (less common).

**Example:** Childbirth

**Stimulus:** Oxytocin release → intensified contractions.

**Response:** Baby delivered → loop stops.



# Real-Life Applications

**Diabetes:** Breakdown in glucose regulation (insulin/glucagon).

**Thermoregulation:** Fever response and exercise.

**Kidneys:** Water balance via ADH.