Aim: To demonstrate positive and negative feedback mechanism

References:

- Tortora, G. J., & Derrickson, B. (2017). Principles of Anatomy and Physiology (15th ed.). Wiley.

Introduction:

Positive and negative feedback mechanisms are fundamental processes in biological regulation, influencing various physiological functions. This practical manual aims to demonstrate both types of feedback mechanisms using simple, illustrative examples.

Equipment Needed:

- Positive Feedback:

- Container of water
- Sponge

- Negative Feedback:

- Thermometer
- Heating pad

Positive Feedback Mechanism: Blood Clotting

1. Setup:

- Fill a container with water to represent blood.
- Place a sponge in the water to simulate injured tissue.

2. Procedure:

- Observe as the sponge absorbs water, mimicking the initiation of blood clotting.
- Note how the swelling of the sponge releases chemicals that attract additional clotting factors.
- Observe the amplification of the clotting process as more clotting factors accumulate.

3. Explanation:

- The initial clotting response stimulates the release of more clotting factors, intensifying the clotting process.

- This positive feedback loop continues until the clotting cascade is sufficiently activated to stop bleeding.

Negative Feedback Mechanism: Regulation of Body Temperature

1. Setup:

- Have a thermometer ready to measure body temperature.

- Use a heating pad to simulate an increase in environmental temperature.

2. Procedure:

- Start with the thermometer indicating a normal body temperature (e.g., 37°C).

- Apply the heating pad to simulate an increase in environmental temperature.

- Observe the thermometer's response over time.

3. Explanation:

- As the environmental temperature rises, the body's temperature also increases.

- Thermoreceptors in the skin and hypothalamus detect this change and signal the brain to initiate cooling mechanisms.

- Sweat production increases, blood vessels dilate, and heat is dissipated through evaporation and vasodilation, restoring normal body temperature.

- Once the temperature returns to the set point, the feedback loop is inhibited, and the cooling mechanisms are deactivated.

Result Table

Positive Feedback Mechanism: Blood Clotting

Observation	Explanation
Sponge absorbs water	Initiation of blood clotting response
Swelling of the sponge	Release of chemicals attracting additional clotting factors

Accumulation of clotting factors	Amplification of the clotting process

Negative Feedback Mechanism: Regulation of Body Temperature

Observation	Explanation
Increase in environmental temperature	Stimulus for body temperature elevation
Thermoreceptor detection of temperature change	Signal transmission to brain for activation of cooling mechanisms
Cooling mechanisms initiated	Sweat production, vasodilation, and heat dissipation
Return to normal body temperature	Inhibition of cooling mechanisms once temperature stabilizes