

# What is Hormone Regulation?

## Worksheet

Hormone regulation occurs through feedback mechanisms: negative feedback (high hormone inhibits further release) and positive feedback (hormone amplifies response, rare). The hypothalamus-pituitary-gland axis is central, coordinating hormone levels to maintain stable internal conditions.

## Questions

1. What is the primary function of negative feedback in hormone regulation?

- A) Amplify hormone response
- B) Maintain hormone levels within a narrow range
- C) Increase hormone secretion
- D) Prevent hormone synthesis

2. High cortisol levels inhibit CRH and ACTH release from the hypothalamus and pituitary. This is an example of:

- A) Positive feedback
- B) Negative feedback
- C) Feedforward mechanism
- D) Hormone antagonism

3. The hypothalamus releases TRH, which triggers the pituitary to release TSH, which stimulates the thyroid. What is this system called?

- A) Feedback loop
- B) Hormone cascade
- C) Hypothalamic-pituitary-thyroid (HPT) axis
- D) Endocrine reflex

4. During positive feedback (e.g., oxytocin during labor), the response:

- A) Inhibits further hormone release
- B) Amplifies the stimulus and hormone release
- C) Returns to baseline
- D) Has no effect on hormone secretion

5. Blood glucose rises to 180 mg/dL after a meal. How does the endocrine system respond?

6. A person experiences acute stress. How does the sympathetic nervous system activate the adrenal medulla?

7. During labor, uterine contractions stimulate oxytocin release. How does this differ from typical negative feedback?

8. Define: What is negative feedback in hormone regulation?

9. Define: Give an example of negative feedback.

10. Define: What is the hypothalamus-pituitary axis?

## Answer Key

1. B) Maintain hormone levels within a narrow range - Negative feedback restores levels to setpoint, preventing dangerous extremes and maintaining homeostasis.
2. B) Negative feedback - High cortisol inhibits its own release - classic negative feedback that maintains stable cortisol levels.
3. C) Hypothalamic-pituitary-thyroid (HPT) axis - The HPT axis is a hierarchical system: hypothalamus pituitary thyroid (endocrine gland).
4. B) Amplifies the stimulus and hormone release - Positive feedback amplifies: more contractions more oxytocin more contractions (until delivery).
5. High blood glucose (hyperglycemia) is detected by pancreatic beta cells. Beta cells release insulin into the bloodstream. Insulin stimulates cells to take up glucose, and the liver to store glucose as glycogen. Blood glucose falls back to ~100 mg/dL (fasting level). As glucose normalizes, insulin secretion decreases (negative feedback).
6. Stressor detected by brain; sympathetic neurons activate. Sympathetic nerves trigger adrenal medulla to release epinephrine and norepinephrine. These hormones increase heart rate, blood pressure, and glucose mobilization. When stress subsides, sympathetic tone decreases and hormone levels fall (negative feedback).
7. Uterine stretch sensory neurons stimulate hypothalamus. Hypothalamus releases oxytocin from posterior pituitary. Oxytocin intensifies uterine contractions more stretch more oxytocin (positive feedback). Positive feedback continues until delivery ends the stimulus - a rare, appropriate use.
8. A mechanism where elevated hormone levels inhibit further hormone release, maintaining stable levels.
9. High thyroid hormone (T3/T4) inhibits TRH and TSH release, reducing thyroid stimulation.
10. The central control system linking the brain (hypothalamus) to the pituitary gland, coordinating hormonal responses.

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