

# Physiology Class 5: Endocrine and Immune Physiology

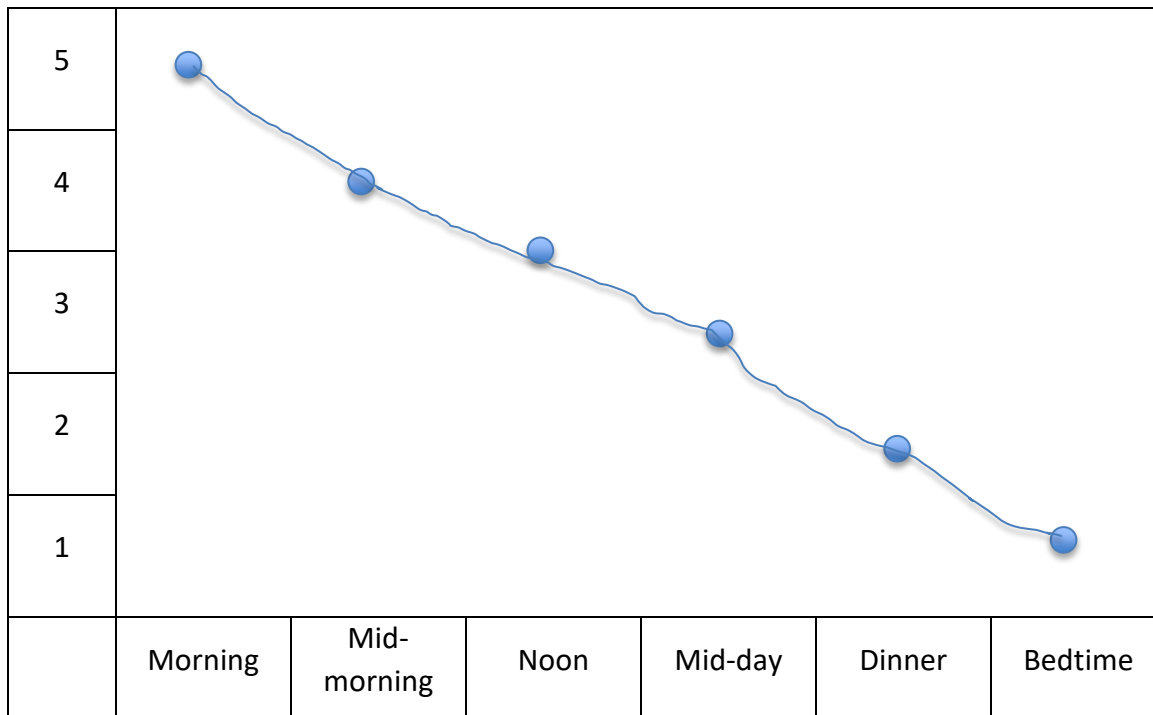
## Activities

These activities are designed to be done at home. There is no grade given for these and they do not have to be turned in. The answer key has been emailed to your grown up.

### Track Your Energy Levels

Let's figure out what your cortisol rhythm might look like. Keep a daily log for 7 days of what your energy level is throughout the day. Use the student chart to mark your energy levels for each day using a different color for each day. When you are done, you will have a graph of your energy levels. Think about the results! When in the day are your energy levels the highest? When are they the lowest? How might this be explained by your cortisol levels? Levels: 1 = very little energy, 3 = not too much and not too little, 5 = most energy. You can choose any number 1-5 to describe your level of energy. Mark it with a colored dot. The first one is an example of 1 day for the teacher. What does yours look like?

### Teacher Example



Student Chart

5						
4						
3						
2						
1						
	Morning	Mid-morning	Noon	Mid-day	Dinner	Bedtime

**There is no specific parent answer key for this activity!**

**Negative Feedback Loops**

Pay attention to the world around you for a few days. See if you can identify some negative feedback loops in your everyday life, whether in your body or in the world around you. And say why this feedback loop is important.

**Answers**

**BODY Examples**

Body Temperature Regulation

- When you are too hot → you sweat → body cools down
- When you are too cold → you shiver → body warms up
- ✓ This keeps body temperature stable.

Blood Sugar Regulation

- After eating → blood sugar rises → insulin released → blood sugar drops
- Between meals → blood sugar falls → glucagon released → blood sugar rises
- ✓ Keeps energy levels balanced.

### Thirst & Hydration

- When water is low → you feel thirsty → you drink water
- When hydrated → thirst turns off
- ✓ Prevents dehydration.

### Breathing & Carbon Dioxide

- When CO<sub>2</sub> in blood rises → breathing speeds up
- When CO<sub>2</sub> drops → breathing slows
- ✓ Keeps oxygen and carbon dioxide balanced.

## EVERYDAY LIFE & WORLD EXAMPLES

### Home Thermostat

- Room too cold → heater turns on
- Room too warm → heater turns off
- ✓ Classic mechanical negative feedback loop.

### Toilet Tank Filling

- Water level drops → valve opens
- Tank fills → valve closes
- ✓ Prevents overflow or emptiness.

### Phone Brightness Auto-Adjust

- Bright light → screen dims
- Low light → screen brightens
- ✓ Matches environment automatically.

### Car Cruise Control

- Car slows down → system adds more gas
- Car speeds up → system reduces gas
- ✓ Keeps speed steady.

## Key Teaching Note for Parents

Students do not need to use scientific terms to be correct.

Any observed system where:

A change triggers a response that reverses the original change counts as a correct negative feedback loop.

## Pre-Assessment Quiz: Endocrine and Immune Physiology

1. Which gland acts as the body's main control center for hormone regulation?

- A. Thyroid gland
- B. Adrenal gland
- C. Pineal gland
- D. Hypothalamus**

2. What hormone produced by the pineal gland helps regulate the sleep–wake cycle?

- A. Insulin
- B. Melatonin**
- C. Cortisol
- D. TSH

3. Which hormone stimulates the thyroid to release T3 and T4?

- A. ACTH
- B. Growth hormone
- C. TSH**
- D. Glucagon

4. What mineral is essential for the thyroid to make its hormones?

- A. Calcium
- B. Sodium
- C. Iodine**
- D. Magnesium

5. Which adrenal hormone produces a fast 'fight or flight' response?

- A. Cortisol
- B. Adrenaline**
- C. Aldosterone

D. Leptin

6. What does insulin do?

A. Raises blood sugar

**B. Lowers blood sugar**

C. Releases stored glucose

D. Blocks glucose from entering cells

7. What do B cells produce to help neutralize and remember pathogens?

A. Cytokines

**B. Antibodies**

C. Cortisol

D. MHC I

8. What is the main purpose of inflammation?

A. To damage tissues

B. To slow immune cells

**C. To promote healing**

D. To reduce blood flow

9. What process do we have in the body that helps increase substances when needed and then decrease substances when we have enough?

**A. Negative Feedback Loop**

B. Detoxification

C. Excretion

D. Bone Remodeling

10. What happens during a negative feedback loop?

A. A change triggers a response that amplifies it

**B. A change triggers a response that reverses it**

Parent Copy

C. Hormones stop working entirely

D. Cells stop recognizing antigens