



Grade 9 Sample Lesson Plan: The Endocrine System

Objectives/Goals

- Students will learn about the glands and functions of the endocrine system. Students will consider these functions in their own lives and will be able to identify the the connections to disease.

Materials

- Handouts, Internet access for video clips and information.

Procedure

- Introduce the endocrine system to students, e.g.,:
The endocrine system is network of glands that produce and release hormones. Hormones are chemical substances that help control many important body functions, including the body's ability to change calories into energy that powers cells and organs. The endocrine system influences how your heart beats, how your bones and tissues grow, even your ability to make a baby. It plays a vital role in whether or not you develop diabetes, thyroid disease, growth disorders, sexual dysfunction, and a host of other hormone-related disorders. (Source: WebMD <http://www.webmd.com/diabetes/endocrine-system-disorders#1>)
- Additionally, ensure that students know that the endocrine system works in concert with the nervous system to regulate body activities.
The nervous system acts through electrical impulses and neurotransmitters to cause muscle contraction and glandular secretion).

Fight or Flight

 psychcentral.com/lib/fight-or-flight/

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Consider this stressful situation: At a meeting for which you have thoroughly prepared, the chair criticizes you and accuses you of failing to attend to tasks that were, in reality, someone else's responsibility. As all eyes turn on you, you feel your face getting hot, your jaw tightening, and your fist clenching. You would not shout or hit anyone—doing so would only make things worse. But you feel like shouting or striking out.

Now consider another stressful situation: You walk into class a few moments late, only to find everyone putting books and notes away—apparently preparing for a test you did not realize had been scheduled for today. Your heart seems to stop, your mouth is dry, your knees feel weak and you momentarily consider hurrying back out the door. Your life is not really in danger, and running away will not solve your problem—so why should you feel a physical urge to escape?

These two scenarios illustrate the two poles of the **fight-or-flight response**, a sequence of internal processes that prepares the aroused organism for struggle or escape. It is triggered when we interpret a situation as threatening. The resulting response depends on how the organism has *learned* to deal with threat, as well as on an *innate* fight-or-flight "program" built into the brain.

The learned fight response

Evidence that the fight response can be learned is seen, for example, in studies showing that reactions to a perceived insult are strongly dependent on culture. In the United States the learned fight response has been nurtured in the "culture of honor" that developed in the South—which some experts believe may account for the southern states' much higher murder rate in comparison to the northern states.⁽¹⁾ Learning can also affect our internal responses to stress. For example, in a study of patients with high blood pressure (which can be a stress response), those who took placebos along with their medication for high blood pressure maintained a healthy blood pressure after the medication was removed, as long as they continued taking the placebo.⁽¹⁾⁽²⁾

This suggests that their expectation that the placebos would control their blood pressure was enough to reduce the emergency response of the blood vessels.

While the fight or flight response clearly can be learned, it also involves an innate reaction that operates largely outside consciousness. This was first recognized in the 1920s by physiologist Walter Canon, whose research showed that a threat stimulates a sequence of activities in an organism's nerves and glands. We now know that the hypothalamus controls this response by initiating a cascade of events in the autonomic nervous system (ANS), in the endocrine system and in the immune system.⁽⁴⁾

As you will recall, the autonomic nervous system regulates the activities of our internal organs. When we perceive a situation as threatening, this judgment causes the hypothalamus to send an emergency message to the ANS, which sets in motion several bodily reactions to stress. This response is helpful when you need to escape a hungry bear or confront a hostile rival.

It served our ancestors well, but it has a cost. Staying physiologically on guard against a threat eventually wears down the body's natural defenses. In this way, suffering from frequent stress—or frequently *interpreting* experiences as stressful—can create a serious health risk: an essentially healthy stress response can become *distress*.

Adapted from Psychology, Third Edition, by Philip G. Zimbardo, Ann L. Weber and Robert Lee Johnson.

References

1. Nisbett, R. E. (1993). "Violence and U.S. regional culture." *American Psychologist*, 48, 441 -449.
2. Ader, R., & Chohen, N. (1975). "Behaviorally conditioned immuno-supression." *Psychosomatic Medicine*, 37, 333 -340.
3. Suchman, A. L. and Ader, R. (1989). "Placebo response in humans can be shaped by prior pharmacologic experience." *Psychosomatic Medicine*, 51, 251.
4. Jansen, A. S. P., Nguyen, X. V., Karpitskiy, V., Mettenleiter, T. C., & Loewy, A. D. (1995, October 27). "Central command neurons of the sympathetic nervous system: Basis of the fight-or-flight response." *Science*, 270, 644 -646.

Name:

Date:

I didn't know that!

Please answer each question with true or false (not T or F). This is not a graded test. I just want to see what you already know!

- _____ 1. Hormones can make you grow to be nine feet tall.
- _____ 2. Hormones can affect your ability to taste salty foods.
- _____ 3. Hormones can make you very sensitive to high-pitched sounds.
- _____ 4. Hormones cause a young man to begin to grow facial hair.
- _____ 5. Hormones can help fight stress.
- _____ 6. Hormones determine what color eyes you have.
- _____ 7. Hormones can cause you to be allergic to milk.
- _____ 8. Hormones can make your heart beat faster when you are scared.
- _____ 9. Hormones can soothe you.
- _____ 10. Hormones can cause your hands to tremble when you are nervous.
- _____ 11. Hormones affect how much energy you have.
- _____ 12. Hormones affect how fast or slow you read.
- _____ 13. Hormones tell your body how fast it should grow.
- _____ 14. Hormones give you the strength and energy to fight or run when in a dangerous situation.
- _____ 15. Hormones cause your voice to change, especially in boys.
- _____ 16. Hormones can make twins become triplets before they are born.
- _____ 17. Hormones tell your body how to swallow.
- _____ 18. Hormones help control when you sleep and when you wake.

ANSWER KEY TO PRE-QUIZ

<http://inside.mines.edu/~nstambac/Body%20Systems%20Lesson%20Plan.pdf>

Name:

Date:

I didn't know that!

Please answer each question with true or false (not T or F). This is not a graded test. I just want to see what you already know!

- True 1. Hormones can make you grow to be nine feet tall.
- False 2. Hormones can affect your ability to taste salty foods.
- False 3. Hormones can make you very sensitive to high-pitched sounds.
- True 4. Hormones cause a young man to begin to grow facial hair.
- True 5. Hormones can help fight stress.
- False 6. Hormones determine what color eyes you have.
- False 7. Hormones can cause you to be allergic to milk.
- True 8. Hormones can make your heart beat faster when you are scared.
- True 9. Hormones can soothe you.
- True 10. Hormones can cause your hands to tremble when you are nervous.
- True 11. Hormones affect how much energy you have.
- False 12. Hormones affect how fast or slow you read.
- True 13. Hormones tell your body how fast it should grow.
- True 14. Hormones give you the strength and energy to fight or run when in a dangerous situation.
- True 15. Hormones cause your voice to change, especially in boys.
- False 16. Hormones can make twins become triplets before they are born.
- False 17. Hormones tell your body how to swallow.
- True 18. Hormones help control when you sleep and when you wake.