

## THE SCIENCE OF FRINGE

### EXPLORING: HORMONES

A SCIENCE OLYMPIAD THEMED LESSON PLAN  
SEASON 3 - EPISODE 1: **OLIVIA**

#### **Overview:**

Students will learn about the types of hormones and how they are used to regulate various functions in an organism.

**Grade Level:** 9–12

#### **Episode Summary:**

Olivia is a prisoner of Walternate and his team in the alternate universe. They submit her to various medical and psychological procedures in an attempt to convert her to their side. When Olivia escapes from the prison she hijacks a taxi and visits various locations in an attempt to find a way back to our universe. As she is running, her mental state slowly deteriorates, while she struggles with maintaining her identity.

#### **Related Science Olympiad Event:**

Anatomy & Physiology - This event encompasses the anatomy and physiology of selected body systems, this year limited to respiratory, muscular and endocrine systems.

#### **Learning Objectives:**

Students will understand the following:

- The endocrine system secretes hormones into the bloodstream to regulate the many functions of an organism, including mood, growth and development, tissue function, and metabolism.
- Only a small amount of hormone is required to alter cell metabolism.
- All multi-cellular organisms produce hormones, including plants.

#### **Episode Scenes of Relevance:**

- Brandon injecting Olivia with B lymphocytes.
- Walternate and Olivia discussing why Olivia's treatment ended up working.
- View the above scenes: <http://www.fox.com/fringe/fringe-science>

**FOX CODE**



**FOR SMARTPHONES**

## Online Resources:

- Fringe “Olivia” full episode: <http://www.fox.com/watch/fringe>
- Science Olympiad Anatomy and Physiology event: [http://soinc.org/anatomy\\_physiology\\_c](http://soinc.org/anatomy_physiology_c)
- The Hormone Foundation: <http://www.hormone.org/endo101/>
- Pathophysiology of The Endocrine System:  
<http://www.vivo.colostate.edu/hbooks/pathphys/endocrine/index.html>
- Plant Hormones: <http://www.biologie.uni-hamburg.de/b-online/e31/31.htm>

## Procedures:

1. Tell your students that they are going to learn about the endocrine system and specifically the role hormones play in regulating various functions of the body.
2. Have your students research hormones and specifically plant hormones in resources such as biology textbooks and websites and discuss what they have learned.
3. Divide your class into groups. Have each group complete the following activity:
  - a. Materials: bowls, water, vitamin C tablets, apples or pears, paper towels, zip lock bags
  - b. Have each group fill two bowls with water. Put a vitamin C tablet in one bowl and stir it to ensure it is dissolved.
  - c. Each group should cut an apple or pear into 4 slices. Place one slice in each bowl, one slice on a paper towel and one slice in the zip lock bag. Try to get as much air as possible out of the bag before sealing it.
  - d. Allow the slices in the bowls to soak for 5-10 minutes and then remove them and place them on the paper towel to dry off.
  - e. Check back regularly on the slices over the next 30-45 minutes. Note the differences in the browning that occurs.
4. Discuss with the class the results of the activity. Be sure to address:
  - a. Which slices browned the fastest? Which ones the slowest?
  - b. Browning is part of the ripening process, which is regulated by the plant hormone ethylene.
  - c. What could be the possible mechanism by which the vitamin C water affects the browning?

## Additional Discussion Suggestions:

- What would happen if the slice left out in the air was placed in a bag with the other slices? They will begin browning faster due to the ethylene it is giving off. Thus the origin of the phrase “one rotten apple spoils the whole bunch”.
- Apples and pears can be bought in the grocery store year-round. What are some possible procedures suppliers utilize to ensure they are also ripe, regardless of the time of year?

## Extension to Other Subjects:

Health Science: Diabetes mellitus is a well-known metabolic disease related to the hormone insulin. Discuss what causes diabetes and ways of managing the disease.

Social Sciences: The use of various types of hormones in livestock is a somewhat controversial practice. Research what some of these practices are and discuss why some people are concerned about them.

History: Many medical therapies and medications related to hormones have resulted in significant increases in the prognosis and quality of life for those affected by related diseases. What are some of these major discoveries of the past century and who are some famous people that were personally impacted?



**National Science Standards Alignment:**

C. Structure and function in living systems

M.C.1 Structure and function in living systems

e. The human organism has systems for digestion, respiration, reproduction, circulation, excretion, movement, control, and coordination, and for protection from disease. These systems interact with one another.