



THE SCIENCE OF “FRINGE”

EXPLORING: HYPOTHERMIA

A SCIENCE OLYMPIAD THEMED LESSON PLAN

EPISODE 402: One Night in October

Overview:

Students will learn about hypothermia and its effects on the body.

Grade Level: 9-12

Episode Summary:

A serial killer “Over There” has killed numerous victims via a technique that involves lowering their brain temperature while he extracts certain memories from them. The suspect’s doppelganger “Over Here,” a professor who teaches Forensic Psychology, is enlisted to help and taken “Over There” to attempt to profile the suspect, without initially being informed of the nature of the assignment. He quickly discovers the truth, and escapes in an attempt to find the suspect and convince him that he doesn’t need to succumb to his dark temptations.

Related Science Olympiad Event:

Thermodynamics - Teams must construct an insulated device prior to the tournament that is designed to retain heat. Teams must also complete a written test on thermodynamic concepts.

Learning Objectives:

Students will understand the following:

- Hypothermia is a decrease in the body’s core temperature below the normal range of 95-100°F.
- Symptoms include confusion, blue skin, shivering, and decreased heart rates.
- Rewarming techniques such as hot water bottles or warmed intravenous fluids can often successfully reverse the effects of hypothermia.

Episode Scenes of Relevance:

- John with his first victim (1:00:25 ‘who took that’ – 1:01:37 (victim freezes))
- “Over There” John with “Over Here” John (1:33:31 ‘how did’ – 1:34:38 ‘so dark’)



Online Resources:

- Fringe “One Night in October” full episode: <http://www.fox.com/fringe/full-episodes/>
 - Science Olympiad Thermodynamics event: http://soinc.org/thermodynamics_c
 - Wikipedia page for Hypothermia: <http://en.wikipedia.org/wiki/Hypothermia>
 - Mayo Clinic page on Hypothermia: <http://www.mayoclinic.com/health/hypothermia/DS00333>
- CDC Winter Weather FAQ: <http://www.bt.cdc.gov/disasters/winter/faq.asp>

Procedures:

1. Tell your students that they are going to learn about hypothermia and the impact of cold on the body.
2. Have your students research hypothermia in resources such as health textbooks and websites and discuss what they have learned.
3. Have your class complete the following activity in small groups:
 - a. Materials: stopwatches / timers, pennies, ice water, bowls, paper towels.
 - b. Ask for volunteers to be test subjects for an experiment that involves putting their hand in ice water.
 - c. Lay 20-30 pennies on a table, heads up.
 - d. Have the volunteers flip the pennies over, using only 1 hand. Use a stopwatch to time how long it takes them.
 - e. Have the volunteer submerge 1 hand in a bowl of ice water for 2 minutes.
 - f. Repeat the penny flipping task with the chilled hand and time how long it takes.
 - g. Wait 4 minutes.
 - h. Repeat the penny-flipping task with the same hand and time how long it takes.
4. Discuss with the class the results of the activity. Be sure to address:
 - a. How much longer did it take to flip the pennies with the chilled hand?
 - b. Why was the task harder with the chilled hand?
 - c. How did the time compare after the hand was slightly rewarmed?

Additional Discussion Suggestions:

- Studies show that the rate of hypothermia is strongly correlated to age in the United States. Why might this be?
- Extended submersion in water at only 79°F can result in hypothermia, while exposure to that temperature air would be considered nice weather. Why does water affect the body differently than air?

Health Science: Therapeutic hypothermia is a technique that is occasionally used by doctors to deliberately lower a patient’s temperature. Research why this is used and what benefits it provides.

History: Hypothermia has played a major role in major significant historical events, such as airplane crashes, ships sinking, and military campaigns. Research some examples events and present what was learned as a result.

Zoology: Many animals deliberately induce hypothermia as part of hibernation. Research what processes such animals use to prevent long term damage to their bodies and why they go through such a procedure.

National Science Standards Alignment:

- M.E.1 Abilities of technological design
- b. Design a solution or product.
 - c. Implement a proposed design.
 - d. Evaluate completed technological designs or products.
 - e. Communicate the process of technological design.