

UNIT 5:

PROTECTION AND CONTROL

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Unit 5: Protection and Control

Specific Learning Outcomes

- B11-5-01:** Describe the body's defence mechanisms for protection from foreign agents. (GLO: D1)
Include: non-specific and specific defences
- B11-5-02:** Describe the body's response to allergens, vaccines, and viruses/bacteria. (GLO: D1)
Include: inflammatory response and immune response
- B11-5-03:** Explain the role of the lymphatic system in protecting the human body. (GLO: D1)
Include: lymph vessels, lymph nodes, and lymph
- B11-5-04:** Investigate issues related to the immune system and the protection of public health. (GLOs: B3, C4, C5, C6, C8, D1)
Examples: immunization policies, travel bans and advisories, epidemics...
- B11-5-05:** Describe the major organization of the nervous system. (GLO: D1)
Include: central nervous system and peripheral nervous system (autonomic and somatic)
- B11-5-06:** Identify the functional regions of the brain. (GLO: D1)
Examples: general anatomy such as cerebellum, specific regions responsible for speech and other functions, left-brain/right-brain concept...
- B11-5-07:** Explain how a nerve impulse travels a particular pathway using chemical and electrical signals. (GLO: D1)
Include: synapse
- B11-5-08:** Compare the general roles of nervous and hormonal controls, recognizing that the nervous and endocrine systems interact to maintain homeostasis in the human body. (GLOs: D1, E2, E3)
Include: communication, speed, duration, target pathway, and action
- B11-5-09:** Explain the effects of a concussion on brain function and the implications of multiple concussions. (GLOs: B3, C8, D1)
Include: second impact syndrome
- B11-5-10:** Describe how personal lifestyle choices can influence the functioning of protection and/or control systems. (GLOs: B3, D1)
Examples: impact of recreational drugs, use of anabolic steroids, lack of sleep, poor diet, non-use of protective equipment...
- B11-5-11:** Investigate and describe conditions/disorders that affect protection and/or control in the human body. (GLOs: B3, C6, D1)

IMMUNE SYSTEM

SPECIFIC LEARNING OUTCOMES

B11-5-01: Describe the body's defence mechanisms for protection from foreign agents. (GLO: D1)

Include: non-specific and specific defences

B11-5-02: Describe the body's response to allergens, vaccines, and viruses/bacteria. (GLO: D1)

Include: inflammatory response and immune response

B11-5-03: Explain the role of the lymphatic system in protecting the human body. (GLO: D1)

Include: lymph vessels, lymph nodes, and lymph

SLO: B11-5-01
SLO: B11-5-02
SLO: B11-5-03

SUGGESTIONS FOR INSTRUCTION

ENTRY-LEVEL KNOWLEDGE

In Grade 8, students examined the human body's defence mechanisms and technologies related to defence mechanisms, such as vaccines and antibiotics.

ACTIVATE

Mapping out Protection

Have groups of students create a Concept Map that outlines all the systems they think are involved in protecting the body.

ACQUIRE/APPLY

Three Lines of Defence—Direct Instruction (U1)

Using multimedia software or overhead projections, describe the body's non-specific and specific responses to foreign agents (e.g., skin and mucous membranes, the inflammatory response, the immune system). Students then refer to their original Concept Map and describe in a paragraph how they would change their initial Concept Map to reflect the information in their notes.



Suggestion for Assessment

Have students create a Concept Frame on the body's defence mechanisms (see *SYSTH*, p. 11.36).

Poster Presentation (U1, I1, I4)

Divide students into groups of two or three. With the help of textbooks or other resources, groups must construct posters to represent the response mechanism assigned to them. Assign the inflammatory response to half the groups, and the immune response to the other half. All posters should include

- the steps involved in the body's response
- illustrations representing the body's response to enhance the written component

SKILLS AND ATTITUDES OUTCOMES

B11-0-U1: Use appropriate strategies and skills to develop an understanding of biological concepts. (GLO: D1)

Examples: using concept maps, sort-and-predict frames, concept frames...

B11-0-U2: Demonstrate an in-depth understanding of biological concepts. (GLO: D1)

Examples: use accurate scientific vocabulary, explain concepts to someone else, make generalizations, apply knowledge to new situations/contexts, draw inferences, create analogies, develop models...

B11-0-P2: Demonstrate a willingness to reflect on personal wellness. (GLO: B3)

B11-0-P3: Appreciate the impact of personal lifestyle choices on general health and make decisions that support a healthy lifestyle. (GLOs: B3, C4)

B11-0-D1: Identify and explore a current health issue. (GLOs: C4, C8)

Examples: clarify what the issue is, identify different viewpoints and/or stakeholders, research existing data/information...

B11-0-D2: Evaluate implications of possible alternatives or positions related to an issue. (GLOs: B1, C4, C5, C6, C7)

Examples: positive and negative consequences of a decision, strengths and weaknesses of a position...

B11-0-I1: Synthesize information obtained from a variety of sources. (GLOs: C2, C4, C6)

Include: print and electronic sources, resource people, and personal observations

B11-0-I4: Communicate information in a variety of forms appropriate to the audience, purpose, and context. (GLOs: C5, C6)



Suggestions for Assessment

The following tool can be used to assess the posters.

Poster Presentation Assessment			
	3	2	1-0
Organization	The information is clear and well-organized.	The information is sometimes confusing and/or disorganized.	The information is confusing and disorganized.
	5-4	3-2	1-0
Required Information	The description of the body's response is well-developed and contains the required details.	The description of the body's response contains most of the required details.	The description of the body's response lacks required details.
	8-7	6-5-4-3	2-1-0
Quality of the Illustrations	The illustrations are visually appealing and enhance the comprehension of the written information.	The illustrations are adequate and complement the written information somewhat.	The illustrations are confusing and don't enhance the comprehension of the written information.
	4	3-2	1-0
Presentation	There are no spelling or grammatical errors.	There are a few minor spelling or grammatical errors.	There are numerous spelling or grammatical errors that detract from the message.

**IMMUNE
SYSTEM**

SPECIFIC LEARNING OUTCOMES

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Include: non-specific and specific defences

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B11-5-03: Explain the role of the lymphatic system in protecting the human body. (GLO: D1)

Include: lymph vessels, lymph nodes, and lymph

Once the posters are assessed, have students use them to construct a Chain Concept Map (see *SYSTH*, p. 11.14) or some other note-taking method to illustrate each response.

Allergens, Vaccines, Viruses, and Bacteria (U1)

Have students complete Appendix 5.1: Concept Frame (BLM) to illustrate the similarities and differences between allergens, vaccines, viruses, and bacteria.



Suggestion for Assessment

The completed Concept Frames can be used as a formative assessment to determine the level of students’ understanding of the body’s reaction to allergens, vaccines, viruses, and bacteria. If needed, reviewing and/or re-teaching may be carried out.



Cumulative Assessment

Have students complete a Compare and Contrast Frame (see *SYSTH*, pp. 10.15, 10.24) to compare allergens, vaccines, viruses, and bacteria.

To Vaccinate or Not to Vaccinate—Case Study (D1, D2, I1)

Have students examine Appendix 5.2: To Vaccinate, or Not to Vaccinate: That Is the Question (BLM) and answer the questions associated with the case study.

Resource Link

Case Study Teaching Notes and Answer Keys are available on the following website. To access some of these resources, you are required to register for a password (available free of charge).

- University at Buffalo. *The National Center for Case Study Teaching in Science Case Collection*.
<<http://ublib.buffalo.edu/libraries/projects/cases/ubcase.htm>>.

SKILLS AND ATTITUDES OUTCOMES

- B11-0-U1:** Use appropriate strategies and skills to develop an understanding of biological concepts. (GLO: D1)
Examples: using concept maps, sort-and-predict frames, concept frames...
- B11-0-U2:** Demonstrate an in-depth understanding of biological concepts. (GLO: D1)
Examples: use accurate scientific vocabulary, explain concepts to someone else, make generalizations, apply knowledge to new situations/contexts, draw inferences, create analogies, develop models...
- B11-0-P2:** Demonstrate a willingness to reflect on personal wellness. (GLO: B3)
- B11-0-P3:** Appreciate the impact of personal lifestyle choices on general health and make decisions that support a healthy lifestyle. (GLOs: B3, C4)
- B11-0-D1:** Identify and explore a current health issue. (GLOs: C4, C8)
Examples: clarify what the issue is, identify different viewpoints and/or stakeholders, research existing data/information...
- B11-0-D2:** Evaluate implications of possible alternatives or positions related to an issue. (GLOs: B1, C4, C5, C6, C7)
Examples: positive and negative consequences of a decision, strengths and weaknesses of a position...
- B11-0-I1:** Synthesize information obtained from a variety of sources. (GLOs: C2, C4, C6)
 Include: print and electronic sources, resource people, and personal observations
- B11-0-I4:** Communicate information in a variety of forms appropriate to the audience, purpose, and context. (GLOs: C5, C6)



Suggestion for Assessment

Brainstorm with students to determine what criteria should be used to assess their responses to the questions.



Personal Records (P2, P3)

Students research their personal vaccinations and immunization records and assess their own immunity to certain diseases. Students research additional immunizations they would need to travel to a different part of the world (e.g., immunization against typhoid, cholera, hepatitis A, malaria). Students may include these records in their Wellness Portfolio.

The Lymphatic System and Immunity—Direct Instruction (U1)

Discuss how the lymphatic system contributes to immunity. Then have students locate and label the lymph nodes and organs on a diagram of the human body. Have students complete a Concept Overview Frame about the lymphatic system's role in immunity (see *SYSTH*, pp. 11.23, 11.37).



Suggestion for Assessment

The Concept Overview Frame can be used as a formative assessment to determine the level of students' understanding of the lymphatic system's role in immunity. If needed, reviewing and/or re-teaching may be carried out.

**IMMUNE
SYSTEM**

SPECIFIC LEARNING OUTCOMES

B11-5-01: Describe the body's defence mechanisms for protection from foreign agents. (GLO: D1)

Include: non-specific and specific defences

B11-5-02: Describe the body's response to allergens, vaccines, and viruses/bacteria. (GLO: D1)

Include: inflammatory response and immune response

B11-5-03: Explain the role of the lymphatic system in protecting the human body. (GLO: D1)

Include: lymph vessels, lymph nodes, and lymph

Write a Story (U2, I4)

Have students write an adventure story about a foreign substance trying to invade the body.



Suggestion for Assessment

Prepare guidelines for the task and develop assessment criteria with students. The criteria should address scientific content as well as creative writing components. Each criterion could be assigned a point value, or a simple rating scale can be used (e.g., excellent, good, fair, poor) for each criterion.



Cumulative Assessment

The above can be used as a cumulative assessment to assess the level of students' understanding of the immune system.

Defence Analogies (U2, I4)

Have students develop analogies for the three lines of defence in the body. For example, a castle:

1. The outer wall serves as the first line of defence.
2. Guards rush to a scene inside the castle.
3. The head of the guards coordinates a search for other infiltrators.

Other examples of possible analogies are computers, homes, and countries.

SKILLS AND ATTITUDES OUTCOMES

- B11-0-U1:** Use appropriate strategies and skills to develop an understanding of biological concepts. (GLO: D1)
Examples: using concept maps, sort-and-predict frames, concept frames...
- B11-0-U2:** Demonstrate an in-depth understanding of biological concepts. (GLO: D1)
Examples: use accurate scientific vocabulary, explain concepts to someone else, make generalizations, apply knowledge to new situations/contexts, draw inferences, create analogies, develop models...
- B11-0-P2:** Demonstrate a willingness to reflect on personal wellness. (GLO: B3)
- B11-0-P3:** Appreciate the impact of personal lifestyle choices on general health and make decisions that support a healthy lifestyle. (GLOs: B3, C4)
- B11-0-D1:** Identify and explore a current health issue. (GLOs: C4, C8)
Examples: clarify what the issue is, identify different viewpoints and/or stakeholders, research existing data/information...
- B11-0-D2:** Evaluate implications of possible alternatives or positions related to an issue. (GLOs: B1, C4, C5, C6, C7)
Examples: positive and negative consequences of a decision, strengths and weaknesses of a position...
- B11-0-I1:** Synthesize information obtained from a variety of sources. (GLOs: C2, C4, C6)
 Include: print and electronic sources, resource people, and personal observations
- B11-0-I4:** Communicate information in a variety of forms appropriate to the audience, purpose, and context. (GLOs: C5, C6)
-

Students should include the following in their analogies:

- description of the structure (biological concept)
- identification of a familiar object (analogy) that shares some similar characteristics
- identification of the shared characteristics of the structure (biological concept) and the analogy
- indication of where the analogy breaks down

(Glynn, “The Teaching with Analogies Model”; Glynn, Duit, and Thiele)

Resource

See Organ Transplant Rejection Lesson Plan in *Life Is a Gift* (Manitoba Education and Transplant Manitoba) for learning activities related to Unit 5: Protection and Control.



Suggestion for Assessment

Defence analogies can be shared with the class and discussed in order to arrive at a consensus as to whether or not the analogy is helpful. The following criteria can help determine the effectiveness of an analogy:

- A familiar analogy is selected.
- Similarities between the analogy and the structure are clear and help explain the structure and/or function of the structure.
- Differences between the analogy and the structure are clear.

**ISSUES
ANALYSIS**

SPECIFIC LEARNING OUTCOMES

B11-5-04: Investigate issues related to the immune system and the protection of public health. (GLOs: B3, C4, C5, C6, C8, D1)

Examples: immunization policies, travel bans and advisories, epidemics...

SLO: B11-5-04

SUGGESTIONS FOR INSTRUCTION

ACTIVATE

Current Events

Have students brainstorm a current news item related to the topic, such as an influenza outbreak, and the actions taken to prevent its spread. Have students share what they know about the issue and identify questions they have.

ACQUIRE/APPLY

Outbreak Scenario (P1, D1, D2, D3, D4, D5, D6, I1, G1, G2, G3)

Have students participate in a simulation/case study, such as those found on the following website, which also contains links to other sources of case study ideas:

- University at Buffalo. *The National Center for Case Study Teaching in Science. Case Collection.*
<<http://ublib.buffalo.edu/libraries/projects/cases/ubcase.htm>>.

For example, in “The 1st New Disease of the 21st Century” by Otto Sanchez, students participate in a role-playing scenario based on the severe acute respiratory syndrome (SARS) outbreak in China, learning about the disease and arguing from the perspective of different health professionals on a plan of action for dealing with its consequences.

Students take on one of the following roles:

- health professionals working in Hong Kong, China
- health professionals working in Toronto, Canada
- World Health Organization officers in Geneva, Switzerland
- Centers for Disease Control officers in Atlanta, Georgia



Suggestion for Assessment

Assessment will depend on the type of activity undertaken. It could focus on a number of areas such as group work and decision making, and involve self-assessment, peer assessment, as well as a written reflection, summary, and so on.

SKILLS AND ATTITUDES OUTCOMES

B11-0-P1: Demonstrate confidence in their ability to carry out investigations. (GLOs: C2, C5)

B11-0-D1: Identify and explore a current health issue. (GLOs: C4, C8)

Examples: clarify what the issue is, identify different viewpoints and/or stakeholders, research existing data/information...

B11-0-D2: Evaluate implications of possible alternatives or positions related to an issue. (GLOs: B1, C4, C5, C6, C7)

Examples: positive and negative consequences of a decision, strengths and weaknesses of a position...

B11-0-D3: Recognize that decisions reflect values and consider personal values and those of others when making a decision. (GLOs: C4, C5)

B11-0-D4: Recommend an alternative or identify a position, and provide justification. (GLO: C4)

B11-0-D5: Propose a course of action related to an issue. (GLOs: C4, C5, C8)

B11-0-D6: Evaluate the process used by self or others to arrive at a decision. (GLOs: C4, C5)

B11-0-I1: Synthesize information obtained from a variety of sources. (GLOs: C2, C4, C6)

Include: print and electronic sources, resource people, and personal observations

B11-0-I2: Evaluate the quality of sources of information, as well as the information itself. (GLOs: C2, C4, C5, C8)

Examples: scientific accuracy, reliability, currency, balance of perspectives, bias, fact versus opinion...

B11-0-I3: Quote from or refer to sources as required, and reference sources according to accepted practice. (GLOs: C2, C6)

B11-0-G1: Collaborate with others to achieve group goals and responsibilities. (GLOs: C2, C4, C7)

B11-0-G2: Elicit, clarify, and respond to questions, ideas, and diverse points of view in discussions. (GLOs: C2, C4, C7)

B11-0-G3: Evaluate individual and group processes used. (GLOs: C2, C4, C7)

Internet Research (D1, I2, I3)

A good way to investigate a current event or issue is to conduct research on the Internet. Have students select from the list of current events they generated earlier and design a research project to gather information about an issue. In addition to exploring a current issue, students need to develop skills in analyzing sources of information on the Internet.

Resource Links

The following websites provide guidelines and tools for analyzing and evaluating information sources:

- Kent State University. "Criteria for Evaluating Web Resources." 22 Mar. 2006. *University Libraries*. <www.library.kent.edu/page/10475>.
- Manitoba Education. "Professional Learning for Teachers." *Literacy with ICT Across the Curriculum: A Developmental Continuum*. <www.edu.gov.mb.ca/k12/tech/lict/let_me_try/le_teachers.html>.
- Schrock, Kathleen. "The Five W's of Web Site Evaluation." 2001–2009. *The ABC's of Web Site Evaluation*. <<http://kathyschrock.net/abceval/5ws.pdf>>.
- ———. "Web Site Evaluation & Internet Lesson Plan Guide." 2002. *The ABC's of Web Site Evaluation*. <<http://kathyschrock.net/abceval/teacherwebeval.pdf>>.

*ISSUES
ANALYSIS*

SPECIFIC LEARNING OUTCOMES

B11-5-04: Investigate issues related to the immune system and the protection of public health. (GLOs: B3, C4, C5, C6, C8, D1)

Examples: immunization policies, travel bans and advisories, epidemics...



Suggestion for Assessment

Develop assessment criteria with students. Ensure an emphasis on the evaluation of information sources.

SKILLS AND ATTITUDES OUTCOMES

B11-0-P1: Demonstrate confidence in their ability to carry out investigations. (GLOs: C2, C5)

B11-0-D1: Identify and explore a current health issue. (GLOs: C4, C8)

Examples: clarify what the issue is, identify different viewpoints and/or stakeholders, research existing data/information...

B11-0-D2: Evaluate implications of possible alternatives or positions related to an issue. (GLOs: B1, C4, C5, C6, C7)

Examples: positive and negative consequences of a decision, strengths and weaknesses of a position...

B11-0-D3: Recognize that decisions reflect values and consider personal values and those of others when making a decision. (GLOs: C4, C5)

B11-0-D4: Recommend an alternative or identify a position, and provide justification. (GLO: C4)

B11-0-D5: Propose a course of action related to an issue. (GLOs: C4, C5, C8)

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Examples: scientific accuracy, reliability, currency, balance of perspectives, bias, fact versus opinion...

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B11-0-G1: Collaborate with others to achieve group goals and responsibilities. (GLOs: C2, C4, C7)

B11-0-G2: Elicit, clarify, and respond to questions, ideas, and diverse points of view in discussions. (GLOs: C2, C4, C7)

B11-0-G3: Evaluate individual and group processes used. (GLOs: C2, C4, C7)

NOTES

NERVOUS SYSTEM

SPECIFIC LEARNING OUTCOMES

B11-5-05: Describe the major organization of the nervous system. (GLO: D1)

Include: central nervous system and peripheral nervous system (autonomic and somatic)

B11-5-06: Identify the functional regions of the brain. (GLO: D1)

Examples: general anatomy such as cerebellum, specific regions responsible for speech and other functions, left-brain/right-brain concept...

B11-5-07: Explain how a nerve impulse travels a particular pathway using chemical and electrical signals. (GLO: D1)

Include: synapse

SLO: B11-5-05
SLO: B11-5-06
SLO: B11-5-07

SUGGESTIONS FOR INSTRUCTION

ACTIVATE

Nervous System Functions

Have students brainstorm components and functions of the nervous system. This could become part of a KWL strategy.

Fooling Your Senses

Conduct demonstrations with students that illustrate the importance of our five senses and how they can be fooled.

Examples:

- Have students smell mint while eating something else. Ask them what they taste.
- Have students close their eyes, and then cross their middle and index fingers and move them along the edge of a table. Students should feel two parallel edges instead of one.
- Have students close their eyes, and then cross their middle and index fingers and rub a pencil in the space between the two fingers. Students should feel two pencils instead of one. If they open their eyes, they will only feel one pencil.
- Have students read the following colours as fast as they can: **Yellow Brown Green Red Blue Black**. Show the same words, but each of them written in a colour other than the word (e.g., **Yellow** written in red). Have students state the colour in which the words are written as quickly as possible.

ACQUIRE/APPLY

Organizing the Nervous System (U1)

With the use of their text or another resource, have students create a flow chart or functional hierarchy to show the organization of the central and peripheral nervous systems.

SKILLS AND ATTITUDES OUTCOMES

- B11-0-U1:** Use appropriate strategies and skills to develop an understanding of biological concepts. (GLO: D1)
Examples: using concept maps, sort-and-predict frames, concept frames...
- B11-0-U2:** Demonstrate an in-depth understanding of biological concepts. (GLO: D1)
Examples: use accurate scientific vocabulary, explain concepts to someone else, make generalizations, apply knowledge to new situations/contexts, draw inferences, create analogies, develop models...
- B11-0-S8:** Analyze data and/or observations in order to identify patterns or draw conclusions. (GLOs: C2, C5, C8)
- B11-0-D2:** Evaluate implications of possible alternatives or positions related to an issue. (GLOs: B1, C4, C5, C6, C7)
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- B11-0-D5:** Propose a course of action related to an issue. (GLOs: C4, C5, C8)
- B11-0-I1:** Synthesize information obtained from a variety of sources. (GLOs: C2, C4, C6)
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- B11-0-I4:** Communicate information in a variety of forms appropriate to the audience, purpose, and context. (GLOs: C5, C6)



Suggestions for Assessment

Review the completed flow charts with students to check for comprehension, and re-teach if necessary (formative assessment).

Have students complete an Exit Slip (see *SYSTH*, p. 13.9) at the end of the lesson. The following questions can help get them started:

- What do you know now that you didn't know when you walked into class today?
- What did you already know?
- What further question(s) do you still have?

The Parts of the Brain (U2)

Have students create and label their own models of the brain using modelling clay, toothpicks, and paper labels. Together with students, develop assessment criteria for the models, such as the following:

- All the required parts of the brain are clearly identified.
- Relative sizes of the parts of the brain are appropriate.



Suggestion for Assessment

Assess students' models using the assessment criteria developed with students.

**NERVOUS
SYSTEM**

SPECIFIC LEARNING OUTCOMES

B11-5-05: Describe the major organization of the nervous system. (GLO: D1)

Include: central nervous system and peripheral nervous system (autonomic and somatic)

B11-5-06: Identify the functional regions of the brain. (GLO: D1)

Examples: general anatomy such as cerebellum, specific regions responsible for speech and other functions, left-brain/right-brain concept...

B11-5-07: Explain how a nerve impulse travels a particular pathway using chemical and electrical signals. (GLO: D1)

Include: synapse

Split My Brain: A Case Study of Seizure Disorder and Brain Function (U2, S8, D2, D3, D4, D5)

The case study “Split My Brain” developed by Julia Omarzu incorporates the effects of seizures on brain function (see Appendix 5.3 for the full case study).

Resource Link

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<<http://ublib.buffalo.edu/libraries/projects/cases/ubcase.htm>>.



Suggestion for Assessment

Teachers could assess the questions associated with both parts of the case study using criteria such as the following:

- Response clearly answers the question.
 - Response uses evidence to identify issues referred to in the question.
 - Response justifies suggested diagnosis or course of action using evidence.
-

Student Presentation—Performance Task (U2, I4)

Have students carry out a performance task to demonstrate concepts related to the functional regions of the brain, such as the cerebellum, the medulla oblongata, the different lobes, the left brain versus the right brain, the effects that strokes can have on different parts of the brain, and so on. This performance task can take on a variety of forms, and students should be given the opportunity to select which form they wish to use to share their understanding. For example, students could prepare a skit or a multimedia presentation.

SKILLS AND ATTITUDES OUTCOMES

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Examples: using concept maps, sort-and-predict frames, concept frames...
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Examples: use accurate scientific vocabulary, explain concepts to someone else, make generalizations, apply knowledge to new situations/contexts, draw inferences, create analogies, develop models...
- B11-0-S8:** Analyze data and/or observations in order to identify patterns or draw conclusions. (GLOs: C2, C5, C8)
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- B11-0-I1:** Synthesize information obtained from a variety of sources. (GLOs: C2, C4, C6)
 Include: print and electronic sources, resource people, and personal observations
- B11-0-I4:** Communicate information in a variety of forms appropriate to the audience, purpose, and context. (GLOs: C5, C6)
-



Suggestion for Assessment

Develop assessment criteria with students. The criteria should include both content and presentation components and may be similar, regardless of which presentation format students choose. Each criterion could be assigned a point value, or a simple rating scale can be used (e.g., excellent, good, fair, poor) for each criterion.

Demonstrating Impulse Transmission (U1)

Use Appendix 5.4: Impulse Transmission Demonstration (BLM) to describe how a nervous impulse travels through a neuron and how neurotransmitters carry this impulse to the next neuron.



Suggestion for Assessment

Have students use a Three-Point Approach strategy (see *SYSTH*, p. 10.9) to represent impulse transmission in a neuron and impulse transmission through a synapse.

**NERVOUS
SYSTEM**

SPECIFIC LEARNING OUTCOMES

B11-5-05: Describe the major organization of the nervous system. (GLO: D1)

Include: central nervous system and peripheral nervous system (autonomic and somatic)

B11-5-06: Identify the functional regions of the brain. (GLO: D1)

Examples: general anatomy such as cerebellum, specific regions responsible for speech and other functions, left-brain/right-brain concept...

B11-5-07: Explain how a nerve impulse travels a particular pathway using chemical and electrical signals. (GLO: D1)

Include: synapse

Chemicals and Synaptic Transmission (I1, U2)

Have students research and give a presentation on the effects various chemicals have on synaptic transmission and use a demonstration device to explain what is happening. Possible discussion topics could include chemicals that impede transmission such as cyanide, which prevents neurotransmitters from forming at the synapse, or the cocaine/dopamine relationship. Develop assessment criteria with students, such as the following:

- The effect of the chemical on synaptic transmission is clearly explained.
- Appropriate vocabulary is used.
- The presentation follows a logical pattern.
- A demonstration device is used to enhance explanations.



Suggestion for Assessment

Assess presentations using the criteria developed with students.

SKILLS AND ATTITUDES OUTCOMES

- B11-0-U1:** Use appropriate strategies and skills to develop an understanding of biological concepts. (GLO: D1)
Examples: using concept maps, sort-and-predict frames, concept frames...
- B11-0-U2:** Demonstrate an in-depth understanding of biological concepts. (GLO: D1)
Examples: use accurate scientific vocabulary, explain concepts to someone else, make generalizations, apply knowledge to new situations/contexts, draw inferences, create analogies, develop models...
- B11-0-S8:** Analyze data and/or observations in order to identify patterns or draw conclusions. (GLOs: C2, C5, C8)
- B11-0-D2:** Evaluate implications of possible alternatives or positions related to an issue. (GLOs: B1, C4, C5, C6, C7)
Examples: positive and negative consequences of a decision, strengths and weaknesses of a position...
- B11-0-D3:** Recognize that decisions reflect values and consider personal values and those of others when making a decision. (GLOs: C4, C5)
- B11-0-D4:** Recommend an alternative or identify a position, and provide justification. (GLO: C4)
- B11-0-D5:** Propose a course of action related to an issue. (GLOs: C4, C5, C8)
- B11-0-I1:** Synthesize information obtained from a variety of sources. (GLOs: C2, C4, C6)
Include: print and electronic sources, resource people, and personal observations
- B11-0-I4:** Communicate information in a variety of forms appropriate to the audience, purpose, and context. (GLOs: C5, C6)
-

NOTES

HOMEOSTASIS

SPECIFIC LEARNING OUTCOMES

B11-5-08: Compare the general roles of nervous and hormonal controls, recognizing that the nervous and endocrine systems interact to maintain homeostasis in the human body. (GLOs: D1, E2, E3)

Include: communication, speed, duration, target pathway, and action

SLO: B11-5-08

SUGGESTIONS FOR INSTRUCTION

ACTIVATE

Brainstorming

Have students discuss questions such as the following:

- Has your stomach ever felt queasy before an examination? Why?
- Why would your heart beat faster if you stepped off a curb and a car, rushing toward you, blared its horn?
- What happens when you are driving along a road and a car pulls into the road directly in front of you?
- Why do you get goosebumps?
- What happens when you accidentally place your hand on a hot stove?

ACQUIRE/APPLY

Concept Map

Have students watch a video, such as *Osmosis Jones*, and create a Concept Map of how the endocrine and nervous systems maintain homeostasis.



Suggestion for Assessment

Use the completed Concept Maps to determine students' current level of understanding of how the endocrine and nervous systems maintain homeostasis.

Reflexes and Homeostasis (U1)

With the help of a text or other resources, have students create a flow chart describing what happens when a hand is placed on a hot surface. Students must use the following terms in their flow chart: *receptor*, *control centre*, and *effector*. Have them indicate which part(s) of the nervous system are involved in reflexes.

SKILLS AND ATTITUDES OUTCOMES

B11-0-U1: Use appropriate strategies and skills to develop an understanding of biological concepts.
(GLO: D1)

Examples: using concept maps, sort-and-predict frames, concept frames...



Suggestions for Assessment

Have students create a flow chart for what happens in another situation, such as an object being thrown toward someone's face.

Have students answer the following question in their scientific journals:

- How do reflexes help maintain homeostasis?

Interaction between the Nervous and Endocrine Systems—Direct Instruction (U1)

Explain to students that many of our homeostatic responses involve the nervous system and the endocrine system. Have students revisit the concept of thermoregulation, which they studied in Unit 1.

Thermoregulation

The autonomic nervous system and the endocrine system are both involved in the body's response to a change in temperature. Receptors in the skin detect external temperature and receptors in the hypothalamus detect the temperature of the blood. When the body is exposed to heat, receptors send a nervous message to the hypothalamus. The hypothalamus sends messages to muscles in arterioles, which constrict to decrease blood flow to extremities and, therefore, decrease heat loss. Nervous messages are sent to muscles in the skin, which cause goosebumps. This erects the tiny hairs on our skin to trap heat. Messages are also sent to our skeletal muscles, which contract and relax quickly to cause shivering. The endocrine system also gets involved in thermoregulation. The hypothalamus sends a message to the pituitary gland in the brain. The pituitary releases a thyroid-stimulating hormone (TSH) in the blood, which causes the release of the hormone thyroxine by the thyroid gland. Thyroxine increases the body's metabolic rate.



Suggestion for Assessment

Have students complete a Negative Feedback Mechanism BLM (see Appendix 1.6 in Unit 1), providing information about the body's response to a change in temperature.

HOMEOSTASIS

SPECIFIC LEARNING OUTCOMES

B11-5-08: Compare the general roles of nervous and hormonal controls, recognizing that the nervous and endocrine systems interact to maintain homeostasis in the human body. (GLOs: D1, E2, E3)

Include: communication, speed, duration, target pathway, and action

The Fight-or-Flight Response (U1)

The fight-or-flight response is another type of response that can be presented to students to illustrate the role of the nervous system in maintaining homeostasis.

Fight-or-Flight Response

The fight-or-flight response is the autonomic nervous system's swift reaction to stress or danger. It causes pupils to dilate and increases respiratory rate and heart rate. It causes the liver to release glucose into the bloodstream, and the adrenal glands to secrete adrenalin. The parasympathetic division of the autonomic nervous system brings the body back to a state of relaxation.



Suggestion for Assessment

Have students create a narrative story that uses descriptive language to describe the biological occurrences during the fight-or-flight scenario.

Why Do We Need Two Systems to Coordinate Homeostasis? (U1)

With the help of text or other resources, have students compare the nervous and endocrine systems by completing Appendix 5.5: Comparing Two Systems (BLM). Students should understand that both these systems are essential in the maintenance of homeostasis. The nervous system acts very quickly, but its effects are short-lived. The endocrine system reacts more slowly to a change in the body, but its effects last longer.

SKILLS AND ATTITUDES OUTCOMES

B11-0-U1: Use appropriate strategies and skills to develop an understanding of biological concepts.
(GLO: D1)

Examples: using concept maps, sort-and-predict frames, concept frames...



Suggestion for Assessment

Review the completed Comparing Two Systems charts with students to verify their comprehension, and re-teach if necessary (formative assessment). The chart should contain the following:

Comparing Two Systems		
	Nervous System	Endocrine System
Communication	impulses across synapses	hormones in the blood
Response Speed	responds very rapidly (within a few milliseconds)	responds relatively slowly (over minutes, hours, or longer)
Duration	short-term and reversible effects	longer lasting effects
Target Pathway	signal runs through nerves to specific cells	hormones broadcast to target cells everywhere
Action	causes glands to secrete or muscles to contract	causes changes in metabolic activity

WELLNESS

SPECIFIC LEARNING OUTCOMES

B11-5-09: Explain the effects of a concussion on brain function and the implications of multiple concussions. (GLOs: B3, C8, D1)

Include: second impact syndrome

B11-5-10: Describe how personal lifestyle choices can influence the functioning of protection and/or control systems.

(GLOs: B3, D1)

Examples: impact of recreational drugs, use of anabolic steroids, lack of sleep, poor diet, non-use of protective equipment...

B11-5-11: Investigate and describe conditions/disorders that affect protection and/or control in the human body.

(GLOs: B3, C6, D1)

SLO: B11-5-09
SLO: B11-5-10
SLO: B11-5-11

SUGGESTIONS FOR INSTRUCTION

BACKGROUND INFORMATION—CONCUSSIONS

Sports injuries that affect the central and peripheral nervous systems are responsible for thousands of deaths or permanent peripheral damage in Canadian youth. A concussion is caused by the brain being subjected to a trauma where it may be twisted. Often both brain cells and blood vessels that feed the brain are affected, and the injury could disrupt the chemicals responsible for brain functions. Blood flow to the brain is restricted by the increase in pressure due to swelling and an insurgence of free calcium ions that constricts blood vessels. The result is an “energy crisis” in the brain that can last for weeks. If a second concussion occurs before the brain recovers from the first one, the energy-starved cells in the brain are likely to die, and individuals may experience a life-threatening swelling of the brain, referred to as second impact syndrome (SIS). Half the individuals with SIS die, and it is most common in male adolescents and young adults. The long-term effects of concussions vary from negligible to cognitive and behavioural impairments, and may depend on the number of concussions.

ACTIVATE

Anticipation Guide

Have students complete an Anticipation Guide (see *SYSTH*, pp. 9.20, 9.26) on the topic of concussions. Here are some possible statements to elicit students’ initial reaction to the topic:

- Bodychecking should be banned in youth hockey.
- To decrease concussions, coaches should train players to bodycheck properly.
- Helmets should be mandatory on all skating rinks.
- Better equipment would reduce the incidence of concussions in hockey.
- After having suffered a concussion, a hockey player should be sidelined for the rest of the season.

SKILLS AND ATTITUDES OUTCOMES

- B11-0-U1:** Use appropriate strategies and skills to develop an understanding of biological concepts. (GLO: D1)
Examples: using concept maps, sort-and-predict frames, concept frames...
- B11-0-U2:** Demonstrate an in-depth understanding of biological concepts. (GLO: D1)
Examples: use accurate scientific vocabulary, explain concepts to someone else, make generalizations, apply knowledge to new situations/contexts, draw inferences, create analogies, develop models...
- B11-0-P2:** Demonstrate a willingness to reflect on personal wellness. (GLO: B3)
- B11-0-P3:** Appreciate the impact of personal lifestyle choices on general health and make decisions that support a healthy lifestyle. (GLOs: B3, C4)
- B11-0-P4:** Demonstrate an understanding of, and respect for, a diversity of cultural perspectives and approaches to maintaining health and treating illness. (GLOs: A4, B3)
Examples: Asian approaches to health and wellness based on concepts of balance; Indigenous people's traditional medicines, concepts of healing; homeopathy...
- B11-0-I1:** Synthesize information obtained from a variety of sources. (GLOs: C2, C4, C6)
 Include: print and electronic sources, resource people, and personal observations
- B11-0-I2:** Evaluate the quality of sources of information, as well as the information itself. (GLOs: C2, C4, C5, C8)
Examples: scientific accuracy, reliability, currency, balance of perspectives, bias, fact versus opinion...
- B11-0-I3:** Quote from or refer to sources as required, and reference sources according to accepted practice. (GLOs: C2, C6)
- B11-0-I4:** Communicate information in a variety of forms appropriate to the audience, purpose, and context. (GLOs: C5, C6)
- B11-0-G1:** Collaborate with others to achieve group goals and responsibilities. (GLOs: C2, C4, C7)
- B11-0-G2:** Elicit, clarify, and respond to questions, ideas, and diverse points of view in discussions. (GLOs: C2, C4, C7)
- S3B-0-G3:** Evaluate individual and group processes used. (GLOs: C2, C4, C7)
-

Should You Wear a Helmet?

Ask students whether they wear a helmet during sporting or recreational activities such as skateboarding, rollerblading, playing hockey, or riding a bike or a scooter. Initiating a discussion about wearing helmets can be a starting point to elicit students' initial interest in the after-effects of head trauma.

ACQUIRE/APPLY

Analyze an Article (U1)

Have students read and analyze the following article:

Marchie, Anthony, and Michael D. Cusimano. "Bodychecking and Concussions in Ice Hockey: Should Our Youth Pay the Price?" *Canadian Medical Association Journal* 169.2 (22 July 2003): 124–128. Available online at www.cmaj.ca/cgi/content/full/169/2/124.

After students have read the article, ask them to complete Appendix 5.6: Article Analysis Frame (BLM).

WELLNESS

SPECIFIC LEARNING OUTCOMES

B11-5-09: Explain the effects of a concussion on brain function and the implications of multiple concussions. (GLOs: B3, C8, D1)

Include: second impact syndrome

B11-5-10: Describe how personal lifestyle choices can influence the functioning of protection and/or control systems. (GLOs: B3, D1)

Examples: impact of recreational drugs, use of anabolic steroids, lack of sleep, poor diet, non-use of protective equipment...

B11-5-11: Investigate and describe conditions/disorders that affect protection and/or control in the human body. (GLOs: B3, C6, D1)



Suggestion for Assessment

Assess students' analysis of the article using criteria such as the following:

- The issue is clearly stated.
 - The main ideas in the article are summarized.
 - The author's opinion is presented with evidence to support it.
 - The student's opinion is clearly stated and supported with evidence.
 - Questions about the article are included.
-

Concussions Follow-Up (P2, P3)

Have students review their *initial* responses to the topic of concussions and explain whether their responses have changed, completing the *after* responses of the Anticipation Guide. Students can pair up and discuss their responses with their partners. They can then share their responses with the whole class.



Suggestion for Assessment

Have students write a personal reflection explaining whether or not their opinion on wearing helmets has changed. This reflection can be included in their Wellness Portfolios.

Sledding Injuries (P3, I1, I4)

Have students read the data in Appendix 5.7: A Profile of Sledding Injuries (BLM) prepared by the Public Health Agency of Canada. The questions that follow ask students to interpret the data provided, and then use the data to support information in a letter to a young child about the potential hazards of sledding.

SKILLS AND ATTITUDES OUTCOMES

- B11-0-U1:** Use appropriate strategies and skills to develop an understanding of biological concepts. (GLO: D1)
Examples: using concept maps, sort-and-predict frames, concept frames...
- B11-0-U2:** Demonstrate an in-depth understanding of biological concepts. (GLO: D1)
Examples: use accurate scientific vocabulary, explain concepts to someone else, make generalizations, apply knowledge to new situations/contexts, draw inferences, create analogies, develop models...
- B11-0-P2:** Demonstrate a willingness to reflect on personal wellness. (GLO: B3)
- B11-0-P3:** Appreciate the impact of personal lifestyle choices on general health and make decisions that support a healthy lifestyle. (GLOs: B3, C4)
- B11-0-P4:** Demonstrate an understanding of, and respect for, a diversity of cultural perspectives and approaches to maintaining health and treating illness. (GLOs: A4, B3)
Examples: Asian approaches to health and wellness based on concepts of balance; Indigenous people's traditional medicines, concepts of healing; homeopathy...
- B11-0-I1:** Synthesize information obtained from a variety of sources. (GLOs: C2, C4, C6)
 Include: print and electronic sources, resource people, and personal observations
- B11-0-I2:** Evaluate the quality of sources of information, as well as the information itself. (GLOs: C2, C4, C5, C8)
Examples: scientific accuracy, reliability, currency, balance of perspectives, bias, fact versus opinion...
- B11-0-I3:** Quote from or refer to sources as required, and reference sources according to accepted practice. (GLOs: C2, C6)
- B11-0-I4:** Communicate information in a variety of forms appropriate to the audience, purpose, and context. (GLOs: C5, C6)
- B11-0-G1:** Collaborate with others to achieve group goals and responsibilities. (GLOs: C2, C4, C7)
- B11-0-G2:** Elicit, clarify, and respond to questions, ideas, and diverse points of view in discussions. (GLOs: C2, C4, C7)
- S3B-0-G3:** Evaluate individual and group processes used. (GLOs: C2, C4, C7)



Suggestion for Assessment

Responses to the questions and/or the letter can be used for assessment purposes. Students should be provided with (or help develop) criteria for what an effective letter would look like.

Should You Cram before an Exam?—Microtheme (U2)

Provide students with the following information:

Microtheme

Your sister is in her first year of university and is writing exams all week. She is staying up very late every night to study and is drinking a lot of coffee to stay awake. She is also eating a lot of junk food because she says she has no time to cook. Using what you know about the impact of factors such as lack of sleep and diet on protection and control systems, convince your sister that a good night's sleep and a balanced diet are just as important as studying, in order to perform well on her exams.

WELLNESS

SPECIFIC LEARNING OUTCOMES

B11-5-09: Explain the effects of a concussion on brain function and the implications of multiple concussions. (GLOs: B3, C8, D1)

Include: second impact syndrome

B11-5-10: Describe how personal lifestyle choices can influence the functioning of protection and/or control systems. (GLOs: B3, D1)

Examples: impact of recreational drugs, use of anabolic steroids, lack of sleep, poor diet, non-use of protective equipment...

B11-5-11: Investigate and describe conditions/disorders that affect protection and/or control in the human body. (GLOs: B3, C6, D1)



Suggestion for Assessment

Refer to Appendix 1.3B: Microthemes – First Draft Checklist (BLM) and Appendix 1.3C: Microthemes – Final Draft Assessment (BLM) from Unit 1 for assessment tools.

Note: This microtheme deals with several key factors (e.g., lack of sleep, caffeine, poor diet) that can affect protection and control systems. Students' microthemes should address all these factors.

Personal Reflection (P2, P3)

Have students answer the following questions in their science journals:

- What things am I doing now in the area of protection and control that could be negatively affecting my health?
- What is one thing I could change?

Student Research/Report (I1, I2, I3, I4)

Have students choose a condition or a disorder associated with protection or control in the human body. Students may be given the option of sharing this information in the format of their choice (e.g., oral presentation, informational brochure, essay). Regardless of the format chosen, student work must contain the following information:

- causes
- symptoms
- treatment (a range of treatments, including non-Western, if possible)
- prevention

SKILLS AND ATTITUDES OUTCOMES

- B11-0-U1:** Use appropriate strategies and skills to develop an understanding of biological concepts. (GLO: D1)
Examples: using concept maps, sort-and-predict frames, concept frames...
- B11-0-U2:** Demonstrate an in-depth understanding of biological concepts. (GLO: D1)
Examples: use accurate scientific vocabulary, explain concepts to someone else, make generalizations, apply knowledge to new situations/contexts, draw inferences, create analogies, develop models...
- B11-0-P2:** Demonstrate a willingness to reflect on personal wellness. (GLO: B3)
- B11-0-P3:** Appreciate the impact of personal lifestyle choices on general health and make decisions that support a healthy lifestyle. (GLOs: B3, C4)
- B11-0-P4:** Demonstrate an understanding of, and respect for, a diversity of cultural perspectives and approaches to maintaining health and treating illness. (GLOs: A4, B3)
Examples: Asian approaches to health and wellness based on concepts of balance; Indigenous people's traditional medicines, concepts of healing; homeopathy...
- B11-0-I1:** Synthesize information obtained from a variety of sources. (GLOs: C2, C4, C6)
Include: print and electronic sources, resource people, and personal observations
- B11-0-I2:** Evaluate the quality of sources of information, as well as the information itself. (GLOs: C2, C4, C5, C8)
Examples: scientific accuracy, reliability, currency, balance of perspectives, bias, fact versus opinion...
- B11-0-I3:** Quote from or refer to sources as required, and reference sources according to accepted practice. (GLOs: C2, C6)
- B11-0-I4:** Communicate information in a variety of forms appropriate to the audience, purpose, and context. (GLOs: C5, C6)
- B11-0-G1:** Collaborate with others to achieve group goals and responsibilities. (GLOs: C2, C4, C7)
- B11-0-G2:** Elicit, clarify, and respond to questions, ideas, and diverse points of view in discussions. (GLOs: C2, C4, C7)
- S3B-0-G3:** Evaluate individual and group processes used. (GLOs: C2, C4, C7)
-

Suggested Topics:

- allergies
- HIV/AIDS
- lupus
- diabetes
- arthritis
- West Nile virus
- Alzheimer's disease
- Parkinson's disease
- Huntington's disease
- cerebral palsy
- epilepsy
- stroke
- Creutzfeldt-Jacob disease
- encephalitis
- others

WELLNESS

SPECIFIC LEARNING OUTCOMES

B11-5-09: Explain the effects of a concussion on brain function and the implications of multiple concussions. (GLOs: B3, C8, D1)

Include: second impact syndrome

B11-5-10: Describe how personal lifestyle choices can influence the functioning of protection and/or control systems. (GLOs: B3, D1)

Examples: impact of recreational drugs, use of anabolic steroids, lack of sleep, poor diet, non-use of protective equipment...

B11-5-11: Investigate and describe conditions/disorders that affect protection and/or control in the human body. (GLOs: B3, C6, D1)



Suggestion for Assessment

Develop assessment criteria with students. The criteria should include both content and presentation components. The list on the previous page can form the basis of the “content” section of the assessment. Student products can be self-assessed and peer-assessed with the help of criteria developed by the class.

A Need for Needles: Acupuncture—Does It Really Work?—Case Study (P4, G1, G2, G3)

The case study in Appendix 5.8: A Need for Needles: Acupuncture—Does It Really Work? (BLM) looks at the effectiveness of alternative treatments for a protection disorder. Students are expected to gather evidence for or against acupuncture and then reach a consensus within a small group about the use of this treatment.

Resource Link

Case Study Teaching Notes and Answer Keys are available on the following website. To access some of these resources, you are required to register for a password (available free of charge).

- University at Buffalo. *The National Center for Case Study Teaching in Science Case Collection*.
<<http://ublib.buffalo.edu/libraries/projects/cases/ubcase.htm>>.

SKILLS AND ATTITUDES OUTCOMES

- B11-0-U1:** Use appropriate strategies and skills to develop an understanding of biological concepts. (GLO: D1)
Examples: using concept maps, sort-and-predict frames, concept frames...
- B11-0-U2:** Demonstrate an in-depth understanding of biological concepts. (GLO: D1)
Examples: use accurate scientific vocabulary, explain concepts to someone else, make generalizations, apply knowledge to new situations/contexts, draw inferences, create analogies, develop models...
- B11-0-P2:** Demonstrate a willingness to reflect on personal wellness. (GLO: B3)
- B11-0-P3:** Appreciate the impact of personal lifestyle choices on general health and make decisions that support a healthy lifestyle. (GLOs: B3, C4)
- B11-0-P4:** Demonstrate an understanding of, and respect for, a diversity of cultural perspectives and approaches to maintaining health and treating illness. (GLOs: A4, B3)
Examples: Asian approaches to health and wellness based on concepts of balance; Indigenous people's traditional medicines, concepts of healing; homeopathy...
- B11-0-I1:** Synthesize information obtained from a variety of sources. (GLOs: C2, C4, C6)
 Include: print and electronic sources, resource people, and personal observations
- B11-0-I2:** Evaluate the quality of sources of information, as well as the information itself. (GLOs: C2, C4, C5, C8)
Examples: scientific accuracy, reliability, currency, balance of perspectives, bias, fact versus opinion...
- B11-0-I3:** Quote from or refer to sources as required, and reference sources according to accepted practice. (GLOs: C2, C6)
- B11-0-I4:** Communicate information in a variety of forms appropriate to the audience, purpose, and context. (GLOs: C5, C6)
- B11-0-G1:** Collaborate with others to achieve group goals and responsibilities. (GLOs: C2, C4, C7)
- B11-0-G2:** Elicit, clarify, and respond to questions, ideas, and diverse points of view in discussions. (GLOs: C2, C4, C7)
- S3B-0-G3:** Evaluate individual and group processes used. (GLOs: C2, C4, C7)



Suggestions for Assessment

See Appendix 5.9: Assessment – Collaborative Process (BLM) for a peer-assessment of the group process.

Observe students using a checklist such as the following:

The student

- presents evidence to support arguments
- uses appropriate language
- clarifies and summarizes his or her ideas
- gives reasons for not agreeing with opposing claims
- listens actively

NOTES

UNIT 5:
PROTECTION AND CONTROL
APPENDICES

Appendix 5.1: Concept Frame (BLM)

(1 of 1)

Concept

Explanation

Examples

Like

Unlike

Appendix 5.2: To Vaccinate, or Not to Vaccinate: That Is the Question* (BLM)

(1 of 3)

by Caren Shapiro
Department of Mathematics and Natural Sciences
D'Youville College, Buffalo, NY

Paula Highsmith was quite distraught. She had returned from a routine checkup for her four-week-old daughter Jennifer. The pediatrician, Dr. Feiller, had informed Paula that he would begin giving Jennifer her DTP shots at her next appointment in a month.

Paula phoned her mother, Marion Johnson. "Oh, Mother, I don't know what to do."

"You were vaccinated as a child and you didn't have any problems," replied Mrs. Johnson.

"You know my friend Julie? Her oldest son Sam had a seizure after getting the DTP shot when he was Jennifer's age. And what about that couple on television that said the rubella vaccine was responsible for their son's autism?"

"I don't know about that couple," replied Mrs. Johnson, "but Sam was vaccinated ten years ago. If the vaccine was really the problem, I'm sure they would have a different vaccine now."

"But now there are so many shots and, besides, the diseases they prevent have practically disappeared, so why do I have to have Jennifer vaccinated?"

"Jennifer will be required to show evidence of vaccination before she'll be allowed to go to school and perhaps even some daycare centres. Don't you remember the article in the *Buffalo News* about the couple whose son wasn't allowed to register for school because he hadn't had his vaccinations? His parents said they had refused to have him vaccinated for religious reasons."

This case presents many of the issues facing parents when they need to begin the vaccination series for their child. Paula wants to do what is best for her child and she wants to make her decision based on scientific fact not emotional rhetoric.

* Source: Shapiro, Caren. "To Vaccinate, or Not to Vaccinate: That Is the Question."
<www.sciencecases.org/vaccination/vaccination.asp>. Reproduced by permission of the National Center for Case Study Teaching in Science, University at Buffalo, State University of New York.

Appendix 5.2:

To Vaccinate, or Not to Vaccinate:

That Is the Question (BLM) *(continued)*

(2 of 3)

What are the issues raised about vaccination by this case study and what kind of information will help Paula make an informed decision about vaccinating her daughter?

1. Is vaccination necessary? What are the consequences of natural infection?
 - Do micro-organisms cause asymptomatic infections or disease?
 - What are the symptoms of the major vaccine preventable diseases?
 - What are the possible sequelae of the infections?
 - What groups of individuals are particularly susceptible to serious disease consequences?
 - How are infections transmitted?
2. What kinds of vaccines are available?
3. a) What are the advantages (e.g., efficacy and duration of immunity) of the different kinds of vaccines?
b) What are the disadvantages (e.g., side effects) of the different kinds of vaccines?
4. What is the purpose of vaccination (i.e., prevent infection and/or disease)?
5. Are there reasons for not being vaccinated?
 - Are there beneficial effects of acquiring an infection naturally?
 - Are religious concerns justifiable?

Assignment

In order to address the general questions posed by this case study, you will individually research information on the disease(s) caused by a particular microbe and the vaccine that is used for it. Address the following questions for the microbe and vaccine that you have been assigned:

1. a) Describe the typical symptoms of the disease(s) caused by the agent.
b) What are the serious sequelae (complications) caused by the agent and how common are they?
c) Is serious disease primarily a problem only in certain individuals? Explain.
2. a) What kind of vaccine preparation is used (live attenuated; killed or inactivated; toxoid)?
b) Are there different kinds of vaccine preparations available?
c) How long has the current vaccine been available?

Appendix 5.2:

To Vaccinate, or Not to Vaccinate:

That Is the Question (BLM) *(continued)*

(3 of 3)

3. a) What side effects are associated with the vaccine and what is the reported frequency for these side effects?
 - b) What is the reported efficacy of the vaccine?
 - What proportion of vaccinated persons are protected from infection (or disease)?
 - What proportion of vaccinated persons are protected from serious disease?
 - c) What is the duration of immunity? Are booster shots necessary?
 - d) How does the latest number of reported cases compare with the number before the vaccine was available?
4. a) Does the vaccine prevent infection?
 - b) Does the vaccine prevent the usual symptoms of disease or primarily the more serious complications of infection?

Appendix 5.3:

Split My Brain: A Case Study of Seizure Disorder and Brain Function (BLM)

(1 of 6)

by Julia Omarzu
Department of Psychology
Loras College, Dubuque, Iowa

Part I—Jerrod and Jump

Jerrod Hamilton is seven years old. He is an only child and much loved by his parents, Karen and Jeff, and by his extended family of grandparents, aunts, uncles, and cousins. Jerrod has always been a very active boy. He loves hockey, baseball, swimming at the local pool, climbing trees, and playing with his golden retriever, Jump. Making friends has never been a problem for Jerrod. He has several good friends he plays ball with whenever he can. He also does fairly well in school, although he is not as interested in the classroom as he is in recess.

Shortly before Jerrod's seventh birthday, he had a small seizure. He was out playing with his dad and Jump in the yard, when suddenly he stopped, his right arm twitched a little and he seemed disoriented for a few seconds. Afterward he said he was fine, but his mother Karen thought he was quieter than usual. Both his parents watched him more closely in the following days. Soon he had another couple of episodes of muscle twitching and weakness. During these seizures, Jerrod also stared blankly, moving his head slightly back and forth, and for a minute or two could not respond to his parents. When the seizures ended, Jerrod had no memory of them.

Jerrod's parents took him to their pediatrician, Dr. Madeline Sierra, who listened as Jerrod's parents described his symptoms.

"Before I try to conclude anything, I'd like to order several tests for Jerrod, including an EEG and an MRI scan. I know that sounds a little scary, but the tests are painless and non-invasive. We should get the results back very quickly. Once I see those, I'll know more about what's going on."

"A friend of mine said it sounds like Jerrod might have epilepsy," said Karen. "Is that what you think? How serious would that be?"

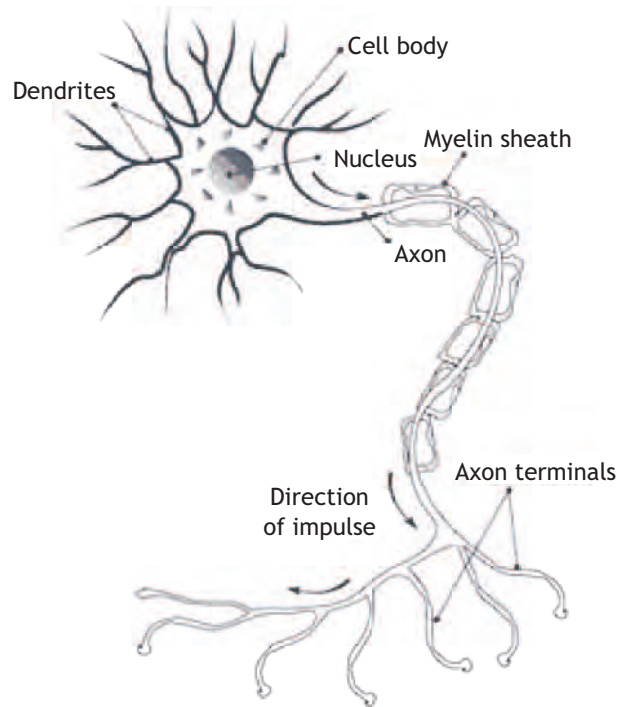
"Epilepsy is one possibility," replied the doctor. "It is a relatively common problem and there are some very good treatments for it."

Dr. Sierra went on to explain: "The brain uses electrical energy. The cells of the brain, called neurons, emit a small electrical charge when they send messages to other cells. This is how the brain communicates and runs your mind and body." Dr. Sierra interrupted her explanation for a moment to show them a diagram of a neuron.

* Source: Omarzu, Julia. "Split My Brain: A Case Study of Seizure Disorder and Brain Function." Parts I-II. <www.sciencecases.org/split_brain/split_brain.asp>. Reproduced by permission of the National Center for Case Study Teaching in Science, University at Buffalo, State University of New York.

Appendix 5.3:
Split My Brain: A Case Study of Seizure
Disorder and Brain Function (BLM) (continued)

(2 of 6)



“In epilepsy, the neurons somehow get out of control,” Dr. Sierra continued. “The electrical activity increases to a level that the brain cannot manage. That produces what we call seizures, where people lose control of their voluntary behaviours for a brief time. Sometimes seizures are nothing more than short lapses of consciousness. Other times they involve convulsions or involuntary movements.”

Jeff and Karen looked at each other. “That sounds sort of like what’s happening to Jerrod,” Jeff said.

“Yes, it does. But let’s not jump to any conclusions. I’d rather wait for the tests.” Dr. Sierra paused. “I would also recommend something else,” she said. “This is something that many families find helpful. Starting today, I suggest that you keep a journal or record of Jerrod’s illness. Include his symptoms, tests, information from doctors, any treatments or therapies. Document everything. I will help you, but ultimately, you and Jerrod are the ones who will have to make the decisions, and there will be lots to think about along the way. I think you will be grateful later to have a record of what you learn and observe.”

That evening Karen and Jeff called a family meeting to share the results of the doctor’s visit.

Appendix 5.3:

Split My Brain: A Case Study of Seizure

Disorder and Brain Function (BLM) *(continued)*

(3 of 6)

You will help Jerrod's family by keeping the record Dr. Sierra suggested. Begin creating Jerrod's records by including the following information in a way that Jerrod's family can use and understand. You are encouraged to do further research, but you must synthesize the information you get from the research into a new form that suits Jerrod's situation. Do not just cut and paste from the Internet.

Jerrod's Records

- Why is there electrical activity in the brain? Describe how it is used by neurons.
- What happens in the brain during a seizure?
- What is epilepsy? How is it diagnosed?
- What are the procedures for doing an EEG test and MRI scan? What type of information does each of these tests provide? [See <[www.epilepsy.com/epilepsy diagnosis](http://www.epilepsy.com/epilepsy_diagnosis)>.]
- What are some possible causes of seizures other than epilepsy?
- Based on the information in the case, what types of seizures does Jerrod appear to be having?
- What should you do during a seizure to help Jerrod?
- What are some treatments for epilepsy?

Part II—A Difficult Decision

Jerrod's tests were done right away, and his parents met again with Dr. Sierra. Jerrod's symptoms were escalating. He had daily seizures, and they included disorientation as well as uncontrollable repetitive movements on the right side of his body. He often felt tired and weak after the seizures.

"Why is this happening to Jerrod?" his mother asked. "Did he get hit in the head or something?"

Dr. Sierra shook her head. "Jerrod's test results show no evidence of an injury like that. The other good news is that there is nothing to indicate a brain tumour. I am more confident that we are dealing with a form of epilepsy, which is probably very treatable. It's also unlikely to be caused by anything he did or you did. However, given the rapid change in Jerrod's symptoms, I would like to refer you to a specialist in neurological disorders. Our office will help set up an appointment."

"Now, I want you to know I'm not abandoning you on this. I'll be following Jerrod carefully, too. But I don't think we should take any chances with this little guy." She smiled and ruffled Jerrod's hair.

Appendix 5.3: Split My Brain: A Case Study of Seizure Disorder and Brain Function (BLM) *(continued)*

(4 of 6)

Dr. Sierra's referral sent Jerrod and his parents to a neurologist who specialized in seizure disorders. Dr. Benjamin Singh questioned Jerrod and his parents carefully about the seizures. He then opened up the folder with Jerrod's test results and discussed them with Karen and Jeff.

"Here is the output from Jerrod's EEG exam." Dr. Singh showed them a printout. "This test shows us the level of electrical activity in Jerrod's brain. There is a particular pattern of spikes here that shows his seizure activity. Based on these tests and some other indications, I believe Jerrod's seizures are what we call 'partial' seizures. This means that they only involve part of the brain. And right now, his MRI scan is okay."

Jerrod's parents looked at each other with some relief.

"However," the doctor added, "if we do not find a way to reduce or control the current level of seizure activity I am afraid that Jerrod's brain will begin to show some damage, regardless of how much of it is now involved. Fortunately, there are several treatment options available to us. Let's start with a seizure medication."

Dr. Singh prescribed medication to help treat Jerrod's disorder. The first medication didn't succeed, so Dr. Singh and Dr. Sierra conferred and then tried another. After some time and other combinations of medications, it became clear that this type of treatment would be problematic for Jerrod. His seizures were becoming more severe and more frequent. The doctors ordered more tests and then Dr. Singh met with Jeff and Karen.

Dr. Singh pulled out Jerrod's records. "Here is a picture from Jerrod's new MRI scan. Look at this area in the left side of the brain. We are beginning to see some slight abnormalities here that indicate Jerrod's brain is starting to be damaged by the seizures."

Jeff asked, "What is going on? Why don't the medicines work? You've said there's no injury or tumour. So, is this a condition he inherited from us somehow? Or is it an allergic reaction to something?"

"No," Dr. Singh reassured them. "Most likely none of those things are causing Jerrod's problem. This is also not your fault or Jerrod's fault. I believe that Jerrod has a disorder called Rasmussen Syndrome. Unfortunately, we don't know what causes it. Some people suspect it may be some type of viral infection, but we don't know for sure. So, likely there is nothing you could have done to prevent it. It involves the type and frequency of seizures we are seeing in Jerrod and usually occurs in children of about Jerrod's age. I must warn you that it is a progressive and potentially serious illness that often does not respond to medication."

Dr. Singh went on to describe another type of more drastic treatment that might work in Jerrod's case.

Appendix 5.3:

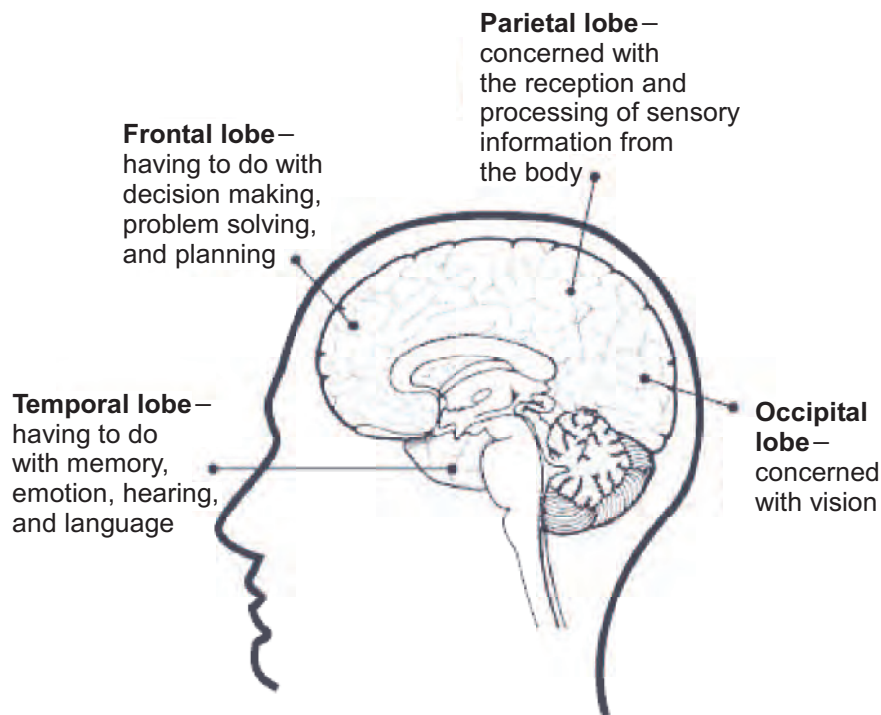
Split My Brain: A Case Study of Seizure

Disorder and Brain Function (BLM) *(continued)*

(5 of 6)

“The upper part of the brain, the cerebrum, is divided into two halves, or two hemispheres,” Dr. Singh explained. “In some cases of severe seizure disorders, seizure activity seems to be concentrated in one half or hemisphere of the brain. This is the case in Jerrod’s illness.”

Dr. Singh showed them a diagram of the brain.



“In Jerrod’s case, his seizure activity is located primarily in the left hemisphere of his brain. Sometimes, we can control or even eliminate seizure activity by removing the portion of the brain which is suffering. We call this a functional hemispherectomy.”

“What do you mean, ‘removing’? You take out his brain?” Karen was horrified.

“Not his entire brain, just the parts that show abnormal activity. In Jerrod’s brain, that would mean a large part of his left hemisphere. We would remove Jerrod’s left temporal lobe, part of his left frontal lobe, and perhaps some areas in his parietal and occipital lobes. We would also sever the corpus callosum, the band of tissue that connects the two hemispheres and allows them to communicate. We would leave intact Jerrod’s thalamus, amygdala, hippocampus, and other deep structures of the brain.”

Image credit: Diagram showing lobes of the cerebral cortex courtesy of National Institute on Drug Abuse (NIDA).

Appendix 5.3:

Split My Brain: A Case Study of Seizure

Disorder and Brain Function (BLM) *(continued)*

(6 of 6)

Dr. Singh looked at their worried faces. “It sounds terrible, but there have been quite a number of these surgeries performed. We have an excellent team of specialists with a great deal of experience performing this type of surgery and with the rehabilitation that would follow. In cases like Jerrod’s, where medications are not working, it can lead to a significantly better quality of life for the patient. Believe it or not, and I know it is difficult to believe, this may be our best option.”

Dr. Singh took out a sheet of paper from a folder. “I have the name of a support group that can put you in contact with people who have had to make this same decision for their children. You may want to talk with some of them before you decide.”

Jerrod’s Record—continued

Add to the family records information about the following:

- What is Rasmussen Syndrome (what are its history, symptoms, prognosis, etc.)?
- What structures or abilities of the brain are concentrated in the areas of the left hemisphere that would be removed in the hemispherectomy?
- Other than reducing his seizures, how else might Jerrod’s thinking or behaviour be affected by losing these parts of his brain?
- What types of abilities would he still retain, because the brain structures would remain intact?
- What might the family do to help Jerrod recover after such a surgery?
- If Jerrod had the surgery, would his level of functioning get better, worse, or stay the same over time?
- What other kinds of questions would you have about the surgery? Can you find the answers?
- What decision do you recommend to the family? Why or why not go ahead with surgery?

Appendix 5.4:

Impulse Transmission Demonstration (BLM)

(1 of 1)

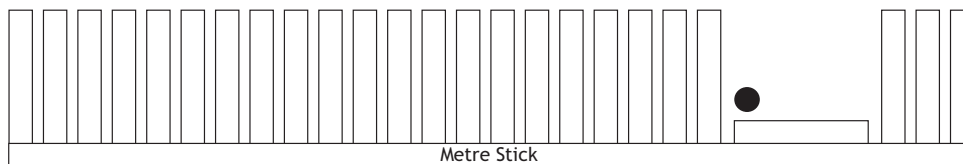
Purpose

The following apparatus is designed to demonstrate the transmission of a nerve impulse along the axon of a neuron and at the point of a synapse.

Materials

1 pkg. of dominoes	1 pencil
1 metre stick	1 marble
tape	

Set up apparatus as indicated in the diagram below.



The dominoes are spaced along the length of the metre stick and secured in place with tape along one side. A gap is left in the space of the dominoes to serve as a synapse. A pencil can be cut in half and secured in place on either side of the metre stick to serve as rails for the marble.

At the start of the demonstration, the neuron is polarized or resting and not actively carrying an impulse. However, a light tap that serves as neural stimulation is applied once the first domino starts the impulse. If the threshold is met, then the impulse will be transmitted. Similarly, if the threshold is not met, then no impulse is transmitted according to the all-or-none response. The last domino before the synapse pushes the marble, which acts as a neurotransmitter in the synapse to carry the impulse to the next neuron. After the impulse is transmitted, the neuron is unable to be stimulated again – this is the refractory period. By tilting the apparatus, the dominoes are once again standing and ready to carry the next impulse.

Appendix 5.5: Comparing Two Systems (BLM)

(1 of 1)

Compare ways in which the nervous system and the endocrine system protect the human body.

	Nervous System	Endocrine System
Communication		
Response Speed		
Duration		
Target Pathway		
Action		

Appendix 5.6: Article Analysis Frame (BLM)

(1 of 1)

Issue

Author's Opinion (Evidence)

Summary (Main Ideas)

Your Opinion (Evidence)

Questions

Relevance Today

Appendix 5.7: A Profile of Sledding Injuries* (BLM)

(1 of 3)

Canadian Hospitals Injury Reporting and Prevention Program (CHIRPP)
Issue 9, November 1996
by Janet Brown, Analyst
Child Injury Division

Sledding is a popular winter activity among children. It has been reported that each winter 75% of Canadian children participate in at least one snow-sliding sport.

This report is based on information collected from the CHIRPP database for sledding injuries occurring in the six months between November 1, 1994, and April 30, 1995. All types of snow-sliding equipment were looked at, including GT-type sleds (three-ski sleds), toboggans, crazy carpets, inner tubes, and snow disks. Snowboarding injuries were not included. Records of injuries that occurred indoors or that involved a sled being towed by a vehicle were eliminated. A total of 806 records were identified.

Distribution of Patients by Age and Sex

Most sledding injuries were to children between the ages of 5 and 14. Of all sledding injuries, 14.7% were to children younger than 5 years of age, 35.1% were to 5–9 year olds, 41.8% were to 10–14 year olds, and 8.3% were to people 15 years of age or older. The proportion of records in the CHIRPP database during this time period due to sledding injuries was 1.5%. Overall, 57.7% of injuries were to males.

Circumstance of Injury

More than half (59.3%) of the injuries occurred in an outdoor recreation area. Other places included the home yard (17.8%), daycare or school (6.9%), and transportation areas such as a road, footpath, or parking area (1.7%).

Overall, patients were injured most frequently when they fell to the ground while sliding (40.1%), collided with an obstacle such as a rock, tree, or snowbank (32.6%), or collided with another person (15.3%). Other circumstances included being injured on a sled, for example, by getting a body part caught in the sled (7.3%), sliding into a dangerous area such as a street or river (2.4%), or being injured while carrying or pulling a sled (1.0%).

* Source: Brown, Janet. "A Profile of Sledding Injuries." *CHIRPP News* 9 (Nov. 1996).
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Appendix 5.7:

A Profile of Sledding Injuries (BLM) (continued)

(2 of 3)

The table below shows how the circumstances of injury varied by age. For the younger patients, colliding with an obstacle was the most common circumstance, while for the older ones collisions were less likely to occur.

Distribution (%) of circumstance of injury by age				
	<5 years (n = 118)	5-9 years (n = 282)	10-14 years (n = 336)	>14 years (n = 67)
Fell off sled	24.9	35.8	47.6	47.8
Collided with object	44.9	36.5	25.9	28.4
Collided with person	15.3	19.1	12.5	13.4
Other/unknown	14.9	8.6	14.0	10.4

In only 37.2% of the cases was the type of sled used specified. Of the sled types that were specified, 41.0% were GT-type sleds, 36.5% toboggans, 15.0% crazy carpets, 3.9% snow disks, 2% luges, and 1.6% inner tubes. For patients younger than 9 years of age, the most common type of sled specified was a toboggan. Among patients aged 10 and older, the GT-type sled was most often reported.

Distribution (%) of circumstance of injury by age				
	<5 years (n = 36)	5-9 years (n = 91)	10-14 years (n = 39)	>14 years (n = 31)
GT-type sled	8.3	33.0	52.3	48.4
Toboggan	63.9	42.9	26.2	35.5
Crazy carpet	16.7	17.6	14.1	9.7
Other/unknown	11.1	6.5	7.4	6.4

Nature of Injury and Body Part Injured

Overall, the most common body part injured was the leg (20.5%) and the most frequent type of injury was abrasion, bruising, or inflammation. Head or neck injuries were more common among younger children than older children. For children younger than 10, these injuries comprised approximately one-third of the injuries. For children 10-14 years of age, approximately 10% of injuries were to the head or neck.

Appendix 5.7:

A Profile of Sledding Injuries (BLM) *(continued)*

(3 of 3)

Treatment

Half (51.6%) of patients with sledding-related injuries received advice only or minor treatment, 36.7% had significant treatment, and 11.1% were admitted to hospital. This indicates a high rate of serious injury: it is twice the percentage of all injuries in the CHIRPP database that resulted in hospital admission (5.7%). While severity of injury fluctuated slightly among age groups, hospitalization rates remained the same.

Less than 1% of the patients, six in all, reported wearing a safety device. In five of these cases, the type of safety device specified was a helmet. Due to the high risk of head injury, particularly among children younger than 10, helmet use should be encouraged.

Questions

Answer the following questions based on the information in “A Profile of Sledding Injuries.”

1. What percentage of Canadian children participate in at least one snow-sliding sport each winter?
2. What age levels received the most injuries?
3. Did males or females experience the most injuries?
4. In what type of location did most of the injuries occur?
5. Under what circumstances did most injuries take place (e.g., crashing, falling off)?
6. Did the type of circumstances of injury differ by age?
7. What was the most common body part injured?
8. What is the most frequent type of injury?
9. How many, of those injured, received significant treatment?

Write a letter to younger siblings, or to a Grade 2 class, talking to them about the potential hazards of sledding, using information from the report to support your message, and making suggestions as to how they could make sledding safer for themselves.

Appendix 5.8: A Need for Needles: Acupuncture— Does It Really Work?*(BLM)

(1 of 4)

by Sarah G. Stonefoot and Clyde Freeman Herreid
University at Buffalo, State University of New York

Janet sat in her car in the driveway of her mother's house and eyed the front yard, which was completely taken over by a vegetable garden. It was possible that somewhere in there her mother was hidden, picking over her prized vegetables. Her mother was a bit eccentric. Actually, the word "crazy" sometimes came to Janet's mind when considering her mother. But she never said it out loud. This was her mother, after all.

Janet took a deep breath and then grabbed the door handle. It was time for another lunch with her mother, a meal that would inevitably turn into an argument, as [these lunches] always did.

Audrey greeted her daughter at the door even before Janet had a chance to knock.

"Why, hello, darling."

Janet was carefully unhooking a tomato vine from her foot before her mother noticed. She looked up and greeted her with a sense of apprehension.

"Hello, Mother."

"Oh, Janet, it's so nice to see you. Isn't it just a gorgeous day today?" Her mother was bubbling over with her usual happiness and high spirits.

"It's hot," Janet grumbled, "too hot."

"Well, come on in. I've just put together a delicious salad for lunch."

Salad again, Janet thought to herself. She was glad she had stopped at McDonald's on the way over. She forced a smile and followed her mother into the house.

Lunch went well, until Audrey decided she couldn't hold her idea back any longer. "I was reading that magazine you got me the other day."

"Oh, really," replied Janet, pleased. She had gotten her mother a subscription to *Time* magazine for Christmas. It was her attempt to get her mother on the same track as the rest of the world, or at least aware of what was happening. She knew her mother used [the magazines] as coasters on the coffee table more than anything else.

"Yes, and I came across this really interesting article. It was on acupuncture."

* Source: Stonefoot, Sarah G., and Clyde Freeman Herreid. "A Need for Needles: Acupuncture—Does It Really Work?" <www.sciencecases.org/acupuncture/acupuncture.asp>. Reproduced by permission of the National Center for Case Study Teaching in Science, University at Buffalo, State University of New York.

Appendix 5.8:

A Need for Needles: Acupuncture—

Does It Really Work? (BLM) *(continued)*

(2 of 4)

Janet sighed. Her hopes evaporated. Of course, the only thing to interest her mother was an article on some sort of nonsense.

“As I was reading it, it began to make a lot of sense. It mentioned that arthritis was one of the things that it helped. And seeing how you’re always telling me that arthritis is why my wrists bother me, I thought it might be helpful. My wrists have been acting up a little. I couldn’t garden the other day. My poor tomato plants are going to wither away in the sun if I don’t get to them soon.”

“Mom, you don’t want acupuncture. The whole thing is ridiculous. It’s a big scam. There is no way that putting needles in your body is going to stop your pain. What you need is to see a doctor.” Janet’s frustration level was quickly rising.

“I had a feeling you would say that,” Audrey sighed. “So I think you should read the article.” She handed her daughter the magazine.

“No, Mom,” Janet said, pushing it away.

Janet knew she had the final say in this situation. After all, she worked for her mother’s insurance agency and had pulled some strings to get her mother covered. She felt strongly that she had a say in what treatment her mother had. Audrey had reluctantly accepted the insurance, knowing that Janet would have some control over her life. She solved the problem simply. She avoided going to doctors.

“Mom, I really think you should go to a doctor about your arthritis. If you don’t, it will just get worse. This could become serious. I’m sure there are tons of different medicines you could choose from to help the pain,” Janet preached. It was a speech she had given many times before, yet as before it got nowhere with her mother.

“Janet—don’t start that again. You know that I’m not putting any drugs into my body, especially when there’s no good reason.”

“No good reason? Mom, you’re in pain,” Janet responded with a touch of sympathy entering her voice.

Audrey sighed. She looked down and realized she had been massaging her wrist the whole time. She knew she was being difficult. Her daughter was right, at least about the pain.

“OK—what if we compromise,” Audrey began. “What if we talk to a doctor about acupuncture. Will you be convinced to let me try the treatment if you hear from a doctor that it is beneficial?”

“Fine,” Janet replied. She knew no sensible doctor would agree to sticking needles in her mother to get rid of her pain. The whole thing was ludicrous.



Appendix 5.8:
A Need for Needles: Acupuncture—
Does It Really Work? (BLM) (continued)

(3 of 4)

It was two weeks later and Janet and her mother were on their way to see a doctor. Audrey had already jumped out of the car and had headed into the doctor's office. Janet dragged herself out and followed.

They sat in the waiting room for what seemed like hours. Janet, in her business suit, was hiding behind the *New York Times* trying not to imagine what people were thinking of her mother. At least her mother had taken off her apron, but she was still in gardening clothes, straw hat resting in her lap. The nurse had seemed amused when she collected the initial data. She now reappeared.

"Audrey Baker, you can come in now."

Janet was glad to escape the eyes of everyone in the waiting room and followed her mother into the doctor's office. Moments later, Dr. Ramirez walked in as they were getting settled.

"Hello, how are you two doing today?" Dr. Ramirez asked.

"Great, thank..." Janet began.

"Just wonderful," Audrey interrupted. "The reason why we're here today is that my daughter can't seem to grasp the concept of acupuncture. I have some pain in my wrists, and I understand it can help that. So, I was wondering if you could just take a couple minutes to explain it to her."

Janet scowled, but before she could say anything, the doctor answered.

"What kind of pain do you have?"

"Oh, nothing serious," Audrey said. "I'm just getting old and my bones aren't what they used to be. When I'm pulling weeds they tend to get a little sore."

"Oh, you're a gardener," Dr. Ramirez said, pleased. "You know, I have a garden of my own."

"Really!" said Audrey. "Flowers or vegetables?"

"Both, actually."

"OK," Janet interrupted. "I'm sorry to be rude, but I am on a tight schedule. Can you just tell my mother that acupuncture will not work on her pain, so that we can set up a suitable treatment?"

"I see," Dr. Ramirez said.

He could see how this was going. He looked at Audrey's chart and paused as he thought how to most effectively approach this case.



Appendix 5.8:

A Need for Needles: Acupuncture—

Does It Really Work? (BLM) *(continued)*

(4 of 4)

Your task is to assist Dr. Ramirez in reaching his goal. There is a recent trend in medicine termed “evidence-based medicine,” in which physicians search the literature to determine effective approaches to treatment, rather than just doing what one of their teachers taught them to do in medical school. Your task is to approach the case in this manner, to scientifically investigate the pros and cons of acupuncture treatment, consult with Dr. Ramirez on what you find, and offer suggestions on how to best proceed with Audrey and Janet.

You will be divided into groups of four; two will search for the “pro” literature (that which supports acupuncture) and two for the “con” literature. Be sure you understand the theory behind acupuncture, the different treatments that acupuncturists might use, and the evidence or lack of it that suggests that acupuncture may work, including the argument that any positive results are due to the placebo effect.

When you return to class armed with evidence, your job will be to work out a consensus consultative opinion to Dr. Ramirez in your group of four students, and to share that opinion with the rest of the class. Part of that sharing will involve the soundness of the evidence. Then, you will need to work out among yourselves what you think Dr. Ramirez should do.

A good place to start your research would be the Acupuncture Information and Resources, National Center for Complementary and Alternative Medicines, National Institutes of Health website at <<http://nccam.nih.gov/health/acupuncture/>>.

Appendix 5.9:

Assessment—Collaborative Process (BLM)

(1 of 1)

Assessment of Collaborative Group Work	
Assess your collaborative processes, using the following rating scale.	
Rating Scale	
4 – We were consistently strong in this area.	
3 – We were usually effective in this area.	
2 – We were sometimes effective in this area.	
1 – We were not effective in this area. We experienced problems that we did not attempt to resolve.	
Group Process	Rating
<ul style="list-style-type: none">• We were respectful of individual group members' approaches and strengths.	
<ul style="list-style-type: none">• We encouraged and supported each person in contributing to group discussion and decision making.	
<ul style="list-style-type: none">• We questioned and challenged each other's ideas, but did not make personal attacks.	
<ul style="list-style-type: none">• We tried to explore a wide range of ideas and perspectives prior to making decisions.	
<ul style="list-style-type: none">• We shared work and responsibility equitably.	
<ul style="list-style-type: none">• We dealt successfully with the problem of absent or disengaged members.	
<ul style="list-style-type: none">• We made our decision through consensus.	
<ul style="list-style-type: none">• We used our time productively.	

