Lesson 2.6: Evaluating Evidence About Bacteria

As we already discovered, bacteria from a fecal transplant can take up food and space in the gut, which leaves very little room for harmful bacteria. Now, we want to know if there are other ways the added bacteria from a fecal transplant can help a patient, as well. Today, you’ll analyze experiments and read about two new types of bacteria that are added to the gut microbiome during a fecal transplant: \textit{B. fragilis} and \textit{L. reuteri}. You will select one of these types of bacteria to study in this lesson, and you’ll evaluate evidence about the bacteria you choose. This will prepare you to write one more argument about this bacteria to add to the press release.

Unit Question

- How can having 100 trillion microorganisms on and in the human body keep us healthy?

Chapter 2 Question

- How can fecal transplants cure patients infected with harmful bacteria?

Key Concepts

- The human microbiome contains approximately 100 trillion microorganisms. Most of these are bacteria.
- The human body provides an environment (food and space) for bacteria to survive.
- A healthy microbiome has various helpful types of bacteria.
- An infection of harmful bacteria in the human microbiome can make a person sick.
- Antibiotics reduce the number of helpful and harmful bacteria in the microbiome.
- Living things with fewer than normal helpful bacteria in their guts can become infected more easily because there is more food and space available for harmful bacteria.

Vocabulary

- antibiotics
- bacteria
- claim
- evidence
- microorganism
- scale
Warm-Up

Read your draft of your initial argument (on page 53) and evaluate it based on the criteria below. Select how well you completed each task.

I stated my claim clearly.

☐ Definitely
☐ Somewhat
☐ Not really
☐ Not at all

I included evidence to support my claim.

☐ Definitely
☐ Somewhat
☐ Not really
☐ Not at all

I made my reasoning clear by explaining how the evidence supports the claim.

☐ Definitely
☐ Somewhat
☐ Not really
☐ Not at all
Analyzing Experiments About Bacteria

1. Choose an experiment to focus on in this lesson, either from this page or the next page.
2. Work with your partner to observe and analyze the results of the experiment you chose.
3. Add annotations to the experiment data.

Experiment 2: *B. fragilis* Bacteria

**Normal mouse gut microbiome**

- **Test Results**
  - Immune Cells: High
  - Gut Mucus: High

**Mouse with no bacteria in gut**

- **Test Results**
  - Immune Cells: Low
  - Gut Mucus: Low

**Mouse with only *B. fragilis* in gut**

- **Test Results**
  - Immune Cells: High
  - Gut Mucus: Low

**Gut Bacteria Key**

- Bacilli (including *L. reuteri*)
- Bacteroidaceae (including *B. fragilis*)
- Prevotellaceae (including *Prevotella*)
- Actinobacteria (including *B. animalis*)
- Gammaproteobacteria (including *E. coli*)
- Epsilonproteobacteria (including *C. jejuni*)
- C. difficile
- Other
- Space

**Question:** How does *B. fragilis* bacteria in the gut microbiome affect mouse gut health?
Analyzing Experiments About Bacteria (continued)

Experiment 3: *L. reuteri* Bacteria

**Normal mouse gut microbiome**

**Test Results**
- Immune Cells: High
- Gut Mucus: High

**Mouse with no bacteria in gut**

**Test Results**
- Immune Cells: Low
- Gut Mucus: Low

**Mouse with only *L. reuteri* in gut**

**Test Results**
- Immune Cells: Low
- Gut Mucus: High

**Gut Bacteria Key**

- **Bacilli** (including *L. reuteri*)
- **Bacteriodaceae** (including *B. fragilis*)
- **Prevotellaceae** (including *Prevotella*)
- **Actinobacteria** (including *B. animalis*)
- **Gammaproteobacteria** (including *E. coli*)
- **Epsilonproteobacteria** (including *C. jejuni*)
- **C. difficile**
- **Other**
- **Space**

**Question:** How does *L. reuteri* bacteria in the gut microbiome affect mouse gut health?
Reading About Bacteria

1. Read the article about the bacteria you analyzed in the previous experiment:
   • “Bacteria: B. fragilis”
   • “Bacteria: L. reuteri”

2. Highlight or make notes about specific parts of the article that could be supporting evidence for your argument.

Active Reading Guidelines

1. Think carefully about what you read. Pay attention to your own understanding.

2. As you read, annotate the text to make a record of your thinking. Highlight challenging words and add notes to record questions and make connections to your own experience.

3. Examine all visual representations carefully. Consider how they go together with the text.

4. After you read, discuss what you have read with others to help you better understand the text.
Evaluating Evidence with the Evidence Gradient

Which experiment did you analyze? (check one)

☐ Experiment 2: B. fragilis Bacteria
☐ Experiment 3: L. reuteri Bacteria

Which claim do you think the evidence from the experiment helps support? (check one)

☐ Subclaim 2: Bacteria from the fecal transplant can help the patient’s body produce immune cells that kill invading bacteria.
☐ Subclaim 3: Bacteria from the fecal transplant can help the patient’s body produce mucus that protects the gut from invading bacteria.
☐ Both claims.
☐ Neither claim.

Bacteria Evidence Card Sort

1. Choose the claim that is best supported by the evidence in your experiment and article and clip it to the top of your Evidence Gradient. Write your names on the claim you chose.

2. Discuss each Bacteria Evidence Card with your partner. Remove any irrelevant cards.

3. Discuss the relevant Bacteria Evidence Cards. Place each one on the Evidence Gradient, according to how strongly it supports your subclaim.
Homework: Revising Your Argument

1. Look back to your initial argument on page 53 and the evaluation of your argument that you completed in today’s Warm-Up on page 56.

2. Then, revise your argument to make it more convincing.

A fecal transplant can work to cure a patient infected with a very harmful bacteria, such as *C. difficile*, in many different ways.

**Subclaim 1:** Bacteria from the fecal transplant can fill up the space in the gut, limiting the food and space for invading harmful bacteria.

Revise your paragraph that supports the subclaim above. Include evidence and explain how your evidence supports this subclaim.

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Homework: Revising Your Argument (continued)