
Project 4.3.1: What is Cholesterol?

Introduction

In Unit 2 you learned that there are different types of lipids. Lipids are a necessary component in your diet; however, it is important that your diet includes the right lipids in the correct amounts. One important lipid, cholesterol, is needed for the proper functioning of cells and for maintaining a healthy body. However, too much cholesterol can lead to health problems, including heart disease and blocked arteries, which can lead to strokes and heart attacks.

Cholesterol is naturally produced in the liver and also absorbed from food as it passes through the intestines. Regardless of where cholesterol originates, it must be transported to all the cells in the body. As with most substances transported through the body, it is carried by the blood stream. Cholesterol is needed by all cells in the body. One type of lipoprotein (a combination of lipid and protein), *LDL*, is responsible for transporting cholesterol to the cells. Another type of lipoprotein, *HDL*, is responsible for removing excess cholesterol from the blood stream and transporting it to the liver. Too much cholesterol in the blood can cause a build-up inside the arteries. Therefore, a balance of these two molecules keeps circulating lipids from becoming trapped inside arteries.

You most likely know someone who has dealt with high cholesterol, or you have probably seen the ads for foods or medications that may help lower cholesterol. Many people have misconceptions about cholesterol, LDL, and HDL. Because of pharmaceutical and food marketing, much misinformation has been spread about these molecules. It is not uncommon to hear LDL referred to as “bad cholesterol” and HDL as “good cholesterol.” In reality, neither is actually good or bad. But a balance needs to exist as they both do their jobs.

In this project you will design and create a brochure, poster, newsletter, or webpage that accurately informs high school and college students about cholesterol, LDL, and HDL. You will use what you learn to analyze Anna Garcia’s cholesterol test results and make recommendations about her cardiac care.

Equipment

- PBS Course File
- Computer with Internet access
- Project 4.3.1 Medical History Resource Sheet
- Activity 2.2.2 Nutritional Terms Chart
- Biomedical Sciences General Rubric
- Computer printer
- Poster board or paper (optional)
- Colored pencils or markers (optional)

- Biomedical Sciences Documentation Protocol

Procedure

1. Review the connection between unsaturated fats, saturated fats, trans fats, and cholesterol with overall health. (See the 2.2.2 Nutritional Terms Chart on the website for reference).
2. Access the webpage Cholesterol and Health—Functions and Food written by Chris Masterjohn at <http://www.cholesterol-and-health.com/cholesterol-and-health.html>. Use the links on the left side of the webpage to read about the many functions cholesterol has in our cells and body. List and describe these functions in your NB.
3. Answer Conclusion question 1.
4. With a partner, design and produce a brochure, poster, newsletter, or webpage that informs and provides accurate, easy-to-follow information to high school and college students about cholesterol, LDL, and HDL.
5. Use appropriate Internet search strategies to access reliable sources and research information that provide answers to the questions listed below.
 - What are LDL and HDL?
 - How do LDL and HDL differ structurally and functionally?
 - Why do doctors monitor the concentrations of LDL and HDL in patients' blood?
 - How are the concentrations of LDL and HDL associated with the risk for heart disease and associated disorders?
 - What other molecules in a patient's blood are monitored along with LDL and HDL?
 - What do the results of a cholesterol test mean? How do patients interpret each value?
 - What can patients do to change the levels of LDL and HDL in their blood?
 - How does intake of unsaturated, saturated, and trans fats affect cholesterol levels and overall health?
6. Write notes from your research in your laboratory journal and include the information you will need to properly cite your sources.
7. Obtain a Biomedical Sciences General Rubric from your teacher. Review the requirements for successful completion of the project.
8. Design your final product to be informative, yet simple to follow. You do not need to go question by question. These are provided as a guide of the types of information you should include. Final organization of information is up to you.
9. Check your brochure or poster to be sure you answered all the questions listed in Step 4 and that you included information about the structure and function of cholesterol.
10. Be sure to properly cite all the sources of the information you used to develop your product.

11. Review the components of the scoring rubric to be sure your final product meets all the expectations.
12. Obtain a Project 4.3.1 Medical History Resource Sheet. Note that Anna's bloodwork is back from the laboratory.
13. Use what you have learned in the project to interpret Anna's results. In the *Follow-up/Diagnosis* section, write a paragraph that explains whether each number in the panel is considered high, low, or borderline.
14. Pretend you are Anna's physician. Add information to the *Recommendations* section regarding a potential plan for Anna to address her cholesterol values.
15. Answer the remaining Conclusion questions.

Conclusion

1. Explain how cholesterol plays an important role in at least two different human body systems.
2. List five factors or behaviors that affect cholesterol levels in the body, how these factors affect cholesterol levels, and whether the effect is positive or negative with regards to a person's health.
3. Explain how cholesterol levels could be linked to health events such as strokes and heart attacks.
4. What do you feel are the pros and cons of using cholesterol-lowering drugs to treat high cholesterol?