

Chapter Summary

Phytochemicals are plant chemicals that are believed to protect the plant from a variety of injurious agents. Although studies have revealed a variety of benefits from consuming phytochemical-rich foods, they are not considered nutrients and therefore have no RDA. Phytochemicals appear to reduce inflammation, protect against cancers, promote immune function, and enhance heart and circulatory health.

Phytochemicals are not considered nutrients; however, consuming phytochemical-rich foods has been shown to reduce the risk for several diseases, including cardiovascular disease, cancer, and Alzheimer's disease. The evidence for these associations comes largely from extensive epidemiological studies, which can reveal only *associations* rather than direct *causes*. This chapter explores some of the controversies and seeks to help the student better understand how phytochemicals influence health and disease.

Learning Objectives

After studying this chapter, the student should be able to:

1. Define phytochemicals and identify a few of the most common phytochemical groups (pp. 419–420).
2. Identify at least three health-promoting functions associated with phytochemicals (pp. 419–421).
3. State three reasons that there is no RDA for phytochemicals (pp. 421–422).
4. Explain why phytochemical supplements should be avoided (pp. 422–423).

Key Term

phytochemicals

Chapter Outline

I. What Are Phytochemicals?

- A. Phytochemicals are plant chemicals that are believed to protect the plant from a variety of injurious agents.

1. Phytochemicals are thought to have health-producing producing properties for those who consume them.

Key Term: phytochemicals

Figures:

Figure 1: Health claims and food sources of phytochemicals.

II. How Might Phytochemicals Help Prevent or Treat Disease?

- A. Consuming foods high in phytochemicals is thought to reduce the risk for many diseases.
 1. Epidemiologic studies have revealed an association that has led to the theory that phytochemicals are productive to humans.
- B. Test-tube studies reveal the high-antioxidant activity of many phytochemicals.
 1. Because phytochemicals are altered during digestion, it is hard to determine whether they are still effective antioxidants after exposure to metabolites.
- C. Cellular and animal studies are revealing health-promoting functions of phytochemicals independent of their antioxidant properties.
 1. Phytochemicals reduce inflammation linked to Alzheimer’s disease, cardiovascular disease, and arthritis.
 2. Phytochemicals protect against cancers by enhancing enzyme activity that detoxifies carcinogens, slowing tumor growth, and instructing cancer cells to die.
 3. Phytochemicals promote immune function and act as antibiotic and antiviral agents.
 4. Phytochemicals lower blood lipids, blood pressure, and blood clotting, reducing risk of cardiovascular disease.
 5. Phytochemicals inhibit lipid synthesis and increase fatty acid oxidation, thereby potentially acting as an “antiobesity agent.”

III. What’s the Best “Dose” of Phytochemicals?

- A. Currently, research has not led to RDAs for phytochemicals.
 1. Phytochemicals are not considered nutrients.
 2. Phytochemicals work synergistically and do not have the same effects singularly.
 3. Phytochemicals differ in their action under different circumstances.
 4. Benefits of phytochemicals may be limited to the amounts we consume from food.
 - a. Supplemental doses may produce different effects.
 - b. Scientists theorize that phytochemicals stress cells to improve their defenses, and larger amounts may overstress the cell, causing damage.
 5. Supplemental phytochemicals may be toxic.
 6. The best way to increase phytochemical intake is to build a rainbow of colors on your plate.

Activities

1. Many websites now offer their list of the top ten “Super Foods.” Find several of these lists and print them, including the source. Divide students into groups of ten, and give each group two different lists. Students should first discuss why the two lists are not identical, then select one food from the lists to research, answering the following questions:

- a. Why was the food distinguished as a super food?
- b. Explain whether or not the research substantiates the claims made for the food. Has the safety been established?
- c. Is the food easily and inexpensively incorporated into the American diet? Does the benefit warrant the cost?
- d. Do you believe this food belongs on a list of super foods?

This research can be discussed in small groups and then shared in a class discussion.

2. Have students go to the USDA's National Agricultural Library at www.fnict.nal.usda.gov and look at the recommendations various organizations make about consuming antioxidants and phytochemicals. They can compare and contrast and discuss their adequacy.
3. Bring a variety of phytochemical foods to class for a "tasting party." Discuss the substances in each food that warrants its status as a potential health booster.

Diet Analysis Activity

4. Review Figure 1 in your textbook. Is your diet a rich source of phytochemicals? Which foods do you consume on a regular basis that provide them? What could you do to increase your intake of phytochemical-rich foods? With your personal family history, which foods might be beneficial to you?

Nutrition Debate Activity

5. Either as a class or in small groups, debate the following questions:
 - a. Should marketers be allowed to make health claims on functional foods?
 - b. Should dietary-supplement labels be required to include the risks of taking supplemental phytochemicals when they are in the product?
 - c. Should the federal government regulate sales and advertisement of functional foods differently than conventional foods?

Web Resources

American Institute for Cancer Research (ACIR)

www.aicr.org

Linus Pauling Institute

www.lpi.oregonstate.edu
