

Chapter 9

Water & Phytochemicals

Fighting Free Radicals

Directions: Read the following selection. Then answer the questions under *Thinking Critically*, and complete the activities as directed by your teacher.

What do some types of cancer, heart disease, cataracts, Alzheimer’s disease, and physical changes related to aging have in common? The villain behind all of these is something called a free radical.

Most atoms are surrounded by pairs of electrons. A free radical has an impaired electron or two or more unpaired electrons that don’t interact. An unpaired electron may snatch an electron from a neighboring atom. That atom then becomes a new free radical and in turn raids another atom’s electrons. The resulting chain reaction can damage cells, tissues, and even genetic material—DNA—itself.

With every breath, the body’s metabolism creates a free radical by robbing oxygen atoms of electrons. Research shows that stress of various types, smoking, and aging can all accelerate damage from oxidation. When healthy cells are weakened by free radicals, they are more susceptible to cardiovascular disease and certain types of cancers.

It has long been known that an adequate intake of nutrients is needed to prevent acute and recognized deficiency diseases, such as scurvy, beriberi, and rickets. More recently, research has focused on the effects of antioxidants, which help prevent tissue damage and disease that can result from free radicals in the body. Vitamin E, vitamin C, and beta carotene have all been studied for their antioxidant properties.

A growing body of research suggests that phytochemicals—unique plant chemicals found in fruits and vegetables—are essential in combating the effects of free radicals and preventing heart disease, cancer, and other diseases. Six of these phytochemicals—allicin, lycopene, lutein, quercetin, flavonoids, and genistein—show great promise and are found in foods you probably eat every day.

Phytochemicals		
Phytochemical	Foods That Have It	Properties
Allicin	Garlic	Antibacterial, antiviral, lowers blood cholesterol, reduces the risk of many cancers
Lutein	Leafy green vegetables, such as kale and spinach	Protects against age-related muscular degeneration
Lycopene	Tomatoes, watermelon	Reduces the risk of many cancers
Quercetin	Red and yellow onions, broccoli, tea	Reduces the risk of many cancers, anti-fungal, anti-inflammatory, anti-viral, anti-bacterial
Flavonoids	Red and purple grapes, grape juice	Thin blood, boost immunity, detoxify LDL cholesterol, anti-allergy, reduce the risk of many cancers
Genistein	Soy beans, soy protein foods (tofu, soy milk)	Reduces the risk of many cancers, lowers blood cholesterol

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Researchers at medical research facilities around the world have confirmed the benefits of phytochemicals. Specifically, Harvard Medical School researchers found that men who ate ten servings of tomato-based foods—those rich in lycopene—were half as likely to develop prostate cancer as men who ate half that amount. Dutch researchers found that people who ate half an onion a day reduced their risk of stomach cancer by half and that people eating sufficient amounts of quercetin-rich foods were least apt to suffer fatal heart attacks. Several studies have linked grape flavonoids to reduced rates of heart disease.

The National Cancer Institute recommends eating at least five fruits and vegetables a day. In addition, follow the latest USDA food guidance system suggestions in MyPyramid. If you eat one serving a day of foods containing each of the six phytochemicals listed, you'll meet the recommendations of both groups and help protect yourself against free radicals.

Thinking Critically

- Use an X to identify the statements that are true based upon the information you read in this article.
 - _____ A. People who eat enough grape flavonoids will not suffer heart attacks.
 - _____ B. Evidence suggests that eating foods with phytochemical properties may lower the risk of some forms of cancer and heart disease.
 - _____ C. Everyone should eat a minimum of five servings a day of fruits and vegetables.
 - _____ D. Oxygen is unhealthy for you.
 - _____ E. According to Harvard researchers, prostate cancer can be prevented by increased intake of lycopene.
- If you were concerned about protecting yourself from cancer, would it be wise to eat five servings a day of tomatoes rather than eating a variety of fruits and vegetables? Why or why not?

- Based on the information in the article, do you think health professionals should advise everyone to consume more than the recommended amounts of foods containing phytochemicals? Why or why not? List two to three positive and negative consequences of doing so.

For Further Study

- ◆ Conduct research about heart disease. What factors are widely accepted as causing or increasing the risk of heart disease? Lowering it? Which factors are related to food choices? Which factors are the topics of current research? Summarize your findings in a brief report.
- ◆ Conduct research about oxygen. What properties of oxygen cause it to transform easily into a free radical? Summarize your findings in a brief report.
- ◆ Find a news summary of a study on a topic related to nutrition. Look up any journal articles or other in-depth reports referred to in the news study, and answer the following questions:
 - ◆ How was the study funded?
 - ◆ Did the person(s) funding the study have a vested interest?
 - ◆ How many subjects were studied?
 - ◆ What variables were controlled?
 - ◆ Are the findings more or less convincing after identifying the answers to these questions? Why?