



Functional Foods, Phytochemicals,
and Fortified/Enriched Foods
NUTR 207 2020: **Module 1** Chap.2
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Functional Foods

“Any modified food or food ingredients that may provide a health benefit beyond the traditional nutrients it contains”

National Academy of Sciences’ Food and Nutrition Board, 1994

“Group of foods known to possess nutrient or non-nutrients that might lend protection against diseases”

Nelson Education, 2021

Functional Foods

Examples

Food	Bioactive component	Proposed health benefit
Fatty fish	Omega-3 fatty acids	Reduces heart disease and myocardial infarctions
Garlic	Organosulfur compounds -E.g. allicin	Reduces total and LDL cholesterol
Tomatoes	Lycopene	Reduces risk of prostate cancer
Whole oat products	Beta-glucan	Reduces total and LDL cholesterol
Green tea	Polyphenols (catechins)	Reduces cancer risk

Functional Foods

Characteristics

- Can be of plant or animal origins
- Functional foods may have characteristics similar to drugs
- The quantity of functional food needed and length of time to see beneficial effects varies by functional food



Phytochemicals

Phyto means plant in Greek

- Phytochemicals are non-nutrient components of plants
- They are biologically active and believed to be protective against disease

Emerging as potential regulators of health

- Antioxidants (more details in future classes...)
- Regular protein synthesis
- Mimic hormones
- Alter blood chemistry

Phytochemicals Examples











 <p>Broccoli and broccoli sprouts (and brussels sprouts, bok choy, cabbage, cauliflower, kale, collard greens, swiss chard, turnips, and watercress) contain an abundance of the cancer-fighting phytochemicals sulforaphane and indoles.</p>	 <p>An apple a day—rich in phenolic acids—may protect against heart disease.</p>	 <p>The phytoestrogens of soybeans seem to starve cancer cells and inhibit tumor growth; the plant sterols may lower blood cholesterol and protect cardiac arteries.</p>	 <p>Garlic (and chives, leeks, onions, and scallions), with its abundant organosulfur compounds, may lower blood cholesterol and blood pressure and protect against stomach cancer.</p>
 <p>The phytochemical resveratrol found in grapes (and nuts) improves glucose control, inhibits cancer cell growth, and limits blood clot formation and inflammation.</p>	 <p>The ellagic acid of strawberries (and blackberries, blueberries, raspberries, and grapes) may inhibit certain types of cancer and decrease cholesterol levels.</p>	 <p>The monoterpenes of citrus fruits (and cherries) may protect the lungs.</p>	 <p>The flavonoids in black tea may protect against heart disease, whereas those in green tea may defend against cancer.</p>
 <p>The flavonoids in cocoa and chocolate defend against oxidation and reduce the tendency of blood to clot.</p>	 <p>Tomatoes (and pink grapefruit, red peppers, and watermelons), with their abundant lycopene, may defend against cancer and heart disease by protecting DNA from oxidative damage.</p>	 <p>Colorful foods such as apricots (and cantaloupes, carrots, kale, kiwifruit, mangoes, papaya, pumpkins, spinach, sweet potatoes, and winter squash) contain beta-carotene, which may help slow aging, protect against some cancers, improve lung function, and reduce complications of diabetes.</p>	 <p>Blueberries (and cherries, plums, and strawberries), a rich source of anthocyanins, may protect against the effects of aging.</p>
 <p>Spinach (and collard greens, corn, swiss chard, and winter squash) contains the carotenoids lutein and zeaxanthin, which help protect the eyes against macular degeneration.</p>	 <p>Quercetins—commonly found in kale (and onions, pears, and grapes)—reduce inflammation from allergies, inhibit tumor growth, and protect the lungs.</p>	 <p>Flaxseed, the richest source of lignans, may prevent the spread of cancer.</p>	

Figure H13-1

Phytochemicals Examples

Colorful Fruits, Vegetables, and Phytochemicals			
Color	Phytochemicals	Fruits and Vegetables	
White and green	Allyl sulphides	Onions, garlic, chives, leeks	
Green	Sulforaphanes, indoles	Broccoli, Brussels sprouts, cabbage, cauliflower	
Yellow and green	Lutein, zeaxanthin	Asparagus, collard greens, spinach, winter squash	
Orange and yellow	Cryptoxanthin, flavonoids	Cantaloupe, nectarines, oranges, papaya, peaches	
Orange	Alpha and beta carotenes	Carrots, mangos, pumpkin	
Red and purple	Anthocyanins, polyphenols	Berries, grapes, plums	
Red	Lycopene	Tomatoes, pink grapefruit, watermelon	

Phytochemicals

Should phytochemicals be taken in a pill/ supplemental form?

- Many claims... but limited scientific research and insufficient evidence
- Supplements are in much higher forms than found in food and can have adverse interactions and may contain untested ingredients



Natural Health Product (NHP)

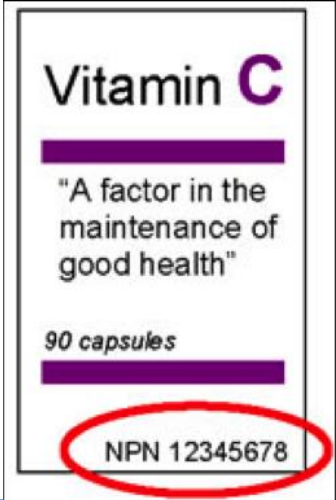
NHP: as defined by Health Canada

- **Natural and Non-prescription Health Products Directorate**

- www.canada.ca/en/health-canada/services/drugs-health-products/natural-non-prescription.html

- 'Under the Natural Health Products Regulations, which came into effect on January 1, 2004, natural health products (NHPs) are defined as:

- Probiotics
- Herbal remedies
- Vitamins and minerals
- Homeopathic medicines
- Traditional medicines such as traditional Chinese medicines
- Other products like amino acids and essential fatty acids
- NHPs must be safe to use as over-the-counter products and do not need a prescription to be sold. Products needing a prescription are regulated as drugs under the Food and Drug Regulations.'



Fortified Foods or Enriched Foods

“Foods to which nutrients have
been added”

Nelson Education, 2021

Fortified Foods Examples



Milk
-Vitamin D



Orange juice
-Vitamin D, Calcium



Wheat Flour
-Thiamin (B1), Riboflavin (B2),
Niacin (B3), Folic acid, Iron

Summary of Definitions

Food Type	Definition
Functional Food	Any food that has benefits beyond nutrients , notably disease prevention
Phytochemical	Non-nutrient components of plants that are biologically active and believed to be protective against disease
Fortified/Enriched Foods	Foods to which nutrients have been added

Some fortified/enriched foods are considered functional foods

E.g. Milk is fortified with Vitamin D, which prevents rickets disease

Some functional foods **CONTAIN** phytochemicals

Phytochemicals, functional foods Safety



Are there concerns about Phytochemical and functional foods? Consider:

- Does it work?
 - Is it safe?
 - Has Health Canada issued a warning/advisory?
 - How much do I really need?
 - Does it meet the current nutrition guidelines?
 - How much does it cost?
 - Who is selling it to me and why?
-
- **Bottom line: Eat a variety of colorful fruits and veggies...Balance your plate!**

References

- Hasler, C. M. (2002). Functional foods: benefits, concerns and challenges—a position paper from the American Council on Science and Health. *The Journal of nutrition*, 132(12), 3772-3781.
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- <https://www.canada.ca/en/health-canada/services/drugs-health-products/natural-non-prescription.html> accessed Aug. 24, 2020.
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