



Health Benefits of Phytochemicals: Mother Nature's Gift.

By Connie Guttersen, RD, PhD

Let food be your medicine and medicine be your food.

Hippocrates was correct when he declared this 3000 years ago. Modern medicine is confirming this ancient wisdom as well as the healthy inspirations of the traditional diets from the Mediterranean, Asia, and Latin America. The intriguing question is what foods from these cuisines contributed most to their extremely low incidence of chronic diseases, many of which affect Americans today – heart disease, certain cancers, obesity, and type II diabetes. Although these cuisines have dramatic differences in their flavors, they do have something in common. They are based on large amounts of plants, that is, vegetables, grains, fruits, nuts, beans, and legumes. This common trait would provide these cuisines with a common nutrient composition. A nutrient composition which is quite different than the typical American diet, where meats and dairy are at the center of our plate.

The scientific literature has now opened new doors for a better understanding of the medicinal value of plants which extend beyond the information we already know concerning vitamins and minerals. In the past, our thinking has centered on the foods which are “bad for us”, today the focus has changed to eating more of the foods which are good for us – fruits and vegetables. The growing interest is in thousands of bio-active compounds produced by plants, also referred to as phytochemicals. Phytochemicals provide protection against cardiovascular disease, several common cancers, premature aging, and other chronic diseases. They are also responsible for many of the distinguishing characteristics of different plants. For example, the bright colors of yellow, red, orange, and green seen in tomatoes, peppers, and leafy vegetables. The particular flavors, of bitter and astringent we experience in eating certain greens, olives, and persimmons.

Collectively, these phytochemicals have phyto-power. Their complementary and overlapping mechanisms of action not only offer protection to plants from hungry predators, but also are protective to us when we include them in our daily meals. Many different modes of actions have been attributed to their medicinal value. The following chart summarizes the disease preventative mechanisms of plants which have been identified in human dietary studies. The thousands of different types of phytochemicals can be categorized under various families. The chart provides these families as well as the specific phytochemicals, the proposed mechanism for health, and dietary sources.

Disease Prevention Mechanisms of Plants.

- Antioxidant Activity
- Detoxification of Carcinogens and Harmful Chemicals
- Stimulation of the Immune System
- Altered Hormone Metabolism
- Blood Pressure Reduction
- Antibacterial and Antiviral Properties
- Maintain Normal DNA Repair
- Inhibit Tumor Growth
- Decreases Processes which Promote Cardiovascular Disease

Of particular importance, is the action of some phytochemicals as antioxidants.

The best known antioxidants are vitamins C, E, and beta carotene, found mainly in fruits and vegetables. But there are thousands of phytochemicals

which also have antioxidant capabilities. Emerging scientific evidence has shown that the flavonoids from the polyphenol category, have antioxidant powers greater than those of vitamins C, E, and beta-carotene.

An antioxidant helps prevent or delay the oxidative damage to the body, cells and tissues which are a result of free radicals. Scientists believe that free radical damage is an important stage which contributes to diseases like heart disease, cancer, and premature aging. Free radicals are natural by-products of metabolism and are also formed in the body in response to smoking, air pollution, and excessive exposure to sunlight. One of the most damaging free radicals is the unstable, highly reactive form of oxygen which attacks cells, genes, and tissues in a rapid chain reaction sequence. The antioxidants stabilize the free radical and stop the damaging chain reaction.

The medical research continues to emphasize that there is no single magical phytochemical but that there is a synergistic or "team effort" to their medicinal value.

Mother Nature has packaged these compounds and other nutrients within the whole foods to co-exist in a balanced relationship. It is questionable whether the protective benefits are possible when one phytochemical is isolated such as in a supplement. What we do know, eating whole and seasonal foods gives us hundreds of optimal phytochemicals.

For many Americans, the challenge is eating a wide variety of vegetables, fruits, grains, and beans, especially in the equivalent amounts of what was consumed in parts of the Mediterranean in the 1960's. Epidemiological data reflects that Americans would have to triple their intake of fruits and vegetables to reach the amounts consumed in parts of the Mediterranean during the 1960's. How do we experience these delicious flavors, especially from the bitter greens which are so good for us? The answer lies in the quality of the food. Vegetables and fruits taste their best when their flavors and colors mature naturally with the seasons. The beauty and flavors of the Mediterranean market basket has already motivated many of us to include more seasonal fruits and vegetables into our daily meals. Much of what we have

learned from the Mediterranean lifestyle has centered on the concept that the traditional diet is a way of thinking of food, the awareness of its origins and preparations are at the core of appreciating food. Good food begins with quality ingredients. Local, fresh, and seasonal products are essential to this cuisine as are the steps to capture flavor and the balanced use of seasonings.

Cooking with bitter greens, such as those found in chard, kale, broccoli rabe, and other greens is a traditional dish of the Mediterranean cuisine. Many of these greens are braised, incorporated into pies, and combined with various pastas. Yet, one must admit that when prepared properly, there is no bitter flavor, just a mellow hint of the greens characteristic flavors. Bitter flavors, which are characteristic of the phytochemicals from the flavonoid family, can be masked without being removed. Minimizing the bitter flavors are achieved by preparing the greens with the proper combinations of olive oil, ripe olives, acid, such as lemon juice or vinegar, a dash of salt, and even a bit of red pepper. Cheeses such as feta, goat, or parmesan can also be used to add additional flavor.

The combination of these ingredients has been used for hundreds of years in the Mediterranean. Interestingly, the phyto-power of the flavonoids are boosted in the company of these ingredients, primarily from the olive oil. But let us not forget the joy of eating. It is one of life's greatest pleasures. Today, we can say that what, when, and how we eat is as important for our health as it is for enjoyment.

For additional information, recipes and snack ideas, visit the California Olive Industry web site at www.calolive.org or write to:



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Plant Food	Phytochemical	Protective Effects
Grains and Beans	Sapponins, Isoflavones	<ul style="list-style-type: none"> • Neutralize cancer causing enzymes in the gut • Reduce serum cholesterol
Soy Beans	Genistein	Alter hormone metabolism to reduce tumor growth
Allium Vegetables: Onions, Garlic, Chives, Leeks, Scallions	Quercetin, Sulfur Allyl Cystein, Allicin	<ul style="list-style-type: none"> • Antioxidant • Detoxify • Decrease cholesterol and atherosclerosis
Cruciferous Vegetables: Broccoli, Kale, Brussels Sprouts, Cabbage, Cauliflower	Sulforane, Brassin, Indoles, Glucosinolates, Indoles, Isothiocyanate	Antioxidants
Citrus Fruits	Terpens, Flavones	<ul style="list-style-type: none"> • Boost protective enzyme activity • Antioxidant
Wine, Grapes, Cranberries	Flavonoids, Ellagic, Quercetin	Antioxidant: beneficial for heart disease and cancer
Green, Black, Oolong Tea	Flavonoids, Quercetin, Polyphenols, Catechins	<ul style="list-style-type: none"> • Antioxidant • Reduce tumor growth • Reduce cholesterol
Extra Virgin Olive Oil	Oleuropin, Hydroxytyrosol, Lycopene	
Tomatoes	Lycopene	Antioxidant, beneficial for heart disease prevention
Fiber	Phytoestrogens	Reduce risk of hormone related cancers

Suggested Reading

Steinmetz KA, Potter JD. Vegetables, fruit, and cancer prevention. J Am Diet Assoc 1996;96:1027-1039

Messina MJ, Persky V, Setchell KDR, et al. Soy intake and cancer risk: a review of the in vitro and in vivo data. Nutr Cancer. 1994;21:113-131

Drewnoski and Carneros, Bitter taste, phytonutrients, and the consumer: a review. Am J Clin Nutr 2000;72:1424-35

Cao, Sofic, Prior. Antioxidant capacity of tea and common vegetables. J Agric Food Chem. 1996; 44:3426-3431

Lampe, J. Health effects of vegetables and fruit; assessing mechanisms of action in human experimental studies. Am J Clin Nutr 1999;70:475S-90S.

Trichopoulou, A, et al. Nutritional composition and flavonoid content of edible wild greens and green peas: a potential rich source of antioxidant nutrients in the Mediterranean Diet. Food Chemistry 2000;70:319-323

Wise JA, Morein, RJ, Sanderson R, Blum K. Changes in plasma carotenoid, alpha tocopherol, and lipid peroxide levels in response to supplementation with concentrated fruit and vegetable extracts; a pilot study. Curr Ther Res Clin Exp 1996; 57:445-61

Rice-Evans CA, Miller NJ, Bolwell PG, Bramely PM, Pridham JB. The relative antioxidant activities of plant derived polyphenolic flavonoids. Free Radic Res 1995;22:375-83.

Visioli, F and Galli, C. The effect of minor constituents of olive oil on cardiovascular disease: New findings. Nutrition Reviews 1998; 56 (5) 142-147.

Formica, JV, Regelson, W. Review of the biology of quercetin and related bioflavonoids. Food Chem Toxicol, 1995; 12: 1061-80

Hayashi A, et al. Effects of daily oral administration of quercetin chalcone and modified citrus pectin. Altern Med Rev 2000;6:546-552

Abdalla DS, Terao, J. Inhibitory effect of flavonoids on low density lipoprotein peroxidation catalyzed by mammalian 15 lipoxygenase. IUBMB Life 2000 Apr;49;4: 289-95

Liggins J, et al. Daidzein and Genistein content of fruits and nuts. J Nutr Biochem 2000;11:326-31



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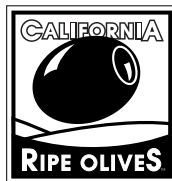


Phytochemical Discussion: Health And The Mediterranean Diet

Many of the diseases which affect Americans today—heart disease, certain cancers, obesity and type II diabetes—were practically nonexistent in traditional Mediterranean populations. The traditional Mediterranean cuisine is a plant-based diet, with plenty of vegetables, grains, fruits, nuts, beans and legumes. This is very different from the typical American diet, where meat and dairy rules.

Scientific literature is opening new doors for a better understanding of the medicinal value of plants and there is growing interest in thousands of bio-active compounds produced by plants—known as phytochemicals.

- o How much would Americans have to increase their intake of fruits and vegetables to reach amounts consumed in the Mediterranean in the 1960s?
- o What clues do colors give you to phytochemicals?
- o What helps prevent or delay oxidative damage to the body, cells and tissues?
- o What are some of the best known antioxidants?
- o Suggest ways that you positively change popular menu offerings by adding "good" things, for example, adding darker leafy greens to a salad or olives to the top of a pizza.



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