

Sunflower kernel is rich in a number of components that have been shown to act as antioxidants and anticarcinogens, and to protect against cardiovascular and other diseases; thus it can be considered a functional food. In comparison to other nuts and foods high in these compounds, sunflower kernel contains high levels of **vitamin E**, **betaine**, **phenolic acids** and **choline**. In addition, kernel is a good source of **arginine** and **lignans** compared to some nuts. Each of these compounds, while perhaps unfamiliar to the layperson, has been studied by the scientific community and shown to offer a variety of health benefits. Consumers are increasingly interested in functional foods, offering manufacturers of baked goods and snack foods the opportunity to consider kernel as an ingredient in new products in order to deliver upon this growing demand.

How does the functional content of the sunflower kernel compare to other foods?

The following charts illustrate levels of functional phytochemicals prevalent in sunflower kernel compared to other sources of each compound. When considered in aggregate, the amazing kernel adds a nutritional wallop to a wide array of products, such as breads, muffins, crackers, and snack foods, just to name a few.

What are some examples of functional foods?

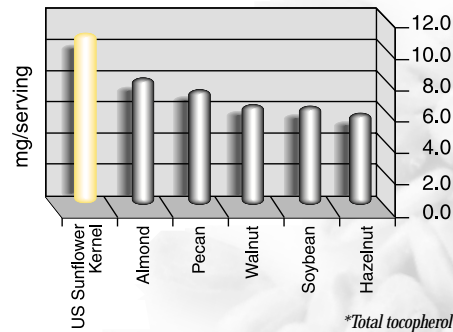
Actually, most foods are functional, at least to some degree, since they provide important nutrients essential for good health. Here are a few examples of functional foods¹:

- Tomatoes contain “lycopene,” which may decrease the risk of developing certain cancers.
- Onions and garlic contain “diallyl sulfide,” which lowers LDL cholesterol and maintains a healthy immune system.

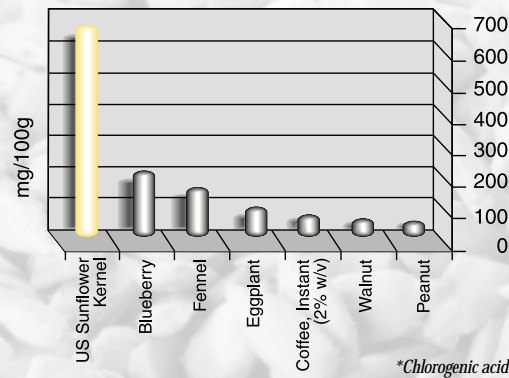
- Cranberries and chocolate contain “proanthocyanidins,” which have been shown to improve urinary tract health and may reduce risk of cardiovascular disease.
- **Sunflower kernel**, the edible heart of the sunflower seed, has recently been studied. Research indicates kernel is a good source of phytochemicals (non-nutrient plant chemicals) that can be protective against disease. A few specific phytochemicals prevalent in kernel, as well as their respective health benefits include:

- **Vitamin E** (tocopherols) – may protect against cardiovascular disease²
- **Betaine** – may protect against cardiovascular disease³
- **Phenolic acids** (chlorogenic acid) – antioxidant⁴ and anticarcinogen^{5,6}
- **Choline** – plays a role in memory and cognitive function⁷
- **Arginine** – potential heart-health benefits⁸
- **Lignans** – may protect against heart disease and some cancers; lowers LDL cholesterol and triglycerides⁹

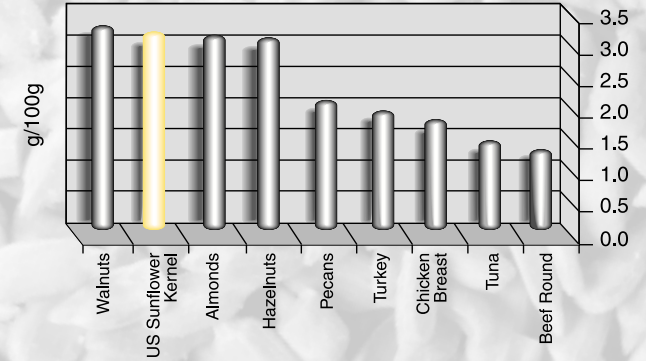
VITAMIN E* : Cardiovascular Benefits



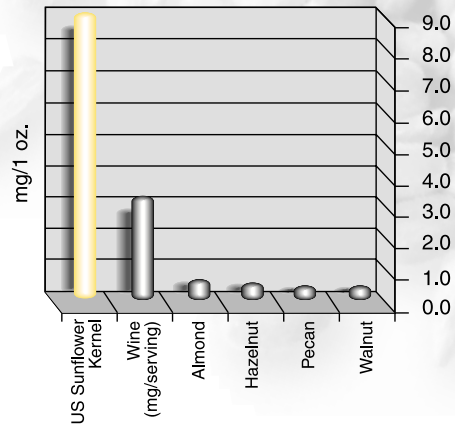
PHENOLIC ACID* : Antioxidant and Anticarcinogen



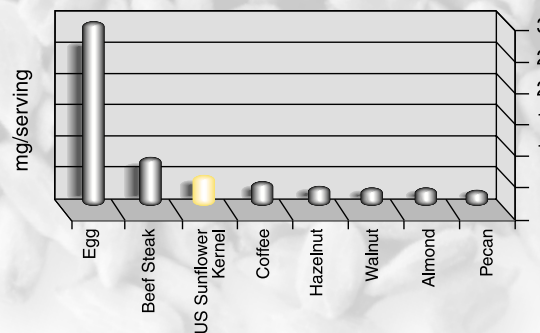
ARGININE: Potential Heart-Health Benefits



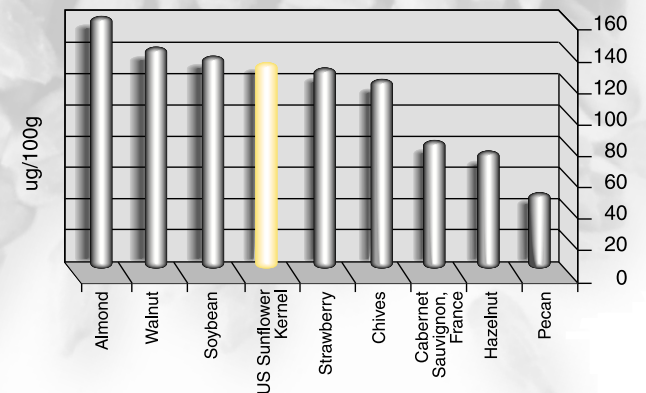
BETAINE: Cardiovascular Benefits



CHOLINE: Memory & Cognitive Function



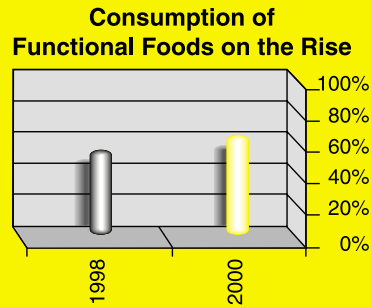
LIGNANS: Heart-Health, Cancer, Cholesterol and Tryglyceride-Lowering Benefits



Consumers and Functional Foods

While an exact definition continues to evolve, functional foods provide benefits beyond basic nutrition; they may prevent certain disease(s) or promote better health. Many experts contend functional foods' benefits are more effectively derived from the consumption of foods, rather than supplements.

In February 2000, International Food Information Council (IFIC) conducted quantitative research exploring consumer attitudes toward functional foods. Some highlights include:



Percentage of Americans eating up to three foods for functional health benefits.

93% of Americans believe that certain foods have health benefits that go beyond basic nutrition and may reduce the risk of disease or other health concerns.

74% believe that food and nutrition play a "great role" in maintaining or improving overall health.

45% list **heart health** as their top health concern.

31% list **cancer** as their top health concern.

¹ IFIC backgrounder on functional foods 12/99

² Guhr, G., Lachance, P.A. (1997). Role of phytochemicals in chronic disease prevention. Nutraceuticals: Designer Foods III. Garlic, Soy, and Licorice, Lachance, P.A. (Ed.), Trumbull, CT: Food & Nutrition Press, Inc., pp. 311-364.

³ Zeisel, S.H. and Mar, M.H. (1999). Betaine in wine: Answer to the French paradox? Med. Hypotheses, 53:383-385.

⁴ Nakatani, N., Kayano, S.I., Kikusaki, H., Sumino, K., Katagiri, K., and Mitani, T. (2000). Identification, quantitative determination, and antioxidative activities of chlorogenic acid isomers in prune (*Prunus domestica* L.). J. Agric. Food Chem., 48:5512-5516.

⁵ Kasai, H., Fukada, S., Yamaizumi, Z., Sugie, S., Mori, H. (2000). Action of chlorogenic acid in vegetables and fruits as an inhibitor of 8-hydroxydeoxyguanosine formation in vitro and in a rat carcinogenesis model. Food Chem. Toxicol., 38:467-471.

⁶ Azuma, K., Ippoushi, K., Nakayama, M., Ito, H., Higashio, H., Terao, J. (2000). Absorption of chlorogenic acid and caffeic acid in rats after oral administration. J. Agric. Food Chem., 48:5496-5500.

⁷ Zeisel, S.H. (2000). Choline: Needed for normal development of memory. J. Amer. Coll. Nutr., 19:528S-531S.

⁸ Brohier, K. Arginine - An amino for the heart. Food Processing's Wellness Foods. Putman Publication, Itasca, IL, February 2001.

⁹ International Food Information Council. December 1999. Background on Functional Foods. Washington, D.C. <http://ificinfo.health.org/pdf/IFICBK.pdf>.

For more information, contact:



risaak@sunflowernsa.com
4023 State Street, Bismarck, ND 58503
701-328-5100
Toll free: 888-718-7033



The Amazing Kernel

**Tiny Sunflower Kernel
Packed with Antioxidants
and Phytochemicals
for Better Health**

Based on research completed in March 2001
by Katherine M. Phillips, Ph.D.,
of Virginia Polytechnic Institute and State University