

# Top 10 Selenium-Rich Foods & Health Benefit

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Selenium (Se), one of the trace elements, is a nutritionally essential mineral that exerts many important biological functions. Se is essential in the synthesis of selenoproteins such as glutathione peroxidase (GSH-Px) (participates in process of detoxification) and thioredoxin reductase, optimal function of the immune system, and optimal neuropsychological function. Se also acts as an antioxidant and as a regulator of metabolism. Selenium plays an important role in the control of thyroid hormone metabolism and proper reproductive performance as well. One of the most researched and studied functions of Se is cancer protection.

Selenium deficiency may cause reduced growth rates owing to a feedback response which lowers triiodothyronine mediated synthesis of growth hormone in the pituitary gland, whereas a combined deficiency of selenium and iodine exacerbates hypothyroidism. Two diseases which are associated with severe endemic Se deficiency in humans including Keshan disease (a disease of the heart muscle that afflicts children and women of child bearing age), and Kaschin-Beck disease (a deforming arthritis) occurs in rural areas of China and Russia (eastern Siberia) are linked to food systems with exceedingly low Se content. For example, Keshan disease has been found in many mountainous provinces of China where Se levels in soil are very low. The incidence of the disease has been dramatically reduced by the prophylactic administration of oral tablets containing  $\text{Na}_2\text{SeO}_3$  or selenite-fortified table salt.

Most of the reported cases of human exposure to hazardous levels of Se have involved occupational exposure and accidental oral consumption of various inorganic Se compounds. Signs of toxicity, referred to as 'selenosis', include skin and nail changes, tooth decay, and nonspecific gastrointestinal and neurologic abnormalities.

The Recommended Dietary Allowances (RDAs) for selenium are 55 mcg/day for women, men, and adolescents (aged 14 to 18) and 20 to 30 mcg/day for children. For infants, the Adequate Intake (AI) is 15 to 20 mcg/day. The RDA during lactation is 70 mcg/day. Combs Jr GF stated that in order to provide regular adult intakes, at least 40 mcg/day is needed to support the maximal expression of the Se enzymes, and perhaps as much as 300 mcg/day to reduce risks of cancer.

Human obtains Se from foods, as selenoamino acids (selenomethionine, selenocysteine, and selenocystine). Thus, individuals with low intakes of protein will also have low intakes of Se. Se enters the food chain through plants. The selenium content of plant foods depends on the bioavailable selenium content of the soils in which they are grown. Selenium which is present in cereals and most vegetables (mainly in the form of selenomethionine) has a higher bioavailability than that observed in dairy products or meats. The Se content of fish is high, presenting a relatively high bioavailability and the same is true of seafoods. The top 10 selenium-rich foods are as follows:

Rank	Food item	Serving size	Selenium content
1	Brazil nuts	1 oz*	543 mcg
2	Rice, white, long grain	1 cup	44 mcg
3	Egg noodles, cooked	1 cup	38 mcg
4	Wheat germ, toasted	¼ cup	28 mcg
5	Sunflower seeds	¼ cup	25 mcg
6	Tuna, canned	1 oz	22.79 mcg
7	Oysters, raw	1 oz	18.67 mcg
8	Chicken, breast, baked	1 oz	13 mcg
9	Shrimp, cooked	1 oz	11.23 mcg
10	Bread, whole-wheat, soft	1 slice	10.38 mcg

\*1 oz = 28.35 g

As one can see from the table, there are many kinds of foods that are good sources of dietary selenium. In order to maintain a healthy body, a balanced diet is essential.

**Note:** An educational article about foods and nutrition by Pattamapan Lomarat (B.Sc. in Pharmaceutical Sciences), Department of Food Chemistry. Edited by N. & V. P. of U.K.

### Reference

1. Finley JW. Reduction of cancer risk by consumption of selenium-enriched plants: Enrichment of broccoli with selenium increases the anticarcinogenic properties of broccoli. *Journal of Medicinal Food*. 6(1); 2003, 19-26.
2. Combs Jr GF. Selenium in global food systems. *British Journal of Nutrition*. 85; 2001: 517-547.
3. Gallagher ML. The nutrients and their metabolism. In: Mahan LK, Escott-Stump S. Krause's Food & Nutrition Therapy. 12<sup>th</sup> ed. Missouri: Saunders, 2008: 129-131.
4. Sanz Alaejos M, Diaz Romero FJ, Diaz Romero C. Selenium and cancer: Some nutritional aspects. *Nutrition*. 16; 2000, 376-383.
5. Rayman MP. Dietary selenium: time to act. *British Medical Journal*. 314; 1997, 387-388.
6. Finley JW. Review: Increased intakes of selenium-enriched foods may benefit human health. *Journal of the Science of Food and Agriculture*. 87; 2007, 1620-1629.
7. Burk RF, Levander OA. Selenium. In: Shils ME, Shike M, Catharine Ross A. Modern nutrition in health and disease. 10<sup>th</sup> ed. Philadelphia: Lippincott Williams & Wilkins, 2006: 312-325.

