



Lutein

Introduction

Lutein is a carotenoid that can be found in dark green and yellow vegetables, fruits and egg yolk. Lutein, like other carotenoids, is an antioxidant.

Sources

Lutein and a close chemical zeaxanthin are xanthophyll carotenoids found in a wide variety of plant foods, especially dark green leafy vegetables, such as kale, spinach, turnip greens, and collards. Their concentrations in these plant foods, as well as in others such as mustard greens, green peas, summer squash, and broccoli, are higher than those of beta-carotene concentrations. Lutein is also highly concentrated in egg yolks. The form in egg yolks is readily available for absorption.

Food	Micrograms/ cup	Micrograms/100 g
Kale	23720	18246
Spinach	20354	11308
Turnip greens	12154	8440
Collards	14619	7694
Mustard greens	8347	5962
Parsley, raw	556	5560
Dandelion greens	4944	4709
Peas, green, frozen	3840	2400
Lettuce, romaine, raw	1295	2313
Summer squash	4048	2249
Beet greens	2619	1819
Lettuce, green leaf, raw	969	1730
Broccoli	2367	1517
Squash, winter	2901	1415
Brussels sprouts	2012	1290
Onions, spring or scallions, raw	1137	1137
Corn, sweet, yellow, canned	2195	1045
Pumpkin	2484	1014



Content of Lutein and Zeaxanthin in Chicken Egg Yolk

	Lutein	Zeaxanthin	Total
Micrograms/yolk	~292	~213	~505
Micrograms/ mg cholesterol	~1.19	~0.87	~2.06
Micrograms/100 g yolk	~1732	~1257	~2980



Roles of Lutein and Zeaxanthin



Research involving cell cultures, animal models, and human studies has looked at the role of lutein and zeaxanthin in protecting against several chronic diseases, particularly age-related macular degeneration (AMD) and cataracts, various types of cancer, and heart disease and stroke.

Age-Related Macular Degeneration (AMD)

AMD is the most common cause of visual impairment and irreversible blindness among elderly Americans. Lutein is thought to protect the eye from degenerative changes due to certain wavelengths of light.

Cataract

Oxidative damage to lens cell membranes is considered an important factor in the initiation and progression of age-related cataracts. Increased lipid peroxidation products have been detected in the eyes of patients with cataract. Studies show that high lutein intake leads to reduced cataract extraction.



Cancer

Xanthophylls may possess antimutagenic and anticarcinogenic properties and play a role in the health of body tissues other than the eye. Studies done related to carcinogenesis and the risk for cancer in humans, plasma lutein was found to be protective against enzymatic changes in the liver.

Breast Cancer

The associations of xanthophyll intake or serum levels with breast cancer risk in humans has been investigated in many epidemiological studies and the results are not clear. However, studies in human mammary cells and in animal models do support a protective role of xanthophylls against breast cancer.

Lung Cancer

Some studies report a large reduction in the incidence of lung cancer in those with the highest lutein and zeaxanthin intakes; whereas others report no statistically significant relationship between the two.

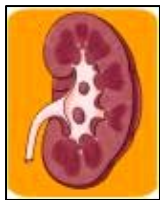


Prostate Cancer

Although lycopene and all trans beta-carotene are the predominant carotenoids in human prostate, lutein and zeaxanthin are about half that level. Some studies indicate an inverse relationship between prostate cancer and lutein intake, while others found no association between the two. Hall et al. found that lutein and zeaxanthin were less effective than beta-carotene, canthaxanthin, or lycopene in inhibiting the growth of human prostate cancer cells.

Ovarian Cancer

There seems to be an inverse association between lutein and ovarian cancer. A case controlled study conducted by Bidoli et al. showed that those in the highest quintile of lutein plus zeaxanthin intake had a 40% lower risk of developing ovarian cancer than those in the lowest quintile of intake.



Kidney Cancer

Yuan et al. found strong inverse associations between the intake of cruciferous and dark green leafy vegetables and cancer risk. A significant inverse association of lutein intake with kidney cancer risk was also observed.

Gastric Cancer

A study suggests a potential adverse association between xanthophylls and gastric cancer, finding that high baseline serum concentrations of lutein and zeaxanthin were directly associated with gastric carcinoma. Several other studies indicate no association between lutein and the development of gastric carcinoma.

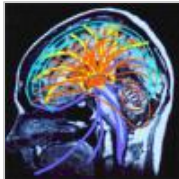
Coronary Heart Disease

Epidemiological data from two studies suggests that lutein may have a protective effect against the progression of early atherosclerosis. High circulating xanthophyll levels indicated reduced carotid artery intima media thickness. In another study, measures of oxidative stress biomarkers was used to determine the relationship between the xanthophylls and risk for heart disease. In the plasma of patients with congestive heart failure, it was found that lutein was significantly lower and malondialdehyde, a product of lipid peroxidation, was significantly higher than in 55 controls.



Stroke

Among a cohort of male smokers without a history of stroke, a significant inverse relationship was observed between intake of lutein and zeaxanthin and risk for stroke after more than six year follow-up. In plasma, there was an inverse correlation between lutein and malondialdehyde in ischemic stroke patients in comparison to controls. The findings suggest that lutein may improve clinical outcomes following ischemic stroke.



Pennington Nutrition Series, Number 3, 2005

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4/05

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