Product Review: *Cancer Prevention: Green Tea Supplement Reviews, Lycopene Supplement Reviews, & Selenium Supplement Reviews*

Initial Posting: 4/28/09

Photo: ConsumerLab.com

Sections: Jump to a section by clicking on its name.

Background:

Some supplements may reduce the risk of developing certain types of cancers. Many of these potential "chemopreventive" ingredients act directly or indirectly as antioxidants, helping to neutralize dangerous free radicals. Others offer potential benefits through hormonal effects or other mechanisms.

The evidence that specific compounds can help prevent cancer generally comes from observational studies, in which populations that consume higher amounts of a natural substance (typically from diet and not from supplements) are found to have lower cancer rates. Such studies don't show cause and effect and must be considered preliminary evidence. In some cases, additional supporting evidence comes from test tube and animal studies.

Double-blind, placebo-controlled studies are the gold standard for determining effectiveness of a treatment. Only a few ingredients have some direct clinical evidence (from double-blind clinical trials) to support their use in for cancer prevention: green tea, lycopene, selenium and, possibly, vitamin E. However, even in these cases the evidence remains far from conclusive. Other ingredients with potential benefit include folate, garlic, soy isoflavones and other isoflavones, indole-3-carbinol (I3C), diindolylmethane (DIM), vitamin C and vitamin D. Those highlighted in blue are the subjects of other reviews from ConsumerLab.com (click on their names to get their reports). This review focuses on three ingredients — **green tea, lycopene,** and **selenium.**

An excellent overview of this area is available in the Cancer Prevention article in the Encyclopedia on this website.

What It Is:

Green Tea

Green tea is made from the plant *Camellia sinensis.* It contains compounds called catechins (a subset of a group of compounds called polyphenols) that in test tube studies show antioxidant, anticarcinogenic, antitumorigenic, and anti-microbial properties. Green and black teas are both made from the same plant, but green tea is made by lightly steaming freshly cut leaves, while black tea is fermented and has lower amounts of polyphenols. The main catechin found in green tea is epigallocatechin gallate (EGCG). Green tea also naturally contains caffeine -- although somewhat less than black tea and much less than coffee.

Lycopene

Lycopene is a red pigment and powerful antioxidant found in tomatoes, pink grapefruit, watermelons, apricots, and pink guavas. On a per gram basis, lycopene is about twice as powerful an anti-oxidant as another well-know carotenoid, beta-carotene.

Selenium

Selenium is a trace mineral that our bodies use to produce glutathione peroxidase — part of the body's own antioxidant defense system. It works with vitamin E to protect cell membranes from damage caused by free radicals.

What It Does:

Green Tea

Test tube and animal studies hint that tea constituents might help prevent cancers of the **stomach**, **lung**, **esophagus**, **duodenum**, **pancreas**, **liver**, **breast**, and **colon**. However, results from observational studies in humans have varied.

One study found that Japanese women who drank more than ten cups of green tea daily had a delay in the onset of cancer and also a 43% lower total rate of cancer occurrence. An effect was also seen in men but it was not statistically significant. A study in China found that those who drank green tea had significantly less risk of developing cancers of the **rectum** and **pancreas**, but not **colon** cancer. Another Chinese study found that green tea drinkers were 29% less likely to get **stomach** cancer than nondrinkers, with those drinking the most tea having the least risk. However, observational studies in both Japan and Hawaii have found no reduction in **stomach** cancer.

A small but well controlled study in humans found that a green tea extract reduced **prostate** cancer rates in men who already have pre-cancerous changes in the prostate. After one year, only 3% of the men receiving the supplement developed prostate cancer while 30% of men who received placebo developed prostate cancer (see ConsumerTips for dosage used).

Regular consumption of green or black tea has been associated with a lower risk of developing **ovarian** cancer compared to women who never or seldom drink tea (Larrson, 2005).

The evidence for green tea in preventing **breast** cancer or its recurrence is mixed.

There is preliminary laboratory evidence suggesting that the green tea catechin, EGCG, may help prevent **skin** cancer if applied directly to the skin. However, a double-blind, placebo controlled study failed to find that a combination of oral and topical green tea extracts reduced signs of precancerous sun-damage in skin.

See the Encyclopedia for more information about studies of green tea.

Lycopene

There is evidence suggesting a cancer-preventing benefit for lycopene, but it is indirect and far from definitive.

A large observational study of men found a reduced incidence of **prostate** cancer among those eating high levels of tomatoes, tomato sauce, and pizza — all of which contain lycopene. However, another large study found not association. One preliminary controlled (but not blinded) study in humans tested a lycopene supplement; when taken at a dose of 4 mg twice daily it appeared to help prevent precancerous cells in the prostate from turning cancerous. Another study using lycopene at a higher dose (15 mg twice daily) reduced tumor growth when given for three weeks prior to surgical removal of the prostate. As noted in the Concerns and Cautions section, while lycopene may help prevent prostate cancer, it is not recommended for men with existing prostate cancer.

A study of elderly Americans was conducted and found a diet high in tomatoes was associated with a 50% reduction in cancer. People who ate at least seven servings of tomatoes weekly developed less **stomach** and **colorectal** cancers compared to those who ate only two servings weekly. However, other observational studies have not found a benefit of lycopene intake on **colorectal** cancer, nor **bladder** cancer. There is some evidence that lycopene intake in the diet is associated with a decreased risk of **pancreatic** cancer, **lung** cancer, and **ovarian** cancer in premenopausal women. These observational studies involved tomato-based foods and not lycopene supplements.

A small clinical study showed that a lycopene supplement reduced the signs and symptoms of **leukoplakia**, a precancerous condition of the mouth and mucous membranes.

See the Encyclopedia for more information about studies of lycopene.

Selenium

It has been observed that in parts of China where the soil is depleted of selenium, the incidence of various types of cancer is much higher than in the rest of the country. This observation has given rise to a theory that selenium deficiency is a common cause of cancer and selenium supplements can reduce this risk.

In North America, however, selenium deficiency is uncommon. In people with adequate selenium intake, it is not clear whether or not additional selenium is helpful. One study indicated a 50% reduction in overall cancer deaths when additional selenium was taken — with significant decreases in cancer of the **lung**, **colon**, and **prostate**. However, results of this study have been tempered by further analysis

indicating that most of the benefits were seen in study participants with somewhat lower levels of selenium to begin with.

A large, multi-year, multi-center human study of selenium and vitamin E for preventing **prostate** cancer was halted after early analysis of the data found that selenium and vitamin E supplements, alone or together, failed to prevent prostate cancer. The analysis also found slightly more cases of diabetes in men taking only selenium.

Selenium has not been shown to reduce the risk of **skin** cancer and selenium supplements do not appear to reduce the risk for **colorectal** cancer. However, early data suggests that there may be more effective and less toxic forms of organic selenium for preventing colorectal cancer than those used previously. In addition, animal trials have found anti-cancer benefits.

Other potential benefits of selenium have been indicated. Low selenium levels have been associated with the development of rheumatoid arthritis — although selenium supplements don't seem to help rheumatoid arthritis once it has developed. There is preliminary evidence that selenium supplements may improve fertility in males who are selenium deficient. There is weak evidence that selenium might be helpful for diabetic neuropathy. Selenium does not appear to be helpful for preventing heart disease. One fairly large double-blind study failed to find that use of selenium improved general sense of well-being.

See the Encyclopedia for more information about studies of selenium.

Quality Concerns and What CL Tested for:

Like other supplements, neither the FDA nor any other federal or state agency routinely tests supplements for quality prior to sale. However, quality issues can include the following:

- **Labeled Amount —** Does the product really contain the labeled amount of ingredient? Too little may not work. Too much may cause toxicity, particularly with selenium.
- **Purity —** Is the product free of lead — a contaminant found in many types of supplements.
- **Ability to Break Apart for Absorption —** Will the product break apart properly so that it can release its ingredient in the body? For a tablet to be most useful, it must fully disintegrate prior to leaving the stomach, delivering its contents for absorption in the gut. Some tablets are not properly made and can pass through your body completely or partially intact, depriving you of its ingredients. Remnants of such products are sometimes found in the stool. This happens, for example, when a tablet is too tightly compressed (too "hard") or is too thickly coated.

ConsumerLab.com, as part of its mission to independently evaluate products that affect health, wellness, and nutrition, purchased commonly available green tea, lycopene, and selenium supplements and tested them to determine whether they 1) possessed the claimed amount of key ingredient, 2) were able to disintegrate fully to be available for absorption and 3) were free from unacceptable levels of lead (see Testing Methods and Passing Score). In green tea products, the amount of caffeine was also determined.

What CL Found:

Green Tea

Only three green tea products selected by CL passed testing, while two others failed to pass for the following reasons:

- *Douglas Laboratories Green Tea Extract Max-V* was contaminated with lead, so that a serving of two or more capsules delivered more than 0.5 mcg of lead – an amount that would necessitate a warning label in the State of California. The suggested serving size was one to twelve capsules per day. The maximum suggested serving of twelve capsules would provide 4.2 mcg of lead -- several times the California limit. In addition, although the product claimed that each capsule contained 50 mg of catechins from 100 mg of green tea extract, as well as 100 mg of green tea “leaf” (which should provide additional catechins), each capsule was found to contain only 44.5 mg of catechins – somewhat lower than expected.
- *Karuna Green Tea Extract* claimed to contain “less than 3% caffeine” [less than 45 mg per daily serving] but actually provided 78.3 mg of caffeine per daily serving -- about as much as two cans of cola. It should also be noted that *Karuna* claimed to provide 750 mg of “catechins/polyphenols” in the daily serving (3 capsules). As catechins are a subgroup of polyphenols, listing them as this way is confusing. ConsumerLab.com actually found 393 mg of catechins per daily serving – about half of the claimed amount of “catechins/polyphenols.” While this is still a reasonable amount of catechins, the labeling could be clearer.

Lycopene

All five of the selected lycopene products passed testing.

Selenium

Just three of the selenium supplements selected by CL passed testing. Two failed to pass for the following reasons:

- *Kal Selenium 100 mcg* was comprised of small tablets weighing just 0.175 grams each, but claiming 1.0 gram of dietary fiber per tablet, which is impossible. It did, however, provide its claimed amount of selenium.
- *MegaFood Daily Foods E and Selenium* also contained its claimed amount of selenium but failed to fully break apart within the USP

limit of 30 minutes, taking approximately one hour. This failure could reduce the amount of ingredient absorbed by the body.

Test Results by Product:

Listed below are the test results for twenty-one supplements. Products are grouped by key ingredient and listed alphabetically within each group. ConsumerLab.com selected fifteen of these products. Six other products (each indicated with an asterisk) were tested at the request of their manufacturers/distributors through the Voluntary Certification Program and are included for having passed testing. Also listed are two products that are the same as ones that passed but sold under different brand names.

Shown for each product are the claimed amount and form of the tested ingredient(s) and serving size recommended on its label. Products listed as "Approved" met their label claims and ConsumerLab.com's quality criteria (see Passing Score). The full list of ingredients (including special dietary designations) is available for each product by clicking on the word "Ingredients" in the first column.

For green tea products, the amount of caffeine found in a daily dose is also shown since caffeine occurs naturally in green tea. To put these amounts in perspective, a can of cola contains about 40 mg of caffeine and a cup of coffee has about 100 mg of caffeine.

RESULTS OF CONSUMERLAB.COM TESTING OF *GREEN TEA SUPPLEMENTS*
(See Weight Loss Review for additional Green Tea products)
Click on $ Price Check beneath a product name to find a vendor that sells it.
To find retailers that sell some of the listed products click here.

Product Name Amount of Green Tea Per Unit, Suggested Daily Serving Click on "Ingredients" for Full List	Manu-facturer or Distri-butor	Claimed Amount of EGCG, Poly-phenols, Catechins† in Daily Serving:	— TEST RESULTS — (See How Products Were Evaluated)				
			Approval Status	Contained Claimed Amount of Catechins (or Minimum Expected†) If Not Claimed, Amount of EGCG Found in Daily Serving	Did Not Exceed Conta-mination Limit for Lead	Broke Apart Pro-perly	Caffeine (mg in Daily Serving)
Andrew Lessman's Green Tea EGCG-200 (200 mg EGCG extract per capsule, 1 or more per day) Ingredients	Mfd. by ProCaps Laboratories; All-Solar Manufacturing	200 mg EGCG	APPROVED	✓	✓	NA	5.9 mg
Douglas Laboratories® Green Tea Extract Max-V (100 mg Green Tea Extract; 100 mg Green Tea Leaf per capsule, 1-12 per day) Ingredients	Mfd. by Douglas Laboratories	50 – 600 mg catechins	**NOT APPROVED**	Found only 71.1% of claimed catechins Found 15 mg -180 mg EGCG	Found 0.35 mcg – 4.2 mcg of lead per daily serving	NA	7.6 – 91.2 mg
FoodScience of Vermont Green Tea Extract (500 mg extract per vegetarian capsule, 2 per day) Ingredients $ Price Check	Dist. by FoodScience of Vermont	140 mg EGCG	APPROVED	✓	✓	NA	34.4 mg
Karuna® Green Tea Extract (500 mg extract per vegetarian capsule, 3 per day) Ingredients	Mfd. by Karuna Corporation	750 mg "catechins / polyphenols"	**NOT APPROVED**	✓ Found expected minimum amount of catechins based on extract amount† (although lower than claimed amount of	✓	NA	Found more caffeine than claimed. Claimed <3% caffeine

				"catechins / polyphenols") EGCG Found: 244.5 mg (383 mg of catechins)			(<45 mg) but found 78.3 mg
Nature's Bounty® Natural Whole Herb Green Tea Extract (315 mg extract per capsule, 4 per day)* Ingredients $ Price Check	Mfd. by Nature's Bounty, Inc.	190 mg polyphenols	APPROVED	✓ EGCG Found: 78.4 mg	✓	N/A	47.6 mg
Vitality Works Daily Green Tea [170 mg Green Tea Leaf; 100 mg Green Tea Extract per 30 drops (1 mL), 1 mL per day] Ingredients $ Price Check	Mfd. by Vitality Works, Inc.	50 mg EGCG 90 mg polyphenols	APPROVED	✓	✓	NA	2.5 mg

*Tested through CL's Voluntary Certification Program prior to, at time of, or after initial posting of this Product Review.

†Minimum amounts of catechins expected for green tea is 10% (wt/wt). Extracts may have more depending on concentration. See ConsumerTips™ for more information about catechins and dose.

RESULTS OF CONSUMERLAB.COM TESTING OF LYCOPENE SUPPLEMENTS

Click on $ Price Check beneath a product name to find a vendor that sells it.

To find retailers that sell some of the listed products click here.

Product Name **Amount of Lycopene Per Unit, Suggested Daily Serving** Click on "Ingredients" for Full List	**Manufac-turer/Distri-butor**	**Labeled Amount of Lycopene (mg) in Daily Serving**	**APPROVAL STATUS**	**Contained Labeled Amount of Key Ingredi-ent(s)**	**Did Not Exceed Conta-mination Limit for Lead**	**Broke Apart Properly** (NA = Not applicable)
Carlson® Lycopene 15 mg (15 mg per softgel, 1 per day) Ingredients $ Price Check	Dist. by Carlson Division of J.R. Carlson Laboratories, Inc.	15 mg	APPROVED	✓	✓	NA
Doctor's A-Z Lycopene (10 mg per softgel, 1 per day) Ingredients	Dist. by Doctor's A-Z	10 mg	APPROVED	✓	✓	NA
Jarrow Formulas® Lyco-Sorb® Lycopene(10 mg per softgel, 1-2 per day) Ingredients $ Price Check	Mfd. by Jarrow Formulas	10 mg - 20 mg	APPROVED	✓	✓	NA
Nature Made® Lycopene Advanced® 6.5 mg (6.5 mg per softgel, 1 per day)*	Dist. by Nature Made Nutritional Products	6.5 mg	APPROVED	✓	✓	NA

Ingredients $ Price Check						
Spring Valley® Lycopene 10 mg (10 mg per softgel, 1 per day) Ingredients	Mfd. by US Nutrition, Inc.	10 mg	APPROVED	✓	✓	NA
Vitamin Power® Lycopene 5 mg (5 mg per softgel, 1 per day) Ingredients	Dist. by Vitamin Power, Inc.	5 mg	APPROVED	✓	✓	NA
Vitamin World Naturally Inspired® Lycopene 10 mg (10 mg per softgel, 1 per day)* Ingredients	Mfd. by Vitamin World, Inc.	10 mg	APPROVED	✓	✓	NA

*Tested through CL's Voluntary Certification Program prior to, at time of, or after initial posting of this Product Review.

** Product identical in formulation and manufacture to a product that has passed testing but sold under a different brand. For more information see CL's Multi-Label Testing Program.

RESULTS OF CONSUMERLAB.COM TESTING OF SELENIUM SUPPLEMENTS

Click on $ Price Check beneath a product name to find a vendor that sells it.
To find retailers that sell some of the listed products click here.

Product Name **Amount of Selenium Per Unit, Suggested Daily Serving** Click on "Ingredients" for Full List	**Manufac-turer/Distri-butor**	**Daily Suggested Amount of Selenium (Form)**	**APPROVAL STATUS**	**Contained Labeled Amount of Selenium**	**Did Not Exceed Conta-mination Limit for Lead**	**Broke Apart Properly** (NA = Not applicable)
FREEDA® Natural Oceanic Selenium 100 mcg (100 mcg per tablet, 1 per day) Ingredients	Mfd. by FREEDA Vitamins, Inc.	100 mcg (Selenium from kelp)	APPROVED	✓	✓	✓
Futurebiotics Selenium (200 mcg capsule, 1 per day) Ingredients $ Price Check	Mfd. by Futurebiotics	200 mcg (Selenium amino acid complex)	APPROVED	✓	✓	NA
GNC Selenium 200 (200 mcg per vegetarian caplet, 1 per day)* Ingredients $ Price Check	Dist. by General Nutrition Corporation	200 mcg (Selenium from yeast)	APPROVED	✓	✓	✓
KAL® Selenium 100 mcg (100 mcg per tablet, 1-2 per day) Ingredients	Mfd. by Nutraceutical Corp.	100 mcg -200 mcg (Seleno-methionine)	**NOT APPROVED** Contained less fiber than claimed	✓	✓	✓
MegaFood Daily Foods E and Selenium (100 mcg per tablet, 1 or more per day) Ingredients	Mfd. by MegaFood	100 mcg (Selenium from FoodState[1])	**NOT APPROVED**	✓	✓	Fail (Needed extra 30 minutes to

						fully break apart)
Puritan's Pride® Selenium 200 mcg (200 mcg per tablet, 1 per day)* Ingredients $ Price Check	Mfd. by Puritan's Pride, Inc.	200 mcg (Selenium from yeast)	APPROVED	✓	✓	✓
Solgar® Selenium 200 mcg (200 mcg per tablet, 1 per day)* Ingredients $ Price Check	Mfd. by Solgar Vitamin and Herb	200 mcg (Selenium from yeast)	APPROVED	✓	✓	✓
Whole Foods™ Selenium (100 mcg per tablet, 1-2 per day) Ingredients	Dist. by Whole Foods Market	100 mcg - 200 mcg (Seleno-methionine)	APPROVED	✓	✓	✓
Similar to APPROVED Products:**						
Nature's Bounty Natural Selenium 200mcg Ingredients $ Price Check	Mfd. By Nature's Bounty, Inc.	Similar to: Puritan's Pride® Selenium 200 mcg				
Vitamin World® Selenium 200 mcg Ingredients	Dist. by Vitamin World, Inc.	Similar to: Puritan's Pride® Selenium 200 mcg				

*Tested through CL's Voluntary Certification Program prior to, at time of, or after initial posting of this Product Review.

** Product identical in formulation and manufacture to a product that has passed testing but sold under a different brand. For more information see CL's Multi-Label Testing Program.

1 Label states that “FoodState” nutrients “have the inherent benefits of Natural Food Factors, known as Nutrient Chaperones. Nutrient Chaperones contain the plant intelligence necessary for all nutrient delivery and utilization.” The meaning of these terms and this statement is not clear to CL.

ConsumerTips™:

What to Consider When Buying:

Green Tea

As tea:

A study in Great Britain found that three cups of green tea provided, on average, about 400 mg of catechins (Khokhar, 2002). This level, however, can vary significantly based on the tea used and how it is brewed. Assuming that about 60% of these catechins is EGCG, three cups of green tea provided approximately 360 mg of EGCG -- somewhat higher than the amount provided in the daily suggested servings of most supplements in this review. Interestingly, in the same British study, three cups of black tea provided only 93 mg of catechins.

As a supplement:

It may be advisable to look for products that state the amount of "EGCG." More broadly, you may see the term "catechins" which includes EGCG and related compounds (epigallocatechin, epicatechin, gallocatechin gallate, epicatechin gallate and catechin gallate). These compounds are anti-oxidants and may help explain the link between green tea consumption and reduced incidence of cancer. Catechins are themselves part of a larger class of compounds called "polyphenols" — another term that you might see on labels but is more vague. As seen in this review, one product used the term “catechins/polyphenols,” making it difficult to know the expected amount of catechins. It that

case, it turned out that only about half of the listed amount was specifically catechins.

Based on the extracts tested in this review, about 11% to 25% of the listed green tea extract weight represented catechins and 6% to 16% was EGCG specifically. EGCG represented about 60% on average of total catechins. The amount of EGCG in a recommended daily serving varied considerably among the products, from as little as 15 mg to 244.5 mg of EGCG.

Unfortunately, there is not enough research to say exactly how much of these compounds may be best. However, the amount used in the study that significantly reduced the risk of developing prostate cancer among men with a precancerous condition (discussed under What It Does) was 600 mg of a highly concentrated green tea extract per day (as three 200 mg capsules) providing a total of 454 mg of total catechins, of which 311 mg was EGCG (Betuzzi 2006). To achieve such as dose of EGCG would require increasing the serving sizes of products in this review.

Possible weight loss benefit was shown in one study using a green tea extract standardized to contain 25% epigallocatechin gallate (EGCG).

Lycopene
From food:
Lycopene exists naturally in fresh fruits and vegetables in the *trans*- configuration, which is poorly absorbed. Cooking tomatoes might make lycopene more bioavailable (more readily used by the body). Heat processing of raw foods into products such as tomato paste, juice, ketchup, changes lycopene from the *trans*- to the cis-configuration, which has better bioavailability. Tomatoes are the best source of lycopene. One cup (240 mL) of tomato juice, for example, provides about 23 mg of lycopene. Relatively high amounts of lycopene are also found in watermelon, guava, and pink grapefruit. Below are approximate amounts of lycopene in some foods.

- Tomato paste: 8 mg / ounce
- Tomato sauce: 9.6 mg / 1/4 cup
- Catsup: 2.9 mg / tbsp
- One medium tomato: 4.5 mg
- One pink grapefruit: 2.3 mg
- One sixteenth of a medium watermelon: 13.6 mg

As a supplement:
Lycopene supplements seem to have a similar bioavailability to foods; lycopene supplements can provide serum lycopene levels similar to those provided by tomato juice when ingested in equivalent amounts. Synthetic lycopene appears to be as well absorbed as natural-source lycopene.

Selenium
From food:
Most individuals in the U.S. and Canada are believed to consume more than enough selenium. Foods containing significant and reliable amounts of selenium include animal products like meat, seafood, and dairy foods, as well as whole grains and vegetables grown in selenium-rich soils. These include wheat germ, nuts (particularly Brazil nuts), oats, whole-wheat bread, bran, red Swiss chard, brown rice, turnips, garlic, barley, and orange juice.

The selenium content of food varies depending on the selenium content of the soil in which it was grown. Studies suggest that many people in certain developed countries, including New Zealand, Belgium, and Scandinavia, do not get enough selenium in their diets.

As a supplement:
Selenium supplements are available in organic and inorganic forms. Some research suggests that the inorganic form, selenite, is harder for the body to absorb than organic forms such as selenomethionine (selenium bound to methionine, an essential amino acid) or high-selenium yeast (which contains selenomethionine). A recent clinical trial found that selenomethionine had 19% better absorption than selenite; absorption from selenium yeast was about 10% better than selenite.

Selenized yeast is brewer's yeast that has been grown in selenium rich broth and then used as a selenium supplement.

What to Consider When Using:

Green Tea
As tea:
Studies inconsistently suggest that 3 cups of green tea daily might provide protection against cancer.

As a supplement:
As discussed above, the dosage suggested by manufacturers varies widely from product to product -- with EGCG ranging from just 15 mg to 244.5 mg per day. Whether these amounts are ideal or these extracts offer any benefit remains unknown. The amount of EGCG in a

supplement shown to reduce progression to prostate cancer (discussed above) was about 300 mg per day, so you might consider adjusting the dose depending your intended use.

Lycopene
The optimum dosage for lycopene has not been established, but the amount found potentially helpful in studies generally fell in the range of 4 to 6.5 mg daily. For reducing the risk of prostate cancer, at least one study found potential benefit with 4 mg of lycopene supplement per day.

In treating leukoplakia, a supplement providing 8 mg of lycopene was most effective, while some benefit was also seen with 4 mg per day.

A possible reduction in the risk of lung cancer in non-smokers has been seen with 12 mg of lycopene (from food) per day in men and about 6 mg per day in women.

Selenium
The Recommended Daily Allowance (RDA) for selenium is 20 mcg for children 1 to 3, 30 mcg for those 4 to 8, and 40 mcg for those 9 to 13. For individuals 14 and older the RDA is 55 mcg. However, the RDA for pregnant woman is 60 mcg and for nursing women it is 70 mcg per day.

Since it is the deficiency of selenium that is potentially associated with cancer risk, getting the RDA should be sufficient to have benefit. However, a higher dose (200 mcg of selenium supplied as a 0.5 gram high-selenium brewer's yeast tablet daily) has also been used in studies.

For patients infected with human immunodeficiency virus (HIV), 250 mcg of L-selenomethionine daily has been used for 12 months, although it is not clear that this provides any benefit.

Bear in mind that certain digestive conditions, such as Crohn's disease, short-bowel syndrome and ulcerative colitis, might impair selenium absorption. Medications that reduce stomach acid might also reduce absorption of selenium.

At very high doses selenium can cause hair loss and tissue damage (see Concerns and Cautions below).

Concerns and Cautions:

Green Tea
Green tea contains a significant amount of caffeine and can cause caffeine-related side effects and interfere with drugs that are MAO inhibitors. Even products listed as "decaffeinated" may contain up to 2% caffeine, and "caffeine free" products can contain small amounts. To help those sensitive to caffeine, we measured caffeine in the products and the results are shown in the results table.

Women who are attempting to conceive or in the first trimester of pregnancy should avoid large amounts of green tea. Preliminary evidence suggests that increasing maternal tea consumption is associated with increased risk of spina bifida in infants (Correa, 2000). Catechins in tea may inhibit the conversion of folic acid to its active folate form which is need for normal spinal cord development. Nursing women should also avoid large amounts of green tea to limit caffeine exposure to infants.

Liver toxicity has been associated with green tea supplements. There are reports of several cases of toxicity beginning from five days to four months after beginning use. Liver function returned to normal in most cases after discontinuation. However, one patient required liver transplant — the specific extract taken (Exolise from Arkopharma) is reported to have been removed from the market. Toxicity has not been reported with green tea beverage and it is possible that certain extraction processes, such as ethanolic extraction, may contribute toxic compounds.

In light of this potential liver toxicity, a USP expert committee voted in June 2007 to require the following cautionary statement to appear on the labels for green tea extracts: *Caution: Must take with a meal. In rare cases extracts from green tea have been reported to adversely affect the liver. Discontinue use and consult a healthcare practitioner if you have a liver disorder or develop symptoms of liver trouble, such as abdominal pain, dark urine, or jaundice.* However, approval of the label requirement was deferred and, in April 2009, USP announced that the proposed requirement was cancelled. According to a USP spokesperson contacted by ConsumerLab.com, monitoring of adverse event databases from June 2007 through February 2009 showed no additional reports of liver toxicity, but USP continues to monitor the safety of green tea.

Green tea contains a small amount of vitamin K, which directly counteracts Coumadin's blood-thinning action, but enormous quantities of green tea would be necessary to provide a significant amount of vitamin K.

Lycopene
Preliminary research has raised concerns that lycopene might worsen established prostate cancer by increasing metastasis. However,

lycopene is otherwise generally believed to be a safe supplement. Maximum safe dosages are not known.

Selenium

Maximum safe doses of selenium for individuals with severe liver or kidney disease have not been established.

Excessive selenium intake, beginning at about 900 mcg daily, can cause selenium toxicity. Signs include depression, nervousness, emotional instability, nausea, vomiting, and brittleness or loss of hair and fingernails. At doses above the tolerable upper intake level (UL) of 400 mcg per day for adults and children 14 and older, hair and nail brittleness and loss occur. The UL is lower for younger individuals. The tolerable upper intake level (UL) for infants up to age 6 months is 45 mcg per day; for infants 7 to 12 months, 60 mcg per day; for children 1 to 3 years, 90 mcg per day; for children 4 to 8 years, 150 mcg per day; for children 9 to 13 years, 280 mcg per day.

Note that these dosages apply to combined dietary and supplemental intake of selenium; when deciding how much selenium it's safe to take, keep in mind that most adults already receive about 100 mcg of selenium in the daily diet.

Several studies suggest that higher levels of selenium taken from supplements or received naturally are associated with an increased risk of diabetes. These include a multi-year study using 200 mcg of selenium per day. One study, however, has shown no association.

back to top