SECTION 7
Immune-Boosting Foods

If you were to look at a sample of your blood under a microscope, you would see an enormous number of red blood cells whose job is to carry oxygen to your body tissues. Here and there among them are white blood cells of various kinds, and they are the key soldiers that make up your immune system. When abnormal cells arise in the body, it is white blood cells' job to recognize and eliminate them.

Some white blood cells are able to engulf and destroy abnormal cells—including cancer cells—as well as viruses, bacteria, and other invaders. Other white blood cells facilitate this process in various ways, for example, by producing *antibodies*, protein molecules that attach to foreign or abnormal cells and flag them for destruction.

The immune system is critically important in fighting cancer. Individual cancer cells can arise in all of us from time to time. Cancer cells can also break free from an existing tumor and spread to other parts of the body. If your immune system is vigilant, it recognizes and destroys cancer cells before they can take hold. So strengthening the immune system is a key strategy in cancer prevention and survival.

Foods That Boost Immunity

Like soldiers anywhere, your immune cells fight more effectively when they are well nourished. Certain nutrients have been shown to be immune boosters.

Beta-carotene. As we saw in Section 6, beta-carotene is an important antioxidant. It also boosts immune function. The best sources are orange and yellow vegetables and fruits, such as carrots, yams, and cantaloupes, as well as green, leafy vegetables. For a detailed list of beta-carotene–rich foods, check the table in Section 6. Research has shown that beta-carotene supplements are not necessarily as safe or effective as food-derived beta-carotene.

The U.S. Government does not have a specific recommended intake for beta-carotene, except to say that 11 milligrams per day for men and 9 milligrams per day for women will give you your daily dose of vitamin A (beta-carotene is converted to vitamin A in the body). Research studies generally use somewhat higher intakes and have shown that the amount of beta-carotene in two large

carrots (about 30 milligrams) consumed daily has a measurable immune-boosting effect.[1,2]

Vitamin C. Nobel Laureate Linus Pauling was a strong advocate for vitamin C, and research suggests that, indeed, vitamin C boosts immunity, in addition to its antioxidant abilities. Once again, vegetables and fruits are the preferred sources. Vitamin C-rich foods are listed in Section 6.

The recommended daily intake is only 90 milligrams per day for men and 75 milligrams per day for women. However, some researchers have recommended higher amounts, typically in the form of supplements and usually in the neighborhood of 500 to 2,000 milligrams. There appear to be no adverse effects from these higher doses of vitamin C.

Vitamin E. When it comes to vitamin E, a little is good, but a lot is not necessarily better. Researchers have found that individuals eating vitamin E-rich foods (see tables in Section Six) tend to have improved immunity. But increasing vitamin E intake to high levels through supplements can impair immune function.[3] The best advice appears to be to stick with food sources and avoid vitamin E supplements.

Zinc. The mineral zinc has been promoted for its cold-fighting abilities, and, indeed, it works. However, when it comes to zinc or any other mineral, you want neither too little nor too much, just as we saw with vitamin E.[4] Researchers in New Jersey discovered this fact accidentally.[5] They tested zinc's effects in a group of older men and women. Some were given zinc tablets, while others got placebo tablets that looked and tasted just like zinc. And to make sure that everyone was generally well-nourished, the researchers also asked everyone to take a daily multiple vitamin.

When the researchers later checked their immune function, they found, to their surprise, that *everyone* had an immune boost. You can guess why. The multiple vitamin apparently counteracted a variety of mild nutritional deficiencies, and that improved their immunity. However, the researchers had a second, and more surprising finding: The volunteers taking as little as 15 milligrams of zinc actually had *worse* immune function than those who got placebos. In other words, zinc is an essential nutrient and a helpful immune booster when ingested in minute quantities. But it is easy to go overboard, and excess zinc *interferes* with immune function. The recommended amount of zinc in the daily diet is 8 milligrams for adult women and 11 milligrams for adult men. Here are some good foods that will keep your zinc intake up where it should be, without going too high:

Zinc (mg)

1 serving of most breakfast cereals	3.75
1 Yves Veggie Burger	9.2
_ cup tempeh	1.3
_ cup peas	0.8
_ cup cooked chickpeas	1.3
1 cup soymilk	0.9
2 Tbsp. tahini	1.4
2 Tbsp. wheat germ	2.3

Foods That Interfere with Immunity

In contrast to these healthy immune boosters, some parts of the diet interfere with immunity. Fatty foods, in particular, impair your immune cells' ability to work. Researchers have fed fatty foods to volunteers, dripped fatty intravenous solutions into volunteers' bloodstreams, and mixed fats with cancer cells. In each case, immune strength is noticeably reduced.[6–8] Simply put, your white blood cells don't work very well in an oil slick. While many people avoid animal fats—which is a good idea—they give themselves free rein with vegetable oils. But when it comes to boosting immunity, you'll want to minimize *all* fats and oils. This includes fish oils. Several research studies have suggested that fish oils can interfere with immunity.[9,10]

Fatty foods probably affect white blood cells directly. But they also tend to cause weight gain, and that can further impair immune function.[11] Studies show that overweight individuals are at increased susceptibility to various infections and to certain forms of cancer, especially postmenopausal breast cancer.

Cholesterol also seems to interfere with immunity. In case you are confused about the difference between fat and cholesterol: Fat is visible as a yellow layer under a chicken skin or white streaks marbled through a cut of beef. Cholesterol, on the other hand, resides as tiny particles inside the cell membranes that surround each cell in an animal's body, and *it is primarily in the lean portion.* Essentially all animal products contain cholesterol, while plant products never do.

When researchers add cholesterol to white blood cells in the test tube, it clearly interferes with their ability to function. Because your liver makes all the

cholesterol your body needs for normal function, there is no need for any cholesterol in the diet.

Vegetarian Diets and Immunity

Vegetarian diets are typically rich in vitamins. They are low in fat, and vegetarians who also avoid dairy products and eggs (i.e., vegans) have no cholesterol in their diets at all. Vegetarian diets also help people lose excess weight; overweight people switching to a vegetarian diet typically lose about ten percent of their body weight. So, theoretically, vegetarian diets ought to boost immunity.

That theory was put to the test at the German Cancer Research Center. Researchers drew blood samples from a group of vegetarians and compared them to healthy nonvegetarians working at the research center. They separated out a particular type of white blood cell called a *natural killer cell.* As its name implies, it really does shoot first and ask questions later. Natural killer (or NK) cells engulf and destroy cancer cells.

By mixing the volunteers' NK cells with standardized samples of cancer cells, the researchers found that the vegetarians had approximately double the natural killer cell activity, compared to the nonvegetarians.[12]

Meal Planning

Here are the keys to an immune-boosting menu:

- Have plenty of vegetables and fruits—five to six servings a day. One serving of vegetables is one-half cup cooked or one cup raw. For fruit, a serving is one small whole fruit or one-half cup chopped fruit.
- Round out your diet with whole grains and legumes (beans, peas, and lentils).
- Take a multiple vitamin each day.
- By avoiding animal products, you'll avoid most fat and all dietary cholesterol.
- By avoiding added oils, you'll keep fat content very low and immunity high.

Recommended Recipes

Spinach Salad with Fruit Flavors (page 99)
Creamy Veggie Curry (page 116) over quinoa

Gingered Melon Wedges (page 130)

Section 7 References

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