

APPENDIX B

Scientific Findings on Diet's Effect on Cancer Survival

Foods and Breast Cancer Survival

Healthful diets not only help prevent cancer; they also improve survival when cancer has been diagnosed. The first clues that foods might affect the course of breast cancer came from studies of women in Japan in the early 1960s. Compared to Western women, Japanese women were much less likely to develop the disease and much more likely to survive it if it occurred.¹ Over the next several decades, researchers have followed up on these observations to try to clarify what is the best diet for cancer survival. Although this work is still in its early stages, important information has already come to light.

One of the best-established factors affecting breast cancer survival is body weight. Women with breast cancer who are near their ideal body weight at the time of diagnosis are more likely to survive than are women with higher body weights.² And although weight gain often occurs after diagnosis, studies suggest that women who avoid weight gain after diagnosis tend to have longer disease-free survival.²

The link between lower body weight and better survival may relate to estrogens, female sex hormones that can encourage the growth of cancer cells. In essence, body fat acts like an estrogen factory, producing estrogens from other compounds coming from the adrenal glands (small organs situated atop each kidney). As a result, women with more body fat tend to have higher amounts of estrogens circulating in their blood, compared to leaner women.

Reduced Fat Intake

Specific dietary factors appear to play key roles in cancer survival. First, two studies of women diagnosed with breast cancer showed that those who had been consuming less fat prior to diagnosis generally had smaller tumors with less evidence of cancer spread, compared to women whose diets had included more fatty foods.^{3,4} One of these studies identified benefits among premenopausal women; the other, among postmenopausal women.

Studies that have followed women for several years after diagnosis have generally found that those with less fatty diets prior to diagnosis live longer than other women. In one of the first such studies, researchers at the State University of New York in Buffalo, N.Y., found that women with advanced cancer had a 40 percent increased risk of dying at any point in time for every 1,000 grams of fat they consumed per month.⁵ Note that this does not mean a person's risk of dying is 40 percent. It means that, if a person's diet contains an extra 1,000 grams of fat per month at the time of diagnosis, that person's risk of dying is 40 percent higher than it would otherwise have been. There is, of course, tremendous variation from one woman to another, so this figure is simply an overall observation drawn from the group of participants. To make this more concrete: The difference between a typical American diet and a low-fat, vegan diet is approximately 1,000–1,500 grams of fat per month, which corresponds to a 40–60 percent difference in mortality risk at any point in time.

Other studies found much the same thing—fatty diets are associated with increased risk, and that is particularly true for saturated fat, the kind that is common in meat, dairy products, eggs, and chocolate.^{6–9} Some studies have failed to confirm the dangers of fatty diets.^{10–13} However, most evidence indicates that women consuming less fat tend to do better after diagnosis.

Why should a low fat intake improve survival? For starters, low-fat diets tend to be modest in calories, since fats and oils are the densest source of calories of any food we consume. In fact, some investigators believe that the main problem with fatty diets is simply their high calorie content. In addition, women who eat less fat tend to have less estrogen coursing through their veins (independent of the difference in their body weight). They may also have stronger immune defenses that can help them fight cancer cells.

Increased Vegetables and Fruits

Some evidence suggests that women whose diets are richer in vegetables and fruits tend to survive longer.^{2,14} In a study of 103 women in Australia followed for six years after they were diagnosed with breast cancer, those who consumed the most fruits and vegetables rich in beta-carotene or vitamin C had the best chance for survival. The researchers divided the group into thirds based on how much beta-carotene they got each day in the foods they chose. It turned out that in the group getting the least beta-carotene, there were twelve deaths over the next six years. In the middle group, there were eight deaths, and in the high-beta-carotene group, there was only one death.¹⁵

In the digestive tract, beta-carotene is converted to vitamin A. In turn, vitamin A is converted to a compound called retinoic acid, which has a demonstrable anti-cancer effect on cells in test-tube studies.¹⁵ A Swedish study found much the same thing: Among women with breast cancer, those consuming more vitamin A were more likely to have estrogen receptor-rich tumors, a good prognostic sign.¹⁶

The Australian researchers also analyzed their data in another way, looking simply at how much fruit of any kind the women had been eating, including both beta-carotene-rich fruits and other varieties, such as apples, bananas, berries, grapes, and dried fruits. The same sort of pattern emerged. In the group eating the least fruit, there were twelve deaths; in the middle group, there were six deaths; and in the group consuming the most fruit, there were only three deaths.¹⁵

Similarly, a study of Canadian women with breast cancer found that those getting the most beta-carotene and vitamin C had significantly better survival odds.⁸ The benefit was dose related, meaning the more of these helpful nutrients they got, the better they did. Those who got more than 5 milligrams of beta-carotene per day had double the likelihood of survival, compared to women who got less than 2 milligrams. To see what this means on your plate: There are about 5 milligrams of beta-carotene in half a medium carrot or one-fourth cup of cooked sweet potato.

For vitamin C, those getting more than 200 milligrams each day had roughly double the survival odds, compared to those getting less than about 100 milligrams per day. In practical terms, an orange has about 60 milligrams of vitamin C, and a one-cup serving of broccoli or other green vegetables has about 80.⁸

Vitamin E may have the opposite effect. In one study, women with breast cancer consuming larger amounts of vitamin E had poorer survival. Every one-milligram increase in daily vitamin E intake was associated with approximately a 15 to 20 percent increased risk of treatment failure.⁷

Increased Fiber

Fiber is essential to the body's ability to eliminate excess estrogens. As the liver filters estrogens from the blood, it sends them through the bile duct into the intestinal tract, where fiber soaks them up and carries them out of the body. A study in Sweden found that women with higher fiber intake at the time of breast cancer diagnosis were more likely to have smaller tumors, compared to women

with lower fiber intake.¹⁶ The amount consumed was not particularly high. Those women with larger tumors (greater than 20 millimeters) averaged 16 grams of fiber per day, compared to 19 grams for women with smaller tumors. Most authorities recommend fiber intake of at least 30 grams daily, and an optimal intake is probably over 40 grams.

Combined Diet Effects

These dietary factors tend to work together. A diet that is higher in fruits and vegetables will also tend to be high in fiber and low in fat. In turn, women who eat such diets tend to be slimmer than other women, avoiding the risks of overweight. One study suggested that there may be a measurable benefit of these combined effects. Researchers at Mt. Sinai Medical Center in New York found that women with breast cancer who were slimmer tended to live longer, and those who had lower cholesterol levels also lived longer. But the women at greatest risk of dying were those who were overweight *and* had high cholesterol levels.¹⁷

Putting Diet Changes to the Test

The findings described above were generally made by studying the diets of women at the time they were diagnosed with cancer. Generally speaking, women who have been eating fewer fatty foods, more fiber, and more vegetables and fruits at the time of diagnosis live longer and are less likely to have a recurrence. However, it has not yet been proven that changing to a low-fat diet that is loaded with fruits and vegetables after diagnosis will put the brakes on cancer as effectively as having habitually followed such a diet since long before the disease occurred. Studies are now underway to test exactly that.

The Women's Intervention Nutrition Study (WINS) tests a low-fat diet deriving 15 percent of calories from fat in 2,500 postmenopausal women with breast cancer. In the Women's Healthy Eating and Living (WHEL) study, 3,109 pre- and postmenopausal women with breast cancer will be included in a test of a diet rich in fruits and vegetables. The study's daily diet guidelines include five vegetable servings, 16 ounces of vegetable juice, three fruit servings, 30 grams of dietary fiber, and no more than 15–20 percent of calories from fat.^{2,18}

One danger in large clinical trials is that their dietary recommendations are sometimes watered down based on the belief that participants will not be willing

to make more extensive diet changes. Nonetheless, such studies are important tests of the diets they do prescribe.

Foods and Breast Cancer Survival References

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Foods and Prostate Cancer Survival

Many research studies have shown how foods affect the risk of developing prostate cancer. Vegetables and fruits reduce the risk, while dairy products and fatty foods appear to increase it.

But what about *after* prostate cancer has been diagnosed? Will a change in eating habits help a man beat the disease? More research is needed, but evidence already available suggests that, whatever other treatments a man may undergo, changes in his diet might well save his life.

The first clues that diet could make a big difference in survival emerged from international comparisons in the 1970s. A man in Hong Kong, where diets are rich in rice and vegetables, is half as likely to have cancerous cells in his prostate, compared to a man in Sweden, where diets are high in dairy products and meat. But if cancer happens to strike, a man in Hong Kong is *eight times more likely to survive it*, compared to his Swedish counterpart.¹ In other words, it appears that the same sort of dietary habits that reduce the risk of cancer also slow its progress if it occurs.

Why would diet changes help? One explanation relates to *insulin-like growth factor* (IGF-I), a substance in the bloodstream that is a powerful stimulus for cancer cell growth. Men following plant-based diets have lower IGF-I levels than other men, while dairy products tend to drive IGF-I levels up. Men following low-fat diets also have slightly lower testosterone and estrogen levels and higher levels of a protein called sex hormone binding globulin, which binds and temporarily inactivates testosterone and estrogen. The net effect is a drop in the biochemical factors that stimulate cancer growth.

Putting Diet to the Test

The first prospective studies of diet's potential benefits were purely observational. In 1999, researchers in Québec City reported their findings after following 384 men with prostate cancer over a five-year period. It turned out that those who consumed the most saturated fat—the kind particularly prevalent in meats and dairy products—had three times the risk of dying from the disease, compared to those with the lowest saturated fat intake. Increased risk was also found with higher intakes of total and monounsaturated fat, but these increases were not significant.²

The following year, researchers in Toronto and Vancouver reported the results of a study of 263 men with prostate cancer. After adjustment for clinical stage, tumor grade, and other factors, men who consumed the most monounsaturated fat (the type that is abundant in olive and canola oils) lived longest. Their risk of

dying was 70 percent lower, compared to those with the lowest intake of monounsaturates. The study also found increased risk from animal fat and saturated fat intake, although these latter findings were not strong enough to reach statistical significance.³

Using a Vegan Diet

Dean Ornish, M.D., who had already demonstrated the benefits of a low-fat, vegetarian diet for heart patients (finding that it reversed heart disease in 82 percent of research participants), decided to put a similar program to the test for prostate cancer.⁴ The 84 volunteers were men with cancer who were able to defer treatment, at least for the moment, because they were keeping a careful watch on their prostate-specific antigen (PSA, an index of cancer spread) levels, a strategy known as “watchful waiting.” Typically, PSA levels slowly rise, and eventually treatment (e.g., surgery) may be required. Dr. Ornish randomly assigned half the men to their usual care (the control group) and the remaining half to a low-fat, vegan diet, along with regular exercise and stress management. In the 42 men in the control group, PSA levels rose over the three-month study period, and 7 required additional treatment. But in the 42 men assigned to the vegan diet and lifestyle intervention, the average PSA level dropped from 6.3 to 5.8, and none required further treatment. These results were presented at the Scientific Conference on Complementary, Alternative, and Integrative Therapies at Harvard University on April 13, 2002.

Using Diet Against Recurrent Cancer

Dr. Ornish’s approach is extremely promising for men with early disease. But what about advanced cancer? Evidence suggests that diet changes can still play a vital role. Two studies have used special diets in men who had previously been operated on for prostate cancer but who had experienced recurrences of their disease. Using a macrobiotic diet emphasizing whole grains, vegetables, and legumes while avoiding dairy products and most meats, nine men with prostate cancer had an average survival of 228 months, compared to 72 months for a matched group of men receiving no special diet.⁵

A study at the University of Massachusetts tested the benefits of a diet change in ten men with prostate cancer that had recurred after surgery. The diet was based on whole grains, legumes, green and yellow vegetables, seeds, soy

products, and fruit, and the men were also instructed in stress-reduction techniques. To measure the program's effect, researchers tracked how long it took for the patients' PSA levels to double—the longer the PSA doubling time, the slower the cancer is spreading. Before the study began, the average PSA doubling time was 6.5 months. But after four months in the program, it had slowed to 17.7 months, an encouraging finding. In three of the men, PSA levels actually fell.⁶

An additional survival study is underway at Memorial Sloan-Kettering Cancer Center in New York.⁷ And at the University of California at Los Angeles, two studies are in progress:⁸ In the first, men with prostate cancer who have elected for “watchful waiting” are randomly assigned to a “Western diet” or a low-fat, high-fiber diet, and serum growth factors and biomarkers are followed. In the second study, men scheduled for radical prostatectomy are given green tea, black tea, or green tea extract prior to surgery, and their prostate tissue is examined for the effects of these treatments. In 2003, an additional pre-prostatectomy study began, studying the effect of a low-fat diet.

Cancer-Fighting Power You Can See

In 2002, researchers at the University of California at Los Angeles reported a series of unusual experiments that demonstrated the power of diet and exercise. They drew blood samples from a group of eight men who had been following a low-fat diet and exercising regularly for several years. They also drew blood samples from overweight men who were not following the diet and exercise program. They added portions of each man's blood serum to test tubes containing standardized prostate cancer cells. Serum from men on the low-fat diet and exercise program slowed cancer cell growth by 49 percent, compared to serum from the other men. How could this be? Differences in testosterone, estrogen, and insulin account for part of the effect, but other changes in the blood exert additional effects the researchers have not yet teased out.⁹ The research team also found that a man's serum shows demonstrable cancer-inhibiting power within as little as 11 days after beginning a low-fat diet and exercise regimen.¹⁰

The Bottom Line

While more research will be of great value, evidence already suggests that men with prostate cancer—and their families—should be encouraged to adopt a

low-fat, vegan diet. By boosting vegetables, fruits, beans, and whole grains, and avoiding dairy products, meats, eggs, and fried foods, men are able to take advantage of protective nutrients and avoid cancer-promoting factors.

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