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Eating to Beat Cancer

Experts blame one-third of all cancers on diet and lifestyle. But cutting-edge research suggests some foods may actually help prevent cancer.

The “war on cancer,” declared by President Nixon back in 1971, is being won—but at a tragically slow pace, with millions of casualties. Emerging research, however, suggests that enlisting Americans’ diets and lifestyles as weapons against cancer could dramatically change that battlefield and speed up the fight against what’s still the nation’s second leading cause of death, exceeded only by heart disease.

In January, the American Cancer Society released its annual report on cancer deaths in America, which showed a slight downward trend for the second consecutive year. The findings, published in *CA: A Cancer Journal for Clinicians*, covered 2004, the most recent year for which mortality statistics have been refined. They showed a total of 553,888 cancer deaths nationwide—3,014 (0.54%) fewer than in 2003. That year had recorded a smaller decline, 369 fewer deaths, compared to 2002.

The society also released a companion study, “Cancer Facts & Figures 2007,” projecting US cancer incidence and mortality for this year; an estimated 1,444,920 new cases and 559,650 cancer deaths—a slight increase—are seen for 2007.

Yet John R. Seffrin, PhD, chief executive officer of the American Cancer Society, sees encouraging signs in the statistics. “This second consecutive drop in the number of actual cancer deaths, much steeper than the first, shows last year’s historic drop was no fluke,” he says. “The hard work towards preventing cancer, catching it early, and making treatment more effective is paying dramatic, lifesaving dividends.”

It’s no surprise that the “Facts & Figures” report once again singles out **tobacco use** as a key preventable cause of cancer: About 30% of cancer deaths in the US are caused by smoking, and other forms such as snuff and chewing tobacco also raise the risk of cancer. Nonetheless, one in five adult Americans still smokes.

But the report also links as many or more cancer deaths—one-third—to **nutrition and lifestyle factors**, such as lack of physical activity. “In fact, for most people who do not smoke, these factors are the most important for affecting cancer risk,” according to the society.

The American Cancer Society is hardly alone in seeing diet and lifestyle as the next front in the war on cancer: In March, the American Chemical Society held its first-ever

symposium on “Natural Products, Diets and Cancer Prevention.” Last July, nearly 400 cancer experts gathered in Washington, DC, for an International Research Conference on Food, Nutrition and Cancer. A followup conference will be held Nov. 1-2, to coincide with the release of a new report, “Food, Nutrition, Physical Activity and the Prevention of Cancer: A Global Perspective.”

The forthcoming report will note that “evidence linking food, nutrition and physical activity to the risk of developing cancer has been obtained from systematic literature reviews of more than 20 cancer sites and of cancer survivor research,” according to a review of the conference published in the *Journal of Nutrition*. The report will also focus on the causes of **obesity**, which is estimated to be responsible for 14% of cancer deaths in men and 20% in women.

The connections of diet and lifestyle to America’s other top killer, heart disease, are well known and documented: Eat lots of saturated fat, for instance, and you’ll raise your LDL cholesterol and your risk of heart disease. It’s easy to see how what you eat can affect what’s in your blood, or how staying in shape can benefit your heart. But the genesis of many cancers remains more mysterious, and the possible associations between cancer and what you eat or how much you exercise seem more subtle and elusive. Even when research can identify foods that appear to increase your risk of cancer, discovering foods that might actually help *prevent* cancer poses a daunting challenge.

Nonetheless, a flurry of recent studies suggests that some foods may actually be cancer fighters. Even though these findings are tentative, most point to benefits from foods and nutrients already known to be good for your health in other ways. So it can’t hurt to add these potential weapons against cancer to your arsenal:

Fruits and vegetables: If any foods would be no surprise as cancer fighters, it’s fruits and vegetables—which seem to be good for you in almost every other way, anyway. Research has shown that **lycopene in tomatoes** may prevent prostate cancer as well as pancreatic cancer in men. (The carotenoids contained in tomatoes, such as lycopene, are implicated as the active agent, but research suggests that the whole vegetable rather than a sin-

TO LEARN MORE:

American Cancer Society, “Cancer Facts and Figures 2007,” <www.cancer.org/docroot/STT/stt_0.asp>.

gle chemical compound is most effective in cancer prevention.) A diet high in **cruciferous vegetables** such as broccoli, Brussels sprouts and cauliflower has been seen to benefit people with a genetic predisposition to lung cancer. Some studies have suggested that **berries** and **red grapes** may have cancer-preventive properties.

Three recent studies have added to the interest in produce's potential cancer-fighting power. As reported in the February 2007

Healthletter, researchers based in Milan, Italy, found that both **onions and garlic** were linked to significant reductions in risk for colorectal, ovarian, prostate, breast, renal, esophageal, oral cavity and throat cancers. The study, published in the *American Journal of Clinical Nutrition*, analyzed dietary data from a network of eight Italian and Swiss case-control studies totaling almost 10,000 cancer patients and 15,000 healthy control subjects.

"For colorectal cancer, one portion of onion per week reduced cancer risk by 14% as compared to nonusers, but the protection became more evident for higher intake," explains lead author Carlotta Galeone of the Istituto di Ricerche Farmacologiche "Mario Negri." "At least two onions per week seem to be needed to reduce cancer risk at several other sites, such as larynx (56%), ovary (43%) and kidney (25%). However, our results are particularly interesting for high intake of onion—about one onion per day—because the protection becomes more consistent for all cancer sites studied, except for prostate and breast cancer. The reduction in cancer risk varies from 56% for colorectal cancer to 88% for oral cancer.

"High intake of garlic is protective against all cancer sites studied as compared to nonusers, except for breast cancer," Galeone continues, "with a reduction in risk from 19% for prostate cancer to 57% for esophageal cancer."

The second new study found that men who consume at least six servings daily of fruits and vegetables had a 55% reduced risk of kidney cancer compared to those eating less than three portions daily. Harvard researchers looked at the diets of 88,759 women and 47,828 men over as long as 20 years; a statistically significant association was seen only in men.

Researchers at the Karolinska Institute in Sweden have previously observed that high consumption of **carotenoid**-rich green leafy vegetables and root vegetables was associated with a reduced risk of stomach cancer. Now, in a study newly published in the *American Journal of Clinical Nutrition*, the research team similarly found that a diet high in **vitamin A, beta-carotene** and **alpha-carotene** was associated with a reduction in risk of stomach cancer by roughly half. The study analyzed dietary data from

45,338 men and 36,664 women over an average 7.2 years of followup, during which 139 cases of stomach cancer were diagnosed in the group.

A Swedish-Danish-American study of diet and non-Hodgkin lymphoma (see below) also found an association between high beta-carotene intake and reduced risk of that type of cancer.

Calcium: Much as you already know that eating fruits and vegetables is a good idea, you're aware of the importance of calcium to prevent osteoporosis. But can calcium also help combat cancer—specifically cancers of the colon and rectum? That possibility remains controversial, but researchers continue to test for associations between getting plenty of calcium and reducing your risk of colorectal cancer. Earlier analyses of data from both the Women's Health Initiative and the Nurses' Health Study failed to find any benefits from calcium against colorectal cancer. But now two new studies

have produced more promising results.

Findings from the Shanghai Women's Health Study, published in the *International Journal of Cancer*, show that participants with the highest daily calcium intake had a significantly lower risk of colorectal cancer than those with the lowest calcium intake. The researchers, led by Wei Zheng, MD, PhD, of Vanderbilt University, studied dietary intakes among 73,314 Chinese women, average age 55.5. After nearly six years of followup, they recorded 129 cases of colon cancer and 91 cases of rectal cancer. The relative risk of colorectal cancer for the group with the highest calcium intake was 40% lower than the women getting the least calcium.

The epidemiological study couldn't determine a potential mechanism for this apparent protective effect, but the researchers pointed to previous studies showing cancer-inhibiting effects of calcium. These have included stopping the growth of cancer cells in the colon and binding to carcinogenic bile acids.

The researchers cautioned that dietary consumption of calcium in China is lower than in Western populations.

Still, another new study adds credence to the connection between calcium and colorectal cancer prevention: The Calcium Follow-up Study, published in the *Journal of the National Cancer Institute*, found that people who received **calcium supplements** in a randomized study had only two-thirds the risk of having adenomas (benign tumors associated with colorectal cancer) compared to those taking placebos in the five years after the treatment was stopped. The original Calcium Polyp Prevention Study randomly assigned 930 people with recent adenomas to four years of daily 1,200-milligram calcium supplements or to a placebo. The group getting extra calcium had a 17% lower relative risk of adenoma recurrence than the placebo group during the treatment phase of the trial.

"Our study provides further evidence of the potential of calcium as a chemopreventive agent against colorectal adenomas among individuals with a history of these tumors," according to lead researcher Maria Grau, MD, MPH, of Dartmouth Medical School.

In an accompanying editorial,

Where Cancer Will Strike

Leading sites of new cancer cases. 2007 American Cancer Society estimated % of new cases:

Men

1. Prostate 29%
2. Lung & bronchus 15%
3. Colon & rectum 10%
4. Urinary bladder 7%
5. Non-Hodgkin lymphoma 4%

Women

1. Breast 26%
2. Lung & bronchus 15%
3. Colon & rectum 11%
4. Uterine corpus 6%
5. Non-Hodgkin lymphoma 4%

Prevention Prescription: Lose Pounds, Add Exercise

Can your waistline affect your risk of cancer? Research by the American Cancer Society and the Duke University Prostate Center recently found a connection between **weight loss** and reduced risk of aggressive prostate cancer. After analyzing data on nearly 70,000 men over a 21-year period, scientists reported that those who lost more than 11 pounds over that span were 42% less likely to develop an aggressive form of prostate cancer than those whose weight remained unchanged.

Lead researcher Carmen Rodiguez, MD, MPH, of the cancer society cautioned that the sample was actually relatively small, given that fewer than 15,000 of the men lost weight and only 1,000 of that group developed prostate cancer. "Our study adds to increasing evidence of the importance of maintaining a healthy weight throughout adult life," she explains. "Although our study suggests that weight loss may lower the risk of aggressive prostate cancer, given the difficulty of losing weight, emphasis should be put on the importance of avoiding weight gain to reduce the risk of prostate cancer."

If you decide to add more **exercise** to your daily routine as part of tackling your weight, a second new study suggests you may reduce your risk of another type of tumor—colon cancer. French researchers involved in the large European Prospective Investigation into Cancer and Nutrition (EPIC) study of more than 413,000 people found that those with the highest level of exercise had a 22% reduced risk of colon cancer. People of normal weight saw the greatest benefit, but those who were overweight or obese also benefited.

One hour a day of vigorous physical activity or two hours of moderate activity would be enough to reduce the risk of colon cancer, according to the researchers. Lesley Walker, PhD, of Cancer Research UK, which partly funded the study and announced the findings, said, "It is important for people to understand that they can take steps in their daily routine to reduce cancer risk. You don't need to join a gym to get the benefit of exercise. If regular brisk walking or going for a run doesn't appeal, you can... do some strenuous housework. Cleaning windows, vacuuming and scrubbing floors burn off a lot of calories. So does gardening or cleaning the car."

TO LEARN MORE: *Cancer Epidemiology, Biomarkers & Prevention*, January 2007; abstract at <cebp.aacrjournals.org/cgi/content/abstract/16/1/63>. Cancer Research UK <www.cancerresearchuk.org>.

Maria Martinez and Elizabeth Jacobs of the Arizona Cancer Center noted that 1,200 milligrams is already the US recommended daily intake of calcium for adults over 50. "Because no protection for colorectal cancer is apparent at higher levels of calcium intake," they wrote, "this recommendation is justified... Individuals with lower rather than higher nutrient intakes are likely to benefit the most from supplementation and... those who have already exceeded the threshold of prevention may experience no added protection."

from 1 million participants in the European Prospective Investigation into Cancer and Nutrition (EPIC) trial. The study found that people averaging less than a half-ounce of fish a day had a 40% higher relative risk of colorectal cancer than those eating the most fish, more than 1.75 ounces daily. The analysis didn't actually differentiate between eating fatty fish high in omega-3s and other types of fish, however.

In research presented in November to the American Association for Cancer Research's Frontiers in Cancer

Fish and omega-3s:

Another possible preventive against colorectal cancer is suggested by several studies of consumption of fatty fish high in omega-3 fatty acids, which have already been linked to improved heart health. In January 2006, a review of 38 studies of omega-3s and cancer, published in the *Journal of the American Medical Association*, concluded, "The jury is still out as to whether eating more omega-3 fatty acids will reduce your risk of developing cancer." Since then, however, evidence has continued to add up for a preventive benefit against colorectal cancer.

In 2005, the *Journal of the National Cancer Institute* published an analysis of data

Prevention meeting but not yet published, Harvard scientists found that men who ate fish at least five times a week had a 40% reduced risk of colorectal cancer compared to those eating the least fish. The study analyzed nearly 20 years of data from 22,071 participants in the Physicians' Health Study who also filled out a questionnaire on fish consumption. Men didn't have to eat fish five times a week—a level reported by only 11%—to show apparent benefits compared to those eating fish less than once a week: Eating fish two to five times a week was associated with a 20% relative risk reduction, and even eating fish once a week was linked to a 13% lower risk.

"We already know that eating fish can reduce the risk of sudden cardiac death, and this might provide another reason to add fish to your diet," said lead researcher Megan Hall of the Harvard School of Public Health.

The study found benefits regardless of whether the men were taking aspirin (one of the topics of the Physicians' Health Study), but another new Harvard study reported significant benefits from omega-3 intake—only in men *not* on an aspirin regimen. This study, published in *Cancer Epidemiology Biomarkers & Prevention*, also looked at men in the Physicians' Health Study, comparing blood samples from 178 participants who'd developed colorectal cancer against 282 control subjects. Among men not on aspirin, those with the highest blood levels of omega-3s had a 66% reduced risk compared to those with the lowest levels. The overall group also showed a reduced risk, but not enough to be statistically significant.

The researchers theorized that omega-3s and aspirin may both combat colorectal cancer risk by the same mechanism. Much like aspirin, omega-3s might work by inhibiting an enzyme, COX-2, associated with inflammation in the body and cancer development. So men taking aspirin regularly would already be getting this protection and would thus see less of an additional benefit from omega-3s.

Omega-3s might also offer protection against non-Hodgkin lymphoma, a cancer that starts in the lymphatic sys-

tem, according to new research from Scandinavia. That study, published in the *American Journal of Epidemiology*, found that those with the highest intake of omega-3s—more than 2,000 milligrams daily for a 2,000-calorie-a-day diet—had a 20% reduced risk compared to those consuming the least, under 1,400 milligrams a day. People who took **fish-oil supplements** also saw a benefit, with a risk reduction of 40% compared to those not taking the supplements. The researchers studied 591 people with the lymphatic cancer and 460 healthy controls.

The study also observed associations between reduced lymphoma risk and high intake of **dietary fiber, beta-carotene** and **vitamin E**.

“Of course, these findings need to be replicated elsewhere,” cautioned lead author Ellen Chang, ScD, of the Northern California Cancer Center, “ideally in studies where diet is measured in a large group of healthy people, who are then followed over many years to find out who develops non-Hodgkin lymphoma later on. This would allow us to make sure that we were measuring what people were eating before they developed non-Hodgkin lymphoma.”

Olive oil: The so-called “Mediterranean diet” has been touted for many possible health benefits, and now some researchers are noting that people in Mediterranean countries are less prone to breast, colon and prostate cancer than those in northern Europe. Might olive oil, a key ingredient in the diet of those Mediterranean peoples, be part of the reason? Researchers at Copenhagen University Hospital in Denmark recently put that idea to the test with a study of 182 men, ages 20 to 60, from five European countries. The results were published in the *Federation of the American Society of Experimental Biology Journal*.

Over a two-week period, the men consumed about two-and-a-half tablespoons of olive oil daily. At the end of the study, scientists found that the men’s

levels of 8oxodG, a marker of oxidative damage to cellular DNA, had dropped 13%. The levels dropped regardless of the antioxidant phenol content in the three olive oils tested, leading researchers to suspect that the monounsaturated fats in the oil, not the phenols, are responsible. In testing the men at baseline, the scientists also noted that those from Mediterranean countries had lower 8oxodG levels than men from northern Europe.

Lead researcher Henrik E. Poulsen, MD, cautions that these findings are a long way from a prescription to guzzle olive oil as a cancer preventative. He also notes that olive oil is only one component of the Mediterranean diet pattern, and that it’s no substitute for calorie control and regular exercise.

Tea: Could your morning or afternoon cup of tea be helping your body fight cancer? A new US Department of Agriculture (USDA) study suggests that both green and black tea could have anti-carcinogenic potential, according to lead researcher Mendel Friedman, PhD. He and colleagues at three Korean universities investigated the power of various polyphenols in tea to kill human cancer cells. Most of the compounds were found to decrease the numbers of breast, colon, prostate and liver cells.

“The anticarcinogenic effects of tea compounds and of tea leaf extracts varied widely,” Friedman noted in the *Journal of Agricultural and Food Chemistry*. He added, “Because tumor promotion may be the only reversible event during cancer development, its suppression is regarded as an effective way to inhibit carcinogenesis.”

While these cellular findings don’t by any means prove that tea fights can-

cer, Friedman wrote, “The observed destruction of a broad range of cancer cells suggests the need for animal and human studies designed to ascertain whether the observed wide variation in potencies of tea compounds and teas can predict corresponding effects” in living organisms.

Like most research on the foods that might help your body fight cancer, this is only the beginning of a long scientific endeavor. The state of nutrition knowledge remains far from being able to state categorically, “Eat this to reduce your risk of cancer”—and science may never be able to make such conclusions with the certainty that, say, tobacco use has been fingered as a cause of cancer. But this front in the long-running war against America’s second-leading and most-feared killer continues to expand. In the meantime, the foods that science suggests might be good for you in preventing cancer match many of the dietary basics that are just plain good for you. So if you’re eating smart, you can be confident that you’re probably also putting the right things on your plate to reduce your risk of cancer.

TO LEARN MORE: *American Journal of Clinical Nutrition*, November 2006; abstract at <www.ajcn.org/cgi/content/abstract/84/5/1027>. *Cancer Epidemiology Biomarkers & Prevention*, December 2006 (kidney cancer); abstract at <cebp.aacrjournals.org/cgi/content/abstract/15/12/2445>. *American Journal of Clinical Nutrition*, February 2007; abstract at <www.ajcn.org/cgi/content/abstract/85/2/497>. *International Journal of Cancer*, Dec. 15, 2006; abstract at <www3.interscience.wiley.com/cgi-bin/abstract/113387002/ABSTRACT>. *Journal of the National Cancer Institute*, Jan. 17, 2007; abstract at <nci.oxfordjournals.org/cgi/content/abstract/99/2/129>. *Journal of the American Medical Association*, Jan. 25, 2006; abstract at <jama.ama-assn.org/cgi/content/abstract/295/4/403>. *Cancer Epidemiology Biomarkers & Prevention*, February 2007; abstract at <cebp.aacrjournals.org/cgi/content/abstract/16/2/314>. *Journal of the National Cancer Institute*, June 15, 2005; abstract at <nci.oxfordjournals.org/cgi/content/abstract/97/12/906>. *American Journal of Epidemiology*, December 2006; abstract at <aje.oxfordjournals.org/cgi/content/abstract/164/12/1222>. *Federation of the American Society of Experimental Biology Journal*, January 2007. *Journal of Agricultural and Food Chemistry*, online before print; abstract at <pubs.acs.org/cgi-bin/abstract.cgi/jafcau/2007/55/i02/abs/jf062276h.html>. ♦

When Cancer Kills

Leading sites of new cancer deaths. 2007 American Cancer Society estimated % of deaths:

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3. Colon & rectum 9%
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3. Colon & rectum 10%
4. Pancreas 6%
5. Ovary 6%