

Courtesy of American Longevity

#### Consumption if Fiber Reduces the Risk of Colorectal Cancer

Charles B. Simone, M.D., Nicole L. Simone, and Charles B. Simone, II

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Simone Protective Cancer Institute

123 Franklin Corner Road

Lawrenceville, NJ 08648

609-896-2646 drsimone@erols.com

Gastrointestinal cancers are the second leading cause of death among all cancer patients. The death rate for cancer of the colon and rectum has remained the same since 1930 which means there has essentially been no progress in the treatment of these cancers. The estimated new colorectal cancer cases for 1999 are 129,400. The estimated number of deaths from colorectal cancer is 56,600. A person has a one in 18 chance of developing colorectal cancer (1) over his or her lifetime.

There are major differences in death rates from colorectal cancer in different parts of the world, and epidemiological studies show that dietary factors account for the different incidence rates (2). The more industrialized a country, the higher the rate of colorectal cancer because the people generally eat less fiber and more animal fat. The highest colorectal cancer rates are found in Western Europe and English-speaking countries. The lowest incidence rates are found in Africa and Asia, but that is changing rapidly for Asians because they have adopted a Westernized diet. In countries where there is a high incidence of colorectal cancer, most of the cancers are located in the left colon and rectum, whereas in countries with a low incidence, most of the cancers are in the right colon.

## Fiber

Fiber is a complex carbohydrate consisting of a polysaccharide and a lignin substance that provides the structure of a plant cell. It is undigested residue that reaches the end of the small intestine. There are three groups of dietary fiber types: vegetable fibers, that are highly fermentable and have a low undigested content; bran, that is less fermentable; and, purified fibers, such as cellulose, that are much less fermentable and have a high undigested content.

Dietary fiber acts as a 'glue' for certain chemicals. For instance, unconjugated bile acids that are produced by the body can be adsorbed by fiber in the colon and passed out in the stool without intestinal bacteria forming carcinogens from those bile acids.(26, 28) In addition some fiber binds to cholesterol and lipids, nitrogen, and certain minerals, and eliminates them in the stool. This action lowers the blood concentration of cholesterol and certain other lipids. (26, 28)

Drs. Higginson and Oettle were the first to report in 1960 that dietary fiber consumption was associated with a low risk of developing colon cancer (3). They noted that the Bantu tribal people in South Africa had a low incidence of colorectal cancer. They also excreted large piles of feces that were related to the large amount of dietary fiber they ate. Dr. Denis Burkitt continued the research and stated that the high fiber diet resulted in a rapid transit time for solid material to pass through the gastrointestinal tract and also increases the amount of stool. And these two variables are associated with a decrease incidence of colorectal cancer (4). Diet in rural Africa and in other similar locations provides about 25 grams of crude fiber daily, whereas Western diets provide less than 5 grams of fiber daily. With a more rapid transit time, bile acids and other carcinogens produced by anaerobic bacteria move out of the gastrointestinal tract more quickly. Furthermore, since the volume of feces is increased, those carcinogens that are produced pass through the gut more diluted. Hence, if more dietary fiber is eaten, carcinogens pass out of the gut more quickly and there are fewer carcinogens per square inch.

## Data Demonstrating that Consumption of Fiber May Reduce

### the Risk of Colorectal Cancer (5-187)

In 1982 the National Academy of Sciences found that according to strict epidemiological criteria there was "no conclusive evidence to indicate that dietary fiber exerts a protective effect against colorectal cancer in humans." Nevertheless the US National Academy of Sciences did issue dietary guidelines because the data were "highly suggestive that reduced fat consumption and increased consumption of cereals, fruit, and vegetables represent the current state of knowledge and form the basis of a diet that is unlikely to do harm and may have the potential for reducing cancer rates in North America."

Because the evidence from epidemiological and laboratory studies was sufficiently consistent that high-fiber low-fat diets could lower cancer risk, interim dietary guidelines were issued by other US Agencies, organizations, and other governments in the mid 1980s. These included the United States National Cancer Institute, National Institutes of Health, United States Department of Agriculture and Department of Health and Human Services, American Cancer Society, Australia, Canada, the Joint European Organization for Cooperation in Cancer Prevention, Norway, Sweden, and Japan. They all independently agreed that to reduce cancer risk people should increase the consumption of green, yellow, and cruciferous vegetables, citrus fruits, and whole grain cereal products; and reduce the intake of fats to about 30 percent.

In 1984 the United States National Cancer Institute recommended an intake of 25-35 grams of fiber daily to decrease the risk of cancer. However, the American public consumes only about 8-10 grams of fiber per day.

During the last 25 years, thousands of in vitro and animal studies have been published demonstrating that fiber can decrease the risk of colorectal cancer. These papers have not been included in this review.

Since 1980 hundreds of published papers demonstrate that high fiber intake can reduce the incidence of colorectal cancer in humans. Some have been included in this review (5-187).

Reports from the United States National Cancer Institute are consistent that dietary fiber will decrease the risk of colorectal cancer:

· "This evaluation clearly suggests a relationship between colon cancer and a diet low in fiber" - from 40 epidemiological studies in 55 reports. (Dr. Peter Greenwald [Director of the Division of Cancer Prevention and Control, National Cancer Institute] et al. Dietary Fiber in the reduction of colon cancer risk. J Am Diet Assoc 1987; 87(9): 1178-88).

· "The analysis of these studies gives support for a protective effect [against colorectal cancer] associated with fiber-rich diets" from 23 case-control studies, 7 international correlation studies, 8 within-country correlation studies, 2 cohort studies, and 3 time-trend studies. (Trock, Lanza, Greenwald. Dietary fiber, vegetables, and colon cancer: critical review and meta-analysis of epidemiological studies. JNCI, 1990; 82:650-661).

· "Based on current knowledge, recommended nutrition guidelines for reducing the risk of colon cancer include decreased fat consumption adequate amounts of fruits, vegetables, and calcium, and avoidance of overweight." [Shike, Winawer, Greenwald, et al. Primary prevention of colorectal cancer. Bull WHO, 1990; 68:377-385].

*Recommendation:* Dietary fiber intake should amount to at least 25 gm/day.

· "Both prospective and retrospective studies suggest that vegetable and fruit intake may reduce the risk of cancers of multiple including cancer of the colon and rectum." Ziegler RG. Vegetables, fruits, and carotenoids and the risk of cancer. Environmental Epidemiology Branch, National Cancer Institute, Bethesda, MD 20892. Am J Clin Nutr 1991 Jan;53(1 Suppl):251S-259S.

### Consensus Statements

Various organizations and governments around the world have issued consensus statements that high fiber consumption can reduce the risk of colorectal cancer.

· 1999 World Health Organization: "The consumption of food rich in polysaccharides (eg. dietary fibre or non-starch polysaccharides) is associated with a decreased risk of colorectal adenoma and colorectal cancer." [Eur J Canc Prev 1999; 3:57-62]

*Recommendation:* "Vegetables and whole grain cereals should be consumed in high amounts and should be a major component of diet."

· 1999 Colon Cancer Prevention Program Project: "13.5 grams of wheat bran per day decreases the recurrence rate of adenomatous colon polyps." [Am J Med 1999; 106(1A):43S-45S].

· 1999 The Seven Countries Study Conclusion (Croatia, Finland, Greece, Italy, Japan, Netherlands, Serbia, US): "High fiber intake was strongly associated with low colorectal mortality. An increase of 10 grams in the daily intake of fiber was associated with a 33% lower risk of 25-year colorectal cancer mortality." [Int J Cancer, 1999; 84:174-179].

*Recommendation:* Increase the daily intake of fiber by 10 grams.

· 1998 European Cancer Prevention Consensus Panel: "A diet rich in high-fibre cereal is associated with a reduced risk of colorectal cancer." [Eur J Canc Prev 1998; 7 (suppl 2): S1-S3].

· 1997 American Dietetic Association Position: "Results of all studies provide substantive evidence that intake of fiber-rich foods is inversely related to risks of both colon and rectal cancers. It is estimated that the risk of colorectal cancer in the US population could be reduced by about 31 percent if fiber intake from food sources were increased by an average of about 13 grams per day." [J Am Diet Assoc. 1997; 97(10):1157-1159].

*Recommendation:* Promote food intake patterns consistent with the Food Guide Pyramid that makes use of a wide variety of plant foods to achieve adequate fiber intakes in healthy children and adults. Include at least 2 to 3 servings of whole grains as part of the daily 6 to 11 servings of grains, 2 to 4 servings of fruits and 3 to 5 servings of vegetables daily, and legumes at least once or twice a week.

· 1995 Australia: Reduction in the incidence in large adenomas was observed when a low-fat diet was combined with high-fiber wheat bran supplementation of 25 grams per day." [JNCI, 1995; 87:1760-1766].

*Recommendation:* 25 grams of fiber daily.

· 1994 United Nations Food and Agriculture Organization: "High fiber intake consisting of vegetables and cereals were protective against colorectal cancer." [Eur J Canc Prev 1998; 7 (suppl 2): S11-S17.

#### **Global Review of Diet and Cancer**

The most compelling and the most comprehensive review and evaluation of the link between diet and the development of cancer concludes that 3 to 4 million cases of cancer per year could be prevented by appropriate diet and lifestyle changes. A panel of over 150 scientists who reviewed and evaluated 4,500 research studies published their findings in a 670 page report, Food, Nutrition and the Prevention of Cancer: A Global Perspective. The report contains 14 dietary recommendations that "are most likely to prevent cancer and are consistent with the prevention of other diseases." The report targets primarily policy and opinion makers worldwide.

The report's conclusion regarding colorectal cancer:

- Vegetables – "Convincing" data shows decrease risk.
- Fiber (non-soluble polysaccharides) – "Possibly" decreases risk.
- Fiber foods with carotenoids - "Possibly" decreases risk.
- Starches - "Possibly" decreases risk.

#### **Risk/Benefit of the Impact of Daily Consumption of Fiber**

Over 40 percent of Americans will develop cancer and the great majority of them will die from it. Over 10 million people in the world developed cancer in 1996 and 6 million died of the disease. The number of deaths attributable to cancer around the world will be 6.7 million in the year 2015. And the majority of health budgets will be spent on treating cancer in most developing countries. Cancer is preventable. Less than 5% of cancer cases are linked to genetics.

The evidence is overwhelming to support the statement that "the consumption of fiber may reduce the risk of colorectal cancer." In fact, based on the volume, credibility, and reliability of the scientific facts, we are convinced that fiber can, not may, but can reduce the risk of colorectal cancer.

#### *Amount of Fiber*

Depending on the study, the American typically consumes only about 8-15 grams of fiber each day. The amount of fiber needed to be protective against colorectal cancer recommended by most of the consensus reports is about 25 to 35 grams of fiber each day. Unless the American has the time or the inclination to become a grazing animal, it would be difficult to attain the protective level of fiber each day without taking a supplement.

Food Guide Pyramid suggests daily: 6 to 11 servings of grains (cereal, rice, pasta, bread), 2 to 4 servings of fruits and 3 to 5 servings of vegetables daily, and legumes at least once or twice a week.

#### *Safety of the Nutrient at Dose Levels and Consumption Levels Needed to Produce the Physiological Effect*

Fiber Consumption is safe at all dose levels.

#### *Competence and Reliability of Recent (1993-present) Science Supporting the Claim*

The data relating to "Consumption of fiber may reduce the risk of colorectal cancer" are reliable, reproducible, and have a high level of credibility and competency.

#### **Conclusion**

Hundreds of reliable and competent scientific studies demonstrate that about 25 to 35 grams daily of dietary fiber will reduce the risk of colorectal cancer. Because the American typically consumes only about 8 to 15 grams of fiber daily, a supplement should be added to attain the desired protective level