Colorectal Cancer: Fruit and Vegetable Intake

Description/Etiology

Colorectal cancer (CRC) is a malignant tumor that originates in the large intestine or the rectum. Most CRCs develop from a benign (i.e., noncancerous) polyp. With proper screening by colonoscopy or sigmoidoscopy, CRC can, in many cases, be detected before the onset of signs and symptoms. When caught early, CRC is highly curable. Treatment depends on the stage of the cancer and the age and health of the patient, and can involve surgery, chemotherapy, and/or radiation therapy. (For more general information about CRC, see Quick Lesson About ... Colorectal Carcinoma)

Dietary risk factors for CRC include obesity, higher total caloric intake, and consumption of red meat. Consumption of fruits and vegetables is generally thought to be protective against CRC, possibly due to chemopreventive effects of antioxidant vitamins (E, C, and A), folate, thioesters, terpenes, and plant phenols. Researchers in numerous epidemiological studies have reported an in inverse correlation between fruit and vegetable intake and CRC risk, but findings in prospective studies have not been entirely consistent.

Kounshik et al. (2007) analyzed pooled data from 14 North American and European prospective cohort studies involving a total of 756,217 men and women who were followed for up to 6–20 years. They found that increasing fruit and vegetable intake was not associated with CRC risk overall, but that lowest intakes were associated with elevated risk. They did find an inverse correlation between fruit and vegetable intake and cancer of the distal colon. More recently, Aune et al. (2011) conducted a meta-analysis of 19 prospective cohort studies and concluded that higher intake of fruit and/or vegetables was associated with a small, nonlinear reduction in CRC risk. Analysis of 11 studies evaluating intake of fruits and vegetables in > 1.5 million participants revealed that highest intake was associated with an 8% reduction in CRC risk compared to lowest intake. Analysis of 14 studies evaluating intake of fruit in > 1.5 million participants revealed that highest intake was associated with 10% reduction in risk, while analysis of 16 studies evaluating vegetable intake in nearly 1.7 million participants indicated a 9% reduction in CRC risk. Wu et al. (2013) conducted a meta-analysis of 24 case-control and 11 prospective studies including nearly 1.3 million participants and found an inverse relationship between cruciferous vegetable intake and CRC risk. They calculated that highest intake of cruciferous vegetables was associated with an 18% reduction in CRC risk compared to lowest intake. When they restricted their analysis to specific cruciferous vegetables, highest intake of cabbage and broccoli were associated with CRC risk reductions of 24% and 18%, respectively. Similarly, Tse et al. (2014), in a meta-analysis of 33 studies, found that high overall intake of cruciferous vegetables was associated with a 16% reduction in CRC risk and high intake of broccoli in particular was associated with a 20% reduction in risk.

Facts and Figures

It is estimated that 1.2 million new CRC cases are diagnosed globally each year, accounting for 10% of all new cancers and resulting in nearly 609,000 deaths. CRC is the third most commonly diagnosed cancer in the United States and the second leading cause of cancer death. In 2017, an estimated 135,430 new cases of CRC will be diagnosed in the U.S. and 50,260 patients will die of the disease. About 20% of cases of CRC are associated with familial clustering.
Risk Factors
Risk factors for CRC cancer include age > 60 years, family history of CRC, certain inherited syndromes (e.g., familial adenomatous polyposis, Lynch syndrome), Black or eastern European descent, inflammatory bowel disease (e.g., Crohn’s disease, ulcerative colitis), colorectal polyps, cancer in another body site, overweight/obesity, metabolic syndrome, smoking, excessive alcohol consumption, consuming a diet high in fat, consuming a diet high in red and processed meat), and a history of breast cancer in women.

Signs and Symptoms/Clinical Presentation
Signs and symptoms of CRC cancer include abdominal pain, diarrhea, constipation, unexplained weight loss, narrow stools, and blood in the stool.

Assessment
› Patient History
  • Ask about previous malignancies and coexisting conditions
  • Ask about symptoms that can negatively affect dietary intake (e.g., nausea, constipation, diarrhea)
  • Conduct a diet analysis by asking the patient to complete a diet history, a food frequency questionnaire, and a 3-day diet recall that includes 1 weekend day to evaluate the patient’s dietary strengths and weaknesses
  • Ask about and assess for anxiety and depression, which are common in patients with cancer and can interfere with dietary intake
  • For information about patient assessment unrelated to diet, see the Quick Lesson referenced above

Treatment Goals
› Promote Optimal Physiologic Function and Reduce Risk of Complications
  • Monitor vital signs (including weight), all physiologic systems, and laboratory/other diagnostic study results; report abnormalities and treat, as ordered. (For information on treatment for CRC unrelated to diet, see the Quick Lesson referenced above)
  • Assess for pain, nausea, and other physical discomfort and provide analgesics and other prescribed medications for relief, as ordered
  • Monitor intake and output, assess for low intake related to decreased appetite, vomiting, diarrhea, and treat, as ordered
  • Monitor weight and encourage maintenance of a healthy body weight
    – Review results of the diet analysis to assess dietary habits and preferences
    – Request referral to a registered dietician for patient evaluation, nutritional education, meal planning, shopping for food and dietary supplementation
› Support Emotional Well-Being and Educate
  • Assess patient for anxiety and depression; provide emotional support and promote a positive self-image for patients who have experienced a dramatic change in lifestyle due to colorectal cancer-related functional limitations
  • Educate and encourage discussion regarding colorectal cancer, risks and benefits of treatment, pain management options, changes in body image and function, what to expect during recovery from treatment, individualized prognosis, and the importance of establishing healthy eating habits to reduce cancer risk/risk of recurrence. (For information regarding risk reduction, see What Do I Need to Tell the Patient? below)

Food for Thought
› Investigators in China conducted a case-control study in which they compared 1,057 patients with CRC and 1,057 healthy controls and found an inverse relationship between intake of red/purple, white, and orange/yellow fruit and vegetables and CRC risk. They did not find a relationship between green fruit and vegetable intake and CRC risk (Luo et al., 2015)
› Researchers in Jordan collected dietary data from 220 patients diagnosed with CRC and 281 healthy controls and concluded that the consumption of refined grains is associated with a higher possibility of developing CRC while the consumption of whole grains has a protective role (Tayyem et al., 2016)

Red Flags
› High doses of supplements should be avoided because there is evidence that use of certain supplements can be damaging. For example, although folate has been shown to be protective against CRC, folate supplementation has been associated with higher CRC risk
Taking very high doses of vitamins can interfere with cancer treatment

**What Do I Need to Tell the Patient/Family Members?**

- Achieve and maintain a healthy weight
- Seek immediate medical attention for new or worsening signs and symptoms (e.g., abdominal pain, diarrhea, unexplained weight loss)
- As tolerated, participate in regular physical activity for at least 150 minutes/week
- Eat a diet high in fiber and low in fat that includes fish and other lean protein, whole grains, and a wide variety of fruits and vegetables
- Limit alcohol consumption and do not use tobacco

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**References**