

# Colorectal Cancer

**Definition:** Colorectal cancer, or cancer of the colon or rectum, is characterized by uncontrolled growth of neoplastic cells developing in the lower segment of the digestive tract, with the potential to invade and spread to other sites. In the Washington State Cancer Registry, new cases of colorectal cancer are coded to ICD-O-3 codes C18.0–C18.9, C19.9, C20.9, and C26.0, excluding histology codes 9140, and 9590–9989.

## Summary

Colorectal cancer is the third most common cancer in Washington State for both men and women. In 2004, 2,776 Washington residents were diagnosed with colorectal cancer ([age-adjusted](#) incidence rate: 47 per 100,000).

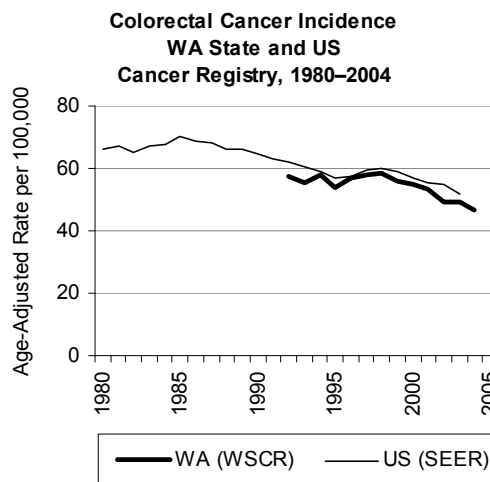
Colorectal cancer is the third leading cause of cancer deaths in Washington for both men and women. In 2005, 942 people died of colorectal cancer (age-adjusted mortality rate: 15 per 100,000).

Regular screening beginning at age 50 can prevent colorectal cancer by detecting and removing pre-cancerous growths before they develop into cancer. Regular screening can also detect colorectal cancer early, when it is most treatable. In Washington, colorectal cancer mortality rates fell by 36% from 1980 to 2005, probably because of improved medical care and more widespread use of effective screening techniques.

## Time Trends

In Washington, colorectal cancer incidence fell about 18% from 1992, the first year incidence data was available in the [Washington State Cancer Registry](#) (WSCR), and 2004. The age-adjusted incidence rate decreased from 57 to 47 cases per 100,000. According to the Surveillance Epidemiology and End Results (SEER) program, the U.S. incidence rate decreased from 1992 to 2003 (the most recent year data are available) by 16%, from 62 to 52 cases per 100,000. The U.S. incidence rate is consistently higher than the Washington rate.

The decline in incidence and mortality might be due to increased screening, which detects early disease. Early screening allows health care providers to detect and remove precancerous lesions or polyps.



## Year 2010 Goals

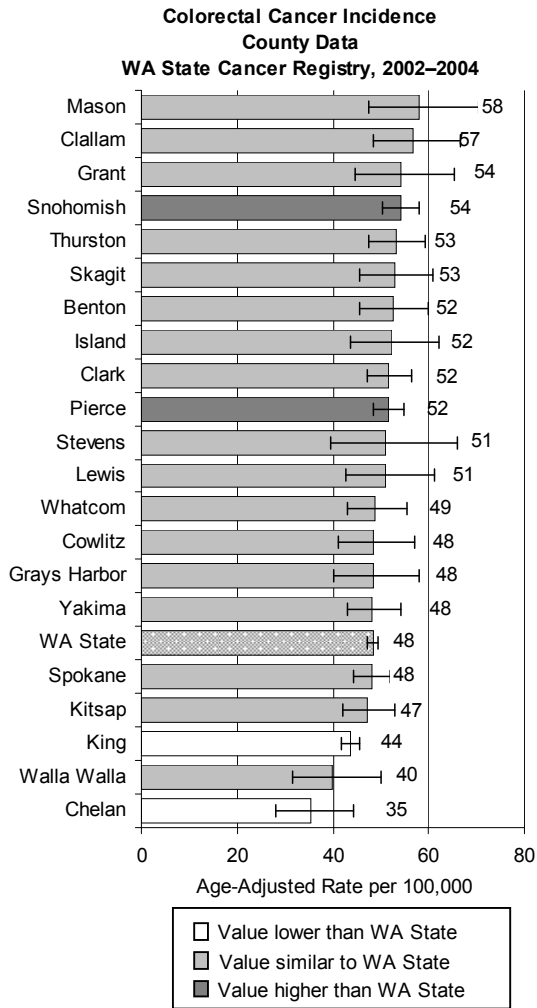
The national *Healthy People 2010, Midcourse Review* goal is to reduce the age-adjusted colorectal cancer mortality rate to 13.7 per 100,000.<sup>1</sup> When calculated in a manner comparable to *Healthy People 2010*, the 2005 mortality rate in Washington is about 15 ( $\pm 1$ ) deaths per 100,000. If the rate continues to decline at the current pace, Washington will meet the 2010 target.

In Washington, the 2006 [Behavioral Risk Factor Surveillance System](#) (BRFSS) data showed that 32% ( $\pm 1\%$ ) of people ages 50 and older received a fecal occult blood test (FOBT) in the two years before the survey. This is close to the national *Healthy People 2010* goal of 33%.

## Geographic Variation

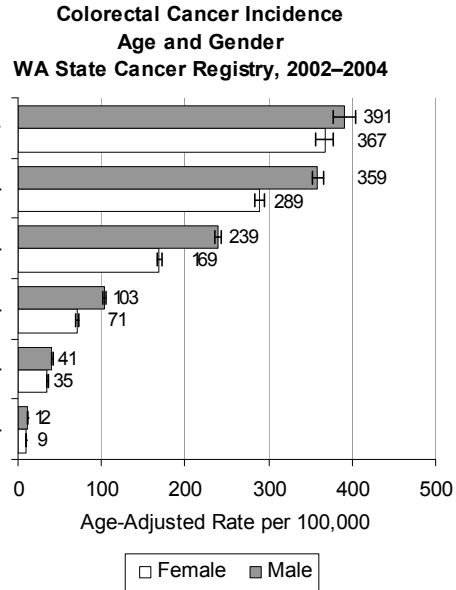
Incidence rates can be highly variable in low population counties. The following chart does not show counties with [fewer than 20](#) residents diagnosed with colorectal cancer in 2002–2004

Snohomish and Pierce counties have significantly higher incidence rates than the state; King and Chelan counties have significantly lower rates.



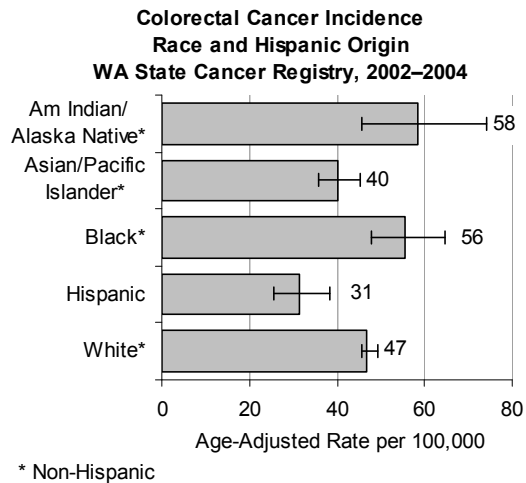
### Age and Gender

Colorectal cancer is rare in people younger than 40. Incidence rates rise sharply after age 55 and increase steadily with age. Although colorectal cancer affects both women and men, incidence rates are consistently higher for men. In 2002–2004 the age-adjusted incidence rate was 43 cases per 100,000 for women and 55 cases per 100,000 for men.



### Race and Hispanic Origin

Colorectal cancer incidence in Washington is lowest in people of Hispanic origin and Asians and Pacific Islanders and highest in blacks and American Indians and Alaska Natives. This pattern is similar to that of the nation for blacks, Asians and Pacific Islanders, and whites. U.S. data for American Indians and Alaska Natives and Hispanics are not comparable to Washington data due to differences in the way race and ethnicity are coded.



\* Non-Hispanic

### Income and Education

There are no direct measures of the relationship between an individual's economic resources and colorectal cancer incidence for Washington. In Washington, however, for 1999–2001 combined, the age-adjusted colorectal cancer incidence rate

increased as the percent of the population in poverty increased and with a decreasing percent of college graduates in the census tract.<sup>2</sup> This finding is consistent with the finding that in Washington in 2004–2006, people with higher levels of education and with higher incomes were more likely to be screened for colorectal cancer than those with relatively lower levels. Colorectal cancer screening can detect pre-cancerous polyps, the removal of which can prevent cancer and hence lower the incidence rate.

## Other Measures of Impact and Burden

**Mortality.** U.S. colorectal cancer age-adjusted mortality rates in 1980–2003 decreased by 32%, from 28 to 19 deaths per 100,000. Similarly, age-adjusted mortality rates in Washington decreased by about 25% in the same period, from 24 to 18 deaths per 100,000.

Colorectal cancer mortality rates in Washington during 2003–2005 appeared to be highest for American Indians and Alaska Natives (29 ±10 per 100,000) and blacks (25 ±6 per 100,000). Blacks, however, had similar rates to American Indians and Alaska Natives and to people of Hispanic origin (17 ±5 per 100,000). American Indians and Alaska Natives and people of Hispanic origin also had similar death rates. Rates were similar for people of Hispanic origin, whites, and Asian and Pacific Islanders (17 ±5, 16 ±1, and 15 ±3 per 100,000, respectively). In 2002–2004, a comparable period for comparing incidence and mortality, the mortality rates for American Indians and Alaska Natives and for blacks were about 64% and 38% higher than the rate for whites, respectively, although the incidence rate for American Indians and Alaska Natives was 25% higher than whites and that for blacks was only about 19% higher. Nationally, the racial and Hispanic origin distribution of colorectal cancer mortality is similar to the distribution in Washington, except that the 2003 national age-adjusted mortality rate for American Indians and Alaska Natives appears lower than that of Washington State (12 vs. 28 per 100,000, respectively).

Survival improves with early diagnosis. From 2002 to 2004, only 36% of colorectal cancers in Washington were diagnosed before spreading beyond the colon or rectum, i.e., at the *in situ* or local stage. If diagnosis occurs at these early stages, national data in 2003 show that more

than 90% of patients are alive five years later. When the disease is diagnosed at the advanced stage of distant metastasis, about 90% of patients die within five years.

**Screening.** Washington BRFSS data show that colorectal cancer screening (defined as reporting either an FOBT in the past year or endoscopy in the past five years) of people ages 50 and older in Washington increased from 49% (±3%) in 1999 to 56% (±1%) in 2004. In 2004, a new question was added to BRFSS that asks whether respondents had a colonoscopy within the past 10 years. Expanding the colorectal cancer screening definition in BRFSS 2004 to include either an FOBT in the past year, a sigmoidoscopy in the past five years, or a colonoscopy in the past 10 years for people ages 50 and older revealed a screening rate of 58% (±2%).

Screening rates were similar among different racial and ethnic groups. People who had health insurance were about twice as likely to have received screening as those who did not. People who had a personal doctor were about three times more likely to have received screening than those who did not, and those who had a health care provider and discussed screening with them were about four times more likely to have received screening than those who did not have that conversation.<sup>3</sup>

## Risk and Protective Factors

Modifiable risk factors for colorectal cancer related to life-style include a diet mostly from animal sources, physical inactivity, obesity, smoking, and excessive alcohol intake.<sup>4</sup> Although current nutrition recommendations for the prevention of colorectal cancer vary widely, there is consensus that maintaining a normal weight, maintaining regular physical activity, eating fruits and vegetables to support general good nutrition, and reducing or eliminating alcohol consumption are probably important behaviors.<sup>5</sup> Certain medical conditions or a family history of some types of medical conditions place people at increased risk for colorectal cancer. Screening for and removal of pre-cancerous polyps clearly reduces a person's risk of getting or dying from colorectal cancer.<sup>6</sup>

**Nutrition.** Research on nutrition and colorectal cancer has yielded inconsistent results. Although older retrospective studies tended to show protective effects of vegetable consumption,<sup>7</sup> more recent, prospective studies have not.<sup>8</sup> Other studies have found an increased risk with diets high in red and processed or well-cooked meat and a decreased risk for diets high in fish consumption.<sup>9</sup>

**Obesity.** Colon cancer occurs more frequently in people who are obese than in those of a healthy weight. The increase might be due to lifestyles associated with increased risk, particularly inactivity and consuming a high-fat diet low in fruits and vegetables. There is evidence that high levels of insulin in obese individuals might promote tumor development.<sup>10</sup>

**Physical activity.** Physical activity is associated with a decreased risk of colon cancer.<sup>11,12</sup> The American Cancer Society recommends at least 30 minutes of moderate to vigorous physical activity, above usual activities, five or more days per week.<sup>13</sup>

**Smoking and alcohol.** Heavy smoking significantly increases the risk of colorectal cancer.<sup>14</sup> A recent study showed that people with a long history of smoking were more likely to develop fatal cancers of the colon and rectum than those who did not have a history of smoking.<sup>15</sup> Alcohol consumption is associated with colorectal cancer, particularly cancers of the rectum. There is evidence that even moderate drinking might be a significant risk factor for colorectal cancer.<sup>11,16</sup>

**Drugs.** Many studies, including randomized controlled trials, have found that non-steroidal anti-inflammatory drugs (NSAIDs), especially aspirin,<sup>17</sup> can reduce the risk of colorectal cancer or prevent the recurrence of colorectal polyps. Because aspirin and other drugs can cause serious side effects, people should seek medical advice before taking aspirin or other drugs to prevent colorectal cancer.

**Hereditary conditions.** Hereditary non-polyposis colorectal carcinoma is a rare inherited condition that increases the risk of colorectal cancer as well as cancer of the uterus, stomach, urinary tract, and other sites. Familial adenomatous polyposis is a rare genetic disorder that causes thousands of polyps to develop in the colon or rectum, increasing the risk of colorectal cancer to nearly 100%.<sup>18</sup> More than 95% of people with colorectal cancer have no genetic predisposition to either condition, however.<sup>19</sup>

**Family history.** People with a first-degree relative (parent, sibling, or child) who had colorectal cancer or adenomatous polyps can have a higher risk for developing the disease.<sup>20</sup> The American Cancer Society recommends that people with a family history of colorectal cancer or polyps begin colorectal cancer

screening at age 40, or 10 years before the youngest case in the immediate family, whichever is earlier.<sup>21</sup>

**Other health conditions.** Certain health conditions increase the risk of colorectal cancer. A history of cancer, especially ovarian, endometrial, or a previous colorectal cancer or pre-cancerous polyp is associated with an increased risk of colorectal cancer. A history of ulcerative colitis or Crohn's disease also increases the risk of colorectal cancer.<sup>22</sup> Many studies indicate that patients with type 2 diabetes have a higher risk of colorectal cancer.<sup>23,24</sup>

**Screening and stage of diagnosis.** Regular screening can prevent colorectal cancer by making it easy to detect and remove precancerous polyps. Regular screening increases the chances of finding cancer early when it is most easily treated. Screening tests include the FOBT, sigmoidoscopy, and colonoscopy. The FOBT or the fecal immunochemical test (FIT) look for hidden blood in the stool. Annual FOBTs in people ages 50 and older reduces mortality by 33%.<sup>25</sup> A sigmoidoscope is a lighted tube that a health care provider inserts into the rectum to see the bottom third of the colon. Sigmoidoscopy every five years reduces mortality by 59% in people older than 50.<sup>26</sup> A colonoscope is a lighted tube that a health care provider inserts into the rectum to see the entire colon. Regular colonoscopic examination may prevent 76% to 90% of cancer.<sup>26</sup> The American Cancer Society recommends that, beginning at age 50, people with average risk and no symptoms should follow one of the following: (1) yearly FOBT or FIT, or (2) flexible sigmoidoscopy every five years, or (3) yearly FOBT or FIT *plus* flexible sigmoidoscopy every five years, or (4) double-contrast barium enema every five years, or (5) colonoscopy every 10 years.<sup>21</sup> The American Cancer Society prefers the third option of a combination of yearly FOBT or FIT *plus* flexible sigmoidoscopy every five years. It also recommends that colonoscopy be done if the FOBT or FIT shows blood in the stool, if sigmoidoscopy results show a polyp, or if double-contrast barium enema studies show anything abnormal. In addition and if possible, polyps should be removed during the colonoscopy.

People should talk to their doctors about starting colorectal cancer screening earlier and/or undergoing screening more often if they have any of the following colorectal cancer risk factors: a personal history of colorectal cancer or adenomatous polyps; a personal history of chronic inflammatory bowel disease; a strong family history of colorectal cancer or polyps (cancer or polyps in a

first-degree relative younger than 60 or in two first-degree relatives of any age); or a known family history of hereditary colorectal cancer syndromes (familial adenomatous polyposis or hereditary nonpolyposis colon cancer).<sup>21</sup>

**Barriers to screening.** In Washington's 2004 BRFSS, 29% to 31% of respondents ages 50 and older who had not received screening reported that their physicians did not recommend it. In the same survey, 3% to 6% of respondents cited cost or lack of insurance as the primary reason for not being screened.<sup>27</sup>

Fear is a significant barrier to colorectal cancer screening although modern technology and procedures have reduced discomfort and unpleasantness.<sup>27</sup>

Physician practices can create barriers to screening as well. Although a physician recommendation significantly increases the likelihood that a patient will receive screening, a survey of primary care physicians in Washington indicated that only about three-fourths recommend at least one colorectal cancer screening test in agreement with American Cancer Society guidelines.<sup>27</sup> Lack of access to health care, whether because of low income, lack of insurance, or lack of primary care provider, also poses barriers to screening.<sup>27</sup>

### **Intervention Strategies**

The Guide to Community Preventive Services recommends several evidence-based strategies to increase screening for colorectal cancer.<sup>28</sup> These include client reminders and facilitating access to screening services. The guide also recommends provider reminders and provider assessment and feedback. Approaches that have successfully increased screening for breast or cervical cancer, such as reduced out-of-pocket expenses and multi-media education campaigns combined with increased access, might increase screening for colorectal cancer as well. Additional research is needed to determine whether these approaches work for increasing colorectal cancer screening.

**See Related Chapters:** [Obesity and Overweight](#), [Nutrition](#), [Physical Activity](#)

### **Data Sources** (For additional detail, see [Appendix B.](#))

Washington State cancer incidence: Washington State Department of Health, Washington State Cancer Registry (WSCR), October 2006

Washington State death certificate data: Washington State Department of Health, Vital Registration System Annual Statistical Files, Deaths 1980–2005, released December 2006

National death data: Surveillance Epidemiology and End Results (SEER)\*Stat Database: Mortality-All Causes of Death (COD), Public-Use With State, Total U.S. (1969–2003), National Cancer Institute, Division of Cancer Control and Population Sciences, Surveillance Research Program, Cancer Statistics Branch, released April 2006. Underlying COD mortality data provided by National Center for Health Statistics

National Incidence Data: SEER\*Stat 6.2, Sept 2006 release, National Cancer Institute, National Institutes of Health

Washington State Behavioral Risk Factor Surveillance System (BRFSS) data: 1987–2006. The data for 2003–2006 were also weighted to reflect the county population estimates from the Washington State Office of Financial Management (OFM). Data release for 2003–2005: November 2006; data release for 2006: June 2007.

U.S. Behavioral Risk Factor Surveillance System Data: 1994–2005, downloaded from [http://www.cdc.gov/brfss/technical\\_infodata/surveydata.htm](http://www.cdc.gov/brfss/technical_infodata/surveydata.htm), August 2006

Washington State Population Counts: U.S. Census provided through Washington State Office of Financial Management (OFM), OFM intercensal and postcensal estimates, Krupski Consulting.

State and county population counts: OFM Forecasting Division, Intercensal and Postcensal Estimates of County Population by Age and Sex: 1980–2005, November 2006

Population Counts by race and census tract: Washington State Department of Health, Vista Partnership, Krupski Consulting; Washington State Population Estimates for Public Health, October 2006

### **For More Information**

Colorectal Cancer, *2002 Health of Washington State*, [http://www.doh.wa.gov/HWS/doc/CD/CD\\_CCN.doc](http://www.doh.wa.gov/HWS/doc/CD/CD_CCN.doc).

Colorectal Cancer Chapter, *The Health of Washington State Supplement 2004*, <http://www.doh.wa.gov/HWS/doc/HWS2004Supp.pdf>

Washington State Cancer Registry  
<http://www3.doh.wa.gov/WSCR/>

National Cancer Institute  
<http://www.nci.nih.gov/>

American Cancer Society  
<http://www.cancer.org>

## Technical Notes

The availability of mortality and incidence data for the U.S. and Washington varies. Incidence and mortality data for the United States are available from 1980–2003. Incidence data for Washington are available from 1992–2004. Washington mortality data are available from 1980–2005.

## Endnotes

- <sup>1</sup> U.S. Centers of Disease Control and Prevention, National Institutes of Health (2003). *Healthy People 2010—Summary of Objectives*, 3-5. Retrieved December 21, 2007 from <http://www.healthypeople.gov/data/midcourse/pdf/fa03.pdf>.
- <sup>2</sup> Washington State Department of Health. (2004). *The Health of Washington State, 2004*. Retrieved April 10, 2007 from <http://www.doh.wa.gov/HWS/default.htm>.
- <sup>3</sup> Hughes, K. (2006). Patterns of Colorectal Cancer Screening Among Men and Women aged 50 and Older in Washington State [unpublished study]. Presented at the Western Regional Epidemiology Network, Ashland, OR, May 2006.
- <sup>4</sup> American Cancer Society. (2007). *A Detailed Guide: Colon and Rectum Cancer: What Are the Risk Factors for Colorectal Cancer?* Retrieved January 24, 2008 from [http://www.cancer.org/docroot/CRI/content/CRI\\_2\\_4\\_2X\\_What\\_are\\_the\\_risk\\_factors\\_for\\_colon\\_and\\_rectum\\_cancer.asp](http://www.cancer.org/docroot/CRI/content/CRI_2_4_2X_What_are_the_risk_factors_for_colon_and_rectum_cancer.asp).
- <sup>5</sup> van den Brandt, P. A., & Goldbohm, R. A. (2006). Nutrition in the prevention of gastrointestinal cancer. *Best Practice & Research. Clinical Gastroenterology*, 20, 589-603.
- <sup>6</sup> American Cancer Society. (2007). *Overview: Colon and Rectum Cancer How Many People Get Colorectal Cancer?* Retrieved January 24, 2008 from [http://www.cancer.org/docroot/CRI/content/CRI\\_2\\_2\\_1X\\_How\\_Many\\_People\\_Get\\_Colorectal\\_Cancer.asp?sitearea=](http://www.cancer.org/docroot/CRI/content/CRI_2_2_1X_How_Many_People_Get_Colorectal_Cancer.asp?sitearea=)
- <sup>7</sup> Steinmetz, K. A., & Potter J. D. (1996). Vegetables, fruit, and cancer prevention: a review. *Journal of the American Dietetic Association*, 96, 1027-1039.
- <sup>8</sup> Voorrips, L. E., Goldbohm, R. A., van Poppel, G., Sturmans, F., Hermus, R. J. J., & van der Brandt, P. A. (2000). Vegetable and fruit consumption and risks of colon and rectal cancer in a prospective cohort study. *American Journal of Epidemiology*, 152, 1081-1092.
- <sup>9</sup> Norat, T., Bingham, S., Ferrari, P., Slimani, N., Jenab, M., Mazuir, M., et al. (2005). Meat, fish, and colorectal cancer risk: the European Prospective Investigation into cancer and nutrition. *The Journal of the National Cancer Institute*, 97, 906-916.
- <sup>10</sup> Larsson, S.C., Orsini, N., & Wolk, A. (2005). Diabetes mellitus and risk of colorectal cancer: a meta-analysis. *Journal of the National Cancer Institute*, 97, 1679-1687.
- <sup>11</sup> Rennert, G. (2007). Prevention and early detection of colorectal cancer—new horizons. *Recent Results in Cancer Research*, 174, 179-187.
- <sup>12</sup> Larsson, S. C., Rutegard, J., Bergkvist, L., & Wolk, A. (2006). Physical activity, obesity, and risk of colon and rectal cancer in a cohort of Swedish men. *European Journal of Cancer*, 42, 2590-2597.

<sup>13</sup> American Cancer Society. (2006). *At a Glance—Nutrition and Physical Activities ACS Recommendations for Nutrition and Physical Activity for Cancer Prevention*. Retrieved January 24, 2008 from [http://www.cancer.org/docroot/PED/content/PED\\_3\\_2X\\_Recommendations.asp](http://www.cancer.org/docroot/PED/content/PED_3_2X_Recommendations.asp).

<sup>14</sup> Giovannucci, E. (2001). An updated review of the epidemiological evidence that cigarette smoking increases risk of colorectal cancer. *Cancer Epidemiology, Biomarkers & Prevention*, 10, 725-731.

<sup>15</sup> Chao, A., Thun, M. J., Jacobs, E. J., Henley, S. J., Rodriguez, C., & Calle, E. E. (2000). Cigarette smoking and colorectal cancer mortality in the cancer prevention study II. *The Journal of the National Cancer Institute*, 92, 1888-1896.

<sup>16</sup> Tanaka, K., Tsuji, I., Wakai, K., Nagata, C., Otani, T., Inoue, M., & Tsugane, S. (2006). Alcohol drinking and colorectal cancer risk: an evaluation based on a systematic review of epidemiologic evidence among the Japanese population. *Japanese Journal of Clinical Oncology*, 36, 582-597.

<sup>17</sup> Bosetti, C., Gallus, S., & La Vecchia, C. (2006). Aspirin and cancer risk: an updated quantitative review to 2005. *Cancer Causes and Control*, 17, 871-888.

<sup>18</sup> Jeter, J. M., Kohlmann, W., & Gruber, S. B. (2006). Genetics of colorectal cancer. *Oncology*, 20, 269-276.

<sup>19</sup> Midgley, R., & Kerr, D. (1999). Colorectal Cancer. *The Lancet*, 353, 391-399.

<sup>20</sup> Ramsey, S. D., Yoon, P., Moonesinghe, R. & Khoury, M. J. (2006). Population-based study of the prevalence of family history of cancer: implications for cancer screening and prevention. *Genetics in Medicine*, 8, 571-575.

<sup>21</sup> American Cancer Society. (n.d.). *Colorectal Cancer: Early Detection*. Retrieved January 24, 2008, from [http://www.cancer.org/docroot/CRI/content/CRI\\_2\\_6X\\_Colorectal\\_Cancer\\_Early\\_Detection\\_10.asp?from=colontesting](http://www.cancer.org/docroot/CRI/content/CRI_2_6X_Colorectal_Cancer_Early_Detection_10.asp?from=colontesting).

<sup>22</sup> von Roon, A. C., Reese, G., Teare, J., Constantinides, V., Darzi, A. W., & Tekkis, P. P. (2007). The Risk of Cancer in Patients with Crohn's Disease. *Diseases of the Colon and Rectum*, 50, 839-855.

<sup>23</sup> Limburg, P. J., Vierkant, R. A., Fredericksen, Z. S., Leibson, C. L., Rizza, R. A., Gupta, A. K., et al. (2006). Clinically confirmed type 2 diabetes mellitus and colorectal cancer risk: a population-based, retrospective cohort study. *The American Journal of Gastroenterology*, 101, 1872-1879.

<sup>24</sup> Giovannucci, E., & Michaud, D. (2007). The Role of Obesity and Related Metabolic Disturbances in Cancers of the Colon, Prostate, and Pancreas. *Gastroenterology*, 132, 2208-2225.

<sup>25</sup> Mandel, J. S., Church, T. R., Bond, J. H., Ederer, F., Geisser, M. S., Mongin, S. J., et al. (2000). The effect of fecal occult-blood screening on the incidence of colorectal cancer. *New England Journal of Medicine*, 343, 1603-1607.

<sup>26</sup> Pignone, M., Rich, M., Teutsch, S. M., Berg, A. O., & Lohr, K. N. (2002). Screening for colorectal cancer in adults at average risk: a summary of the evidence for the U.S. Preventive Services Task Force. *Annals of Internal Medicine*, 137, 132-141.

<sup>27</sup> Hannon, P.A., Martin, D.P., Harris, J.R., & Bowen, D.J. (n.d.). Primary care physicians' colorectal cancer screening recommendations and practices in Washington State. *Cancer Control*, in press.

<sup>28</sup> U.S. Centers for Disease Control and Prevention. (n.d.). *Guide to Community Preventive Services, Cancer*. Last updated January 22, 2007. Retrieved May 9, 2007 from <http://www.thecommunityguide.org/pa/default.htm>.