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Regular Screening, Prompt Treatment Reduce Risk of Colorectal Cancer

Although this typically slow-growing cancer is among the leading causes of cancer death in developed countries, if detected early, it often can be excised before it spreads. In most cases, there is no recurrence of the disease. For pilots, treatment often requires minimal absence from work.

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FSF Editorial Staff

Colorectal cancer (bowel cancer) is the third-leading cause of cancer death in the world's developed countries and one of the most commonly diagnosed cancers among flight crewmembers.[1,2,3]

Colorectal cancer typically grows slowly, and symptoms are not obvious for some time (see "Symptoms of Colorectal Cancer," page 2). Nevertheless, several tests — most notably colonoscopy — can aid in early diagnosis, and with prompt treatment, many cases of colorectal cancer can be cured. Worldwide, 50 percent of people diagnosed with colorectal cancer now survive at least five years,[4] as do 90 percent of those diagnosed at the earliest stage (if other causes of death are not considered).[5] A recurrence of the disease after five years is rare.[6]

Among pilots, data show that colorectal cancer is one of the most prevalent cancers. For example, one study of cancer among professional pilots and air traffic controllers in the United Kingdom showed that nearly 20 percent of cases of cancer among these groups involved colon cancer.[7,8]

Each case requires an individual assessment by aviation medical examiners, but civil aviation authorities typically consider pilots unfit for flight duties during chemotherapy and radiation treatment and during recovery periods after cancer surgery. (Recovery from surgery can take as few as one or two days or as many as several months, depending on the extent of the surgery.)

After treatment and recovery, if the cancer has not spread, pilots often are assessed as fit for flight — sometimes, depending on the severity of their illness and the likelihood of its recurrence, with restrictions or requirements for continuing medical evaluation. If the cancer has spread, the pilot may feel ill and fatigued, and a return to work may not be possible.

The primary risk factor for colorectal cancer is increasing age. More than 90 percent of people diagnosed with the disease are 50 or older; the average age for diagnosis is 64.[9]

Other risk factors include a dietary emphasis on fatty foods, animal protein and refined carbohydrates; low physical

activity; being overweight; use of tobacco; consumption of alcohol; inflammatory bowel disease and other long-lasting inflammatory diseases of the colon, including ulcerative colitis and Crohn's disease; and a personal history or family history of colorectal polyps. In addition, about 5 percent of all cases of colorectal cancer are inherited, primarily as a result of the following genetic syndromes:[10]

- Family adenomatous polyposis (FAP), which causes the growth of hundreds of polyps in the colon, rectum and, in some cases, the upper gastrointestinal tract, the thyroid gland, the small intestine and the brain. People with FAP have about a 90 percent chance of developing colorectal cancer by age 45; and,

- Hereditary nonpolyposis colorectal cancer (HNPCC), which causes the growth of polyps — but not as many polyps as occur in people with FAP. People with HNPCC have an 80 percent chance of developing colorectal cancer by age 75. HNPCC also is associated with cancers of the endometrium (the lining of the uterus), ovaries, stomach, small intestine, liver and brain.

Genetic tests can determine whether an individual has the genetic mutations that are associated with the syndromes but not whether they eventually will develop cancer.

Symptoms of Colorectal Cancer

The following are among the possible symptoms of colorectal cancer:[1]

- Blood in the stool;
- Changes in bowel habits;
- Diarrhea, constipation or a sensation that the bowel has not emptied completely after a bowel movement;
- Stools that are narrower than usual;
- Frequent gas pain, cramps or bloating;
- Unexplained weight loss;
- Fatigue; and,
- Vomiting.♦

— FSF Editorial Staff

Note

1. U.S. National Cancer Institute. *Colon Cancer*. <www.cancer.gov>.

Most Polyps Are Harmless

Colorectal polyps are extra tissues that grow within the colon and rectum (Figure 1, page 3). By age 50, one of every four people has polyps.[11] Most polyps — especially those smaller than a pea — are harmless and cause no symptoms. Nevertheless, because some polyps grow and eventually become malignant (cancerous), physicians remove all polyps and test them to determine whether they contain cancer cells.[12]

When polyps do cause symptoms, those symptoms typically include rectal bleeding; blood in the stool, which can appear black or red;[13] constipation or diarrhea that lasts longer than a week; and pain or an obstruction of the colon that can result in abdominal cramps, nausea or vomiting.[14,15]

There are three types of polyps:

- Adenomatous polyps are most likely to become cancerous, especially if they grow until their diameters are larger than 0.4 inch (10.0 millimeters);

- Hyperplastic polyps typically occur in the descending colon (the left side of the colon) and the rectum and typically are smaller than 0.2 inch (5.0 millimeters) and non-cancerous; and,

- Inflammatory polyps may develop in an individual who has had ulcerative colitis. Inflammatory polyps themselves typically are not cancerous; nevertheless, ulcerative colitis is a risk factor for colorectal cancer.

Polyps can grow anywhere in the large intestine and can develop in many shapes and in sizes as large as a golf ball. Typically, the larger a polyp is, the greater the possibility that it is cancerous.

Tests Detect Colorectal Polyps, Cancer

The same procedures are used to detect and remove colorectal polyps and to screen patients for colorectal cancer.

A *fecal occult blood test* (*FOBT*), often administered at home, requires samples from two or three bowel movements, which are analyzed to detect amounts of blood too small to be visible to the unaided eye. Blood often is released from cancerous colorectal tumors or cancerous polyps.[16]

If blood is found by an FOBT, this does not necessarily mean that the person being tested has colorectal cancer; blood in the stool can result from other medical conditions, including noncancerous polyps, hemorrhoids or inflammation of the bowel, and further tests typically are required to determine the cause. Conversely, because some cancerous tumors do

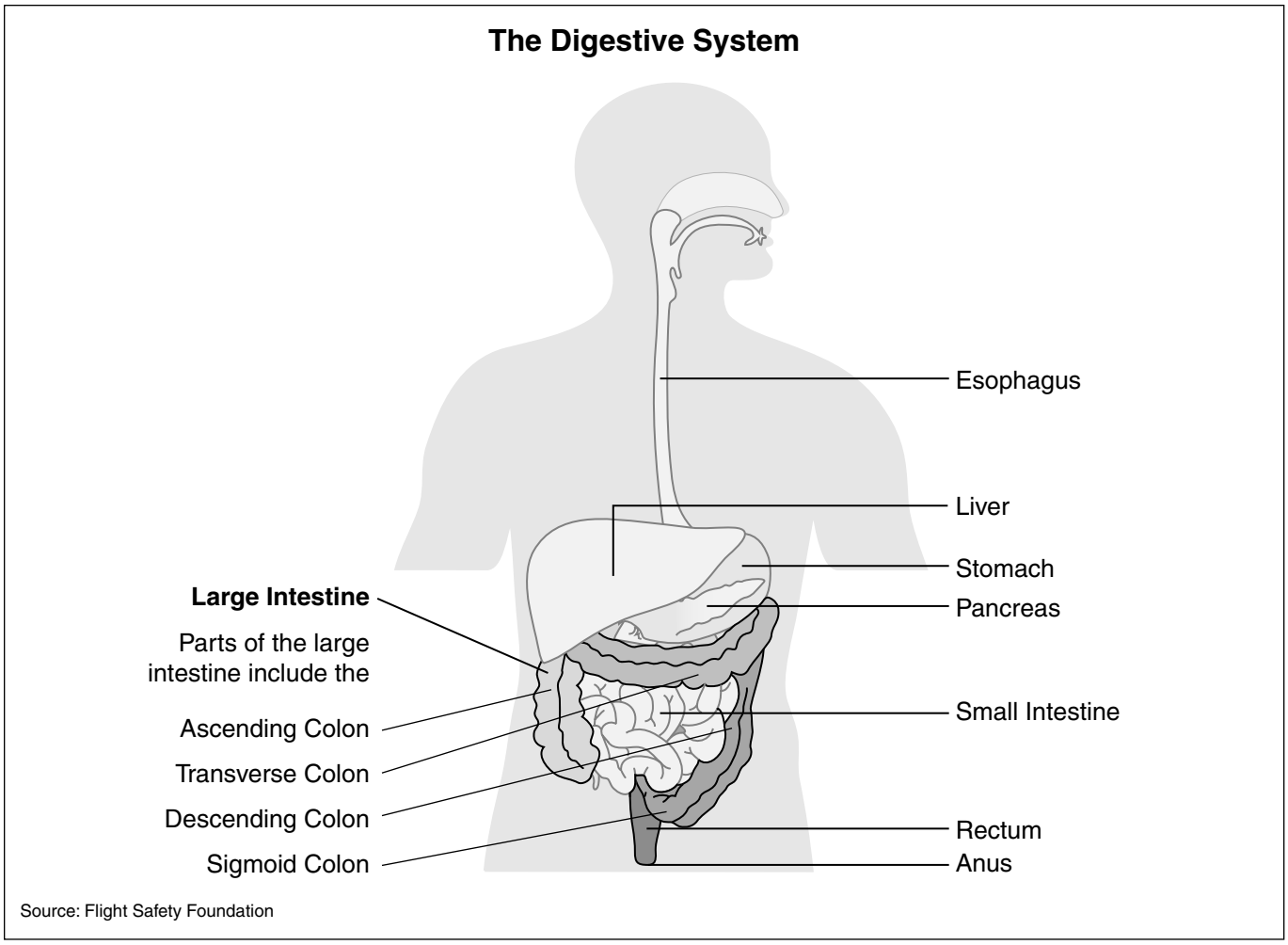

Figure 1

not bleed — or bleed only intermittently — they may not be detected by an FOBT.

Flexible sigmoidoscopy involves a physician's use of a flexible, lighted tube called a sigmoidoscope to inspect the inner walls of the rectum and the lower portion of the colon (descending colon) for bleeding, inflammation, polyps and cancerous growths. The procedure takes 10 minutes to 20 minutes and typically does not require sedation. If polyps or other abnormal tissues are observed, they can be removed using small medical instruments inserted through the sigmoidoscope. Disadvantages of flexible sigmoidoscopy are that the procedure cannot detect polyps or cancer in the upper two-thirds of the colon (the ascending colon and the transverse colon). The procedure itself sometimes (but rarely) causes complications such as bleeding or puncture of the colon.[17,18]

A *double-contrast barium enema* involves a series of X-rays taken after the patient is given an enema that contains barium dye and also an injection of air into the lower portion of the colon. The air causes the colon to expand, making small polyps and other abnormalities easier for medical specialists to see. On X-rays, the barium appears white, outlining the colon and simplifying the detection of polyps and tumors. The procedure takes 20 minutes to 45 minutes, is performed without sedation and may cause minor abdominal cramping, which usually ends soon after the test is finished. If the procedure reveals an abnormality, further procedures — typically a colonoscopy — may be required for a more thorough examination.[19] Disadvantages are that the procedure may not detect small polyps — or small areas of cancer cells.

A *colonoscopy* — the most sensitive test for detecting both cancer and precancerous polyps — is considered the "gold standard" in colon examination. The procedure involves a physician's use of a colonoscope, a flexible, lighted tube longer than a sigmoidoscope and with a small video camera at the tip. The camera transmits images of the colon to an external monitor to allow a physician to inspect the inner walls of the rectum and the entire colon. The procedure, often conducted with the patient under sedation or anesthesia, takes 30 minutes to 60 minutes.

During a colonoscopy, the physician can see areas of inflammation or bleeding, as well as polyps and other growths. Using instruments passed through the colonoscope, the

physician can remove small polyps and/or other small tissues. If bleeding is observed, lasers or other small instruments can be passed through the colonoscope to be used in stopping the bleeding.

As in a flexible sigmoidoscopy, complications of colonoscopy may include bleeding or puncture of the colon; these are rare.[20] Other disadvantages may include the cost; in the United States, for example, a colonoscopy costs US$800 to $1,600, compared with between $150 and $300 for a flexible sigmoidoscopy and between $250 and $500 for a double-contrast barium enema.[21]

A newer screening method, *virtual colonoscopy,* has been developed in recent years, using an X-ray machine linked to a computer to produce two-dimensional images or three-dimensional images of the entire colon.[22] The 10-minute procedure, usually conducted without sedation, involves insertion of a thin tube into the rectum. Air is pumped through the tube to inflate the colon to allow medical specialists to better view the inside of the colon. Images are obtained from the X-ray/computer equipment. If the images reveal polyps, a conventional colonoscopy usually is required for their removal.

The National Institute of Diabetes and Digestive and Kidney Diseases (NIDDKD) at the U.S. National Institutes of Health says that for many people, virtual colonoscopy is more comfortable than conventional colonoscopy because a colonoscope is not used, sedation is not required and patients can resume their usual activities immediately after the procedure. In addition, virtual colonoscopy provides "clearer, more detailed images than a conventional X-ray using a barium enema" and takes less time than either a conventional colonoscopy or barium enema, NIDDKD says.[23]

Disadvantages include the requirement for a conventional colonoscopy if polyps are found or if tissue samples must be obtained. In addition, the images — less detailed than those produced by conventional colonoscopies — may not show polyps smaller than about 0.4 inch in diameter, NIDDKD says.

In a 2003 study, 1,233 adults with no symptoms of colorectal cancer underwent a virtual colonoscopy, followed several hours later by a conventional colonoscopy. A report on the study said that the virtual colonoscopies detected more than 90 percent of the polyps of the type most likely to be cancerous. The virtual colonoscopies also detected two cancerous polyps; traditional colonoscopies detected one of the cancerous polyps, and the second polyp was found after a review of the virtual colonoscopy indicated the polyp's location.[24]

The patient's preparations are similar for virtual colonoscopy, colonoscopy, double-contrast barium enema and flexible sigmoidoscopy. For each type of test, the colon must be emptied of all stool. (The preparation process is less extensive for flexible sigmoidoscopy than for the other tests, however.) The cleansing process is accomplished by complying with a physician's instructions about what to eat or drink before the test and by taking prescribed laxatives and/or a nonprescription enema. Blood thinners and some other medications typically are discontinued several days before a flexible sigmoidoscopy or colonoscopy, according to a physician's instructions.

Medical specialists typically recommend that patients discuss with their physicians several options in colorectal cancer screening: an annual FOBT; a flexible sigmoidoscopy every five years; a double-contrast barium enema every five years; a colonoscopy every 10 years; or a combination of two or more of these tests.[25]

Sometimes, a digital rectal examination (DRE) is performed to check for rectal polyps or to identify the source of rectal bleeding (as well as to detect abnormalities in the prostate gland in men or in the reproductive organs in women). To perform this exam, a physician or other health care professional inserts a lubricated, gloved finger into the rectum to feel for polyps

Guidelines for Preventing Colorectal Cancer

The following are guidelines for preventing colorectal cancer:[1,2]

- Eat a healthy diet, low in fat (especially from animal sources), cholesterol, calories and alcohol, and high in fiber. Some researchers say that deficiencies of calcium, folate (folic acid or vitamin B-9) or vitamin D may contribute to colorectal cancer;
- Maintain an active lifestyle;
- Maintain a healthy weight;
- After age 50, undergo regular screening for colorectal cancer; and,
- Undergo genetic testing if a relative has a form of colorectal cancer caused by genetic mutations or if you are of Ashkenazi Jewish (Eastern European Jewish) descent. Studies have identified a genetic mutation among some Ashkenazi Jews that may make them susceptible to colorectal cancer.♦

— FSF Editorial Staff

Notes

1. Myers, Donna. *Colon Cancer Prevention*. <coloncancer.about.com>.
2. U.S. National Cancer Institute. *Colorectal Cancer*. <www.cancer.gov>.

and other abnormalities. A DRE is not, by itself, an adequate check for colorectal cancer.

Surgery Is Most Common Treatment

When colorectal cancer is diagnosed, medical specialists determine whether the cancer has spread within the colon and rectum or to other parts of the body. This information enables them to determine the "stage" of the disease and to develop a plan for treatment. For example, the least invasive is stage 0 cancer (carcinoma in situ), which is confined to the innermost lining of the colon. The most invasive is stage IV cancer, which has spread to nearby lymph nodes and to other parts of the body.

Surgery is the most common treatment for all stages of colorectal cancer; about 80 percent of colorectal cancer patients undergo surgery, sometimes followed by chemotherapy (the use of drugs to destroy cancer cells and to prevent their further growth).

Several types of surgical procedures are common, including the following:[26]

- Local excision, in which a physician inserts a tube through the rectum into the colon to cut out very-early-stage cancer cells. If the cancer cells are in a polyp and the polyp is removed, the surgical procedure is called a polypectomy;

- Resection, in which a physician performs a type of surgery called a partial colectomy to remove the cancer cells and a small amount of healthy tissue surrounding them. The healthy parts of the colon that remain are then sewn together. During this procedure, the physician usually removes lymph nodes near the colon to examine them for signs of cancer;

- Resection and colostomy, in which the two ends of the colon cannot be sewn back together; instead, a physician makes an opening called a stoma on the outside of the body for waste to pass through. A bag is placed around the opening to collect the waste. In some cases, the colostomy is temporary and is removed after the lower part of the colon has healed; in other cases involving surgical removal of the entire lower colon, the colostomy may be permanent;

- Radiofrequency ablation, in which a physician inserts — through the skin or through an abdominal incision — a probe containing electrodes that kill cancer cells; and,

- Cryosurgery (cryotherapy), in which an instrument is used to freeze and destroy abnormal tissue.

Chemotherapy drugs are administered by mouth or by injection into a vein or muscle (systemic chemotherapy) to reach cancer cells throughout the body, or by injection into the spinal column, an organ or a body cavity (regional chemotherapy) to reach cancer cells in a specific part of the body.

Radiation treatment, which uses X-rays or other forms of radiation to kill cancer cells, rarely is used for colon cancer, although it sometimes is administered to relieve pain; for patients with rectal cancer, use of radiation is common.[27] In external radiation therapy, the radiation is delivered toward the cancer cells by a machine outside the body; in internal radiation, a radioactive substance is placed in needles, seeds or wires inside the body, near the cancer cells. The exact method by which radiation is administered depends on the type of cancer being treated and its stage.[28]

Other types of treatment are being tested, including biologic therapy (biotherapy or immunotherapy), in which substances made by the body or in a laboratory are used to bolster the body's natural defenses against cancer.

To prevent colon cancer, medical specialists recommend a healthy, low-fat diet; regular exercise; and maintaining a healthy weight (see "Guidelines for Preventing Colorectal Cancer," page 4).

In addition, regular screening for colorectal cancer can aid in the detection and removal of polyps before they develop into cancerous tumors.♦

Notes

1. Colorectal cancers include cancer of the colon, defined by the U.S. National Cancer Institute as approximately the first six feet (two meters) of the large intestine, and cancer of the rectum (back passage), defined as the last several inches of the large intestine, ending at the anus.

2. United Nations World Health Organization (WHO). *Global Cancer Rates Could Increase by 50 Percent to 15 Million by 2020.* <www.who.int>. About 940,000 new cases of colorectal cancer are diagnosed worldwide each year. About 1.2 million new cases of lung cancer — the most common cancer in the world — and about 1 million new cases of breast cancer are diagnosed annually.

3. Janvrin, Simon. "Malignant Disease." Chapter 28 in *Aviation Medicine, Third Edition* (John Ernsting, Anthony N. Nicholson and David J. Rainford, editors). Oxford, England: Butterworth Heinemann, 1999.

4. WHO.

5. Australian Bureau of Statistics. *Health: Colorectal Cancer.* <www.abs.gov.au>.

6. Janvrin.

7. Ibid.

8. Irvine, David; Davies, D. Michael. "British Airways Flightdeck Mortality Study, 1950-1992." *Aviation, Space, and Environmental Medicine* Volume 70 (June 1999): 548–555.

9. Myers, Donna. *About: Fifteen Causes of Colorectal Cancer.* <http://coloncancer.about.com>.

10. Mayo Clinic. *Genetic Testing for Colon and Rectal Cancer.* <www.mayoclinic.com>.

11. Myers.

12. U.S. National Digestive Diseases Information Clearinghouse (NDDIC). *What I Need to Know About Colon Polyps*. <digestive.niddk.nih.gov>.

13. Mayo Clinic. *Do You Need Testing?* <www.mayoclinic.com>. Some foods, including beets and red licorice, can make stools appear red. Iron supplements and some anti-diarrheal medications can cause black stools.

14. NDDIC.

15. Mayo Clinic. *Colon Polyps*. <www.mayoclinic.com>.

16. Australian Government Department of Health and Ageing. *Faecal Occult Blood Test (FOBT*). <www.cancerscreening.gov.au>.

17. NDDIC. *Flexible Sigmoidoscopy*. <digestive.niddk.nih.gov>.

18. Mayo Clinic. *Flexible Sigmoidoscopy: Screening for Colon and Rectal Problems*. <www.mayoclinic.com>.

19. Mayo Clinic. *Barium Enema: Viewing the Colon for Abnormalities.* <www.mayoclinic.com>.

20. Mayo Clinic. *Colonoscopy: Detecting Colon and Rectal Abnormalities.* <www.mayoclinic.com>.

21. U.S. Centers for Disease Control and Prevention (CDC). *Screen for Life: National Colorectal Cancer Action Campaign — Facts on Screening*. <www.cdc.gov>.

22. A virtual colonoscopy is performed either with computed tomography (a CAT scan) or with magnetic resonance imaging (MRI).

23. NDDIC. *Virtual Colonoscopy*. <www.digestive.niddk.nih.gov>.

24. Pickhardt, Perry J. et al. "Computed Tomographic Virtual Colonoscopy to Screen for Colorectal Neoplasia in Asymptomatic Adults." *The New England Journal of Medicine* Volume 349 (Dec. 4, 2003): 2191–2200.

25. American Cancer Society. *Colon Cancer Fact Sheet*. <www.cancer.org>.

26. National Cancer Institute. *Colon Cancer (PDQ) Treatment*. <www.cancer.gov>.

27. Cancer Research U.K. *Cancers at a Glance*. <cancerresearchuk.org>.

28. National Cancer Institute. *Cancer Treatment (PDQ*). <www.cancer.gov>.

Further Reading From FSF Publications

FSF Editorial Staff. "Aviation Medical Examinations May Not Be Adequate to Ensure All-around Good Health." *Human Factors & Aviation Medicine* Volume 49 (May–June 2002).

FSF Editorial Staff. "Longer Life Expectancies Mean More People Live With — and Manage the Effects of — Chronic Diseases." *Human Factors & Aviation Medicine* Volume 47 (November–December 2000).

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