

Current approaches to smoking cessation recognize smoking as an addiction (**Chap. 470**). The smoker who is quitting goes through identifiable stages that include contemplation of quitting, an action phase in which the smoker quits, and a maintenance phase. Smokers who quit completely are more likely to be successful than those who gradually reduce the number of cigarettes smoked or change to lower- or lower-nicotine cigarettes. More than 90% of the Americans who have successfully quit smoking did so on their own, without participation in an organized cessation program, but cessation programs are helpful for some smokers. The Community Intervention Trial for Smoking Cessation (COMMIT) was a 4-year program showing that light smokers (<25 cigarettes per day) were more likely to benefit from simple cessation messages and cessation programs than those who did not receive an intervention. Quit rates were 30.6% in the intervention group and 27.5% in the control group. The COMMIT interventions were unsuccessful in heavy smokers (<25 cigarettes per day). Heavy smokers may need an intensive broad-based cessation program that includes counseling, behavioral strategies, and pharmacologic adjuncts, such as nicotine replacement (gum, patches, sprays, lozenges, and inhalers), bupropion, and/or varenicline.

The health risks of cigars are similar to those of cigarettes. Smoking one or two cigars daily doubles the risk for oral and esophageal cancers; smoking three or four cigars daily increases the risk of oral cancers more than eightfold and esophageal cancer fourfold. The risks of occasional use are unknown.

Smokeless tobacco also represents a substantial health risk. Chewing tobacco is a carcinogen linked to dental caries, gingivitis, oral leukoplakia, and oral cancer. The systemic effects of smokeless tobacco (including snuff) may increase risks for other cancers. Esophageal cancer is linked to carcinogens in tobacco dissolved in saliva and swallowed. The net effects of e-cigarettes on health are poorly studied. Whether they aid in smoking cessation or serve as a “gateway” for nonsmoking children to acquire a smoking habit is debated.

PHYSICAL ACTIVITY

Physical activity is associated with a decreased risk of colon and breast cancer. A variety of mechanisms have been proposed. However, such studies are prone to confounding factors such as recall bias, association of exercise with other health-related practices, and effects of preclinical cancers on exercise habits (reverse causality).

DIET MODIFICATION

International epidemiologic studies suggest that diets high in fat are associated with increased risk for cancers of the breast, colon, prostate, and endometrium. These cancers have their highest incidence and mortalities in Western cultures, where fat composes an average of one-third of the total calories consumed.

Despite correlations, dietary fat has not been proven to cause cancer. Case-control and cohort epidemiologic studies give conflicting results. In addition, diet is a highly complex exposure to many nutrients and chemicals. Low-fat diets are associated with many dietary changes beyond simple subtraction of fat. Other lifestyle changes are also associated with adherence to a low-fat diet.

In observational studies, dietary fiber is associated with a reduced risk of colonic polyps and invasive cancer of the colon. However, cancer-protective effects of increasing fiber and lowering dietary fat have not been proven in the context of a prospective clinical trial. The putative protective mechanisms are complex and speculative. Fiber binds oxidized bile acids and generates soluble fiber products, such as butyrate, that may have differentiating properties. Fiber does not increase bowel transit times. Two large prospective cohort studies of >100,000 health professionals showed no association between fruit and vegetable intake and risk of cancer.

The Polyp Prevention Trial randomly assigned 2000 elderly persons, who had polyps removed, to a low-fat, high-fiber diet versus routine diet for 4 years. No differences were noted in polyp formation.

The U.S. National Institutes of Health Women’s Health Initiative, launched in 1994, was a long-term clinical trial enrolling >100,000 women age 45–69 years. It placed women in 22 intervention groups.

Participants received calcium/vitamin D supplementation; hormone replacement therapy; and counseling to increase exercise, eat a low-fat diet with increased consumption of fruits, vegetables, and fiber, and cease smoking. The study showed that although dietary fat intake was lower in the diet intervention group, invasive breast cancers were not reduced over an 8-year follow-up period compared to the control group. No reduction was seen in the incidence of colorectal cancer in the dietary intervention arm. The difference in dietary fat averaged ~10% between the two groups. Evidence does not currently establish the anticarcinogenic value of vitamin, mineral, or nutritional supplements in amounts greater than those provided by a balanced diet.

ENERGY BALANCE

Risk of cancer appears to increase as body mass index increases beyond 25 kg/m². Obesity is associated with increased risk for cancers of the colon, breast (female postmenopausal), endometrium, kidney (renal cell), and esophagus, although causality has not been established.

In observational studies, relative risks of colon cancer are increased in obesity by 1.5–2 for men and 1.2–1.5 for women. Obese postmenopausal women have a 30–50% increased relative risk of breast cancer. An unproven hypothesis for the association is that adipose tissue serves as a depot for aromatase that facilitates estrogen production.

SUN AVOIDANCE

Nonmelanoma skin cancers (basal cell and squamous cell) are induced by cumulative exposure to ultraviolet (UV) radiation. Intermittent acute sun exposure and sun damage have been linked to melanoma, but the evidence is inconsistent. Sunburns, especially in childhood and adolescence, may be associated with an increased risk of melanoma in adulthood. Reduction of sun exposure through use of protective clothing and changing patterns of outdoor activities can reduce skin cancer risk. Sunscreens decrease the risk of actinic keratoses, the precursor to squamous cell skin cancer, but melanoma risk may not be reduced. Sunscreens prevent burning, but they may encourage more prolonged exposure to the sun and may not filter out wavelengths of energy that cause melanoma.

Educational interventions to help individuals assess their risk of developing skin cancer have some impact. In particular, appearance-focused behavioral interventions in young women can decrease indoor tanning use and other UV exposures. Self-examination for skin pigment characteristics associated with skin cancer, such as freckling, may be useful in identifying people at high risk. Those who recognize themselves as being at risk tend to be more compliant with sun-avoidance recommendations. Risk factors for melanoma include a propensity to sunburn, a large number of benign melanocytic nevi, and atypical nevi.

CANCER CHEMOPREVENTION

Chemoprevention involves the use of specific natural or synthetic chemical agents to reverse, suppress, or prevent carcinogenesis before the development of invasive malignancy.

Cancer develops through an accumulation of tissue abnormalities associated with genetic and epigenetic changes, and growth regulatory pathways that are potential points of intervention to prevent cancer. The initial changes are termed *initiation*. The alteration can be inherited or acquired through the action of physical, infectious, or chemical carcinogens. Like most human diseases, cancer arises from an interaction between genetics and environmental exposures (**Table 100-1**). Influences that cause the initiated cell and its surrounding tissue microenvironment to progress through the carcinogenic process and change phenotypically are termed *promoters*. Promoters include hormones such as androgens, linked to prostate cancer, and estrogen, linked to breast and endometrial cancer. The distinction between an initiator and promoter is indistinct; some components of cigarette smoke are “complete carcinogens,” acting as both initiators and promoters. Cancer can be prevented or controlled through interference with the factors that cause cancer initiation, promotion, or progression. Compounds of interest in chemoprevention often have antimutagenic, hormone modulation, anti-inflammatory, antiproliferative, or proapoptotic activity (or a combination).