Cancer and Physical Activity

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What is known about the relationship between physical activity and cancer risk?
There is substantial evidence that higher levels of physical activity are linked to lower risks of several cancers [2]

Colon Cancer
Colon cancer is one of the most extensively studied cancers in relation to physical activity [3]. A 2009 meta-analysis of 52 epidemiologic studies that examined the association between physical activity and colon cancer risk found that the most physically active individuals had a 24% lower risk of colon cancer than those who were the least physically active [4]. A pooled analysis of data on leisure-time physical activity (activities done at an individual's discretion generally to improve or maintain fitness or health) from 12 prospective U.S. and European cohort studies reported a risk reduction of 16%, when comparing individuals who were most active to those where least active [5]. Incidence of both distal colon and proximal colon cancers is lower in people who are more physically active than in those who are less physically active [6, 7]. Physical activity is also associated with a decreased risk of colon adenomas (polyps), a type of colon polyp that may develop into colon cancer [8]. However, it is less clear whether physical activity is associated with lower risks that polyps that have been removed will come back [9-11].

Breast Cancer
Many studies show that physically active women have a lower risk of breast cancer than inactive women; in a 2013 meta-analysis of 31 prospective studies, the average breast cancer risk reduction associated with physical activity was 12% [12]. Physical activity has been associated with a reduced risk of breast cancer in both premenopausal and postmenopausal women; however, the evidence for an association is stronger for postmenopausal breast cancer [12-15]. Women who increase their physical activity after menopause may also have a lower risk of breast cancer than women who do not [13, 15].

Endometrial Cancer
Many studies have examined the relationship between physical activity and the risk of endometrial cancer (cancer of the lining of the uterus). In a meta-analysis of 33 studies, the average endometrial cancer risk reduction associated with high versus low physical activity was 20% [16]. There is some evidence that the association between physical activity and endometrial cancer risk may reflect the effect of physical activity on obesity, a known risk factor for endometrial cancer [16-18].

For a number of other cancers, there is more limited evidence of a relationship with physical activity. In a study of over 1 million individuals, leisure-time physical activity was linked to reduced risks of esophageal adenocarcinoma, liver cancer, gastric cardiac cancer (a type of stomach cancer), kidney cancer, myeloid leukemia, myeloma, and cancers of the head and neck, rectum, and bladder [5]. These results are generally corroborated by large cohort studies [19] or meta-analyses [20-22].

Nearly all of the evidence linking physical activity to cancer risk comes from observational studies, in which individuals report on their physical activity and are followed for years for diagnoses of cancer. Data from observational studies can give researchers clues about the relationship between physical activity and cancer risk, but such studies cannot definitively establish that being physically active causes cancer (or that being physically active protects against cancer). That is because people who are not physically active may differ from active people in ways other than their level of physical activity. These other differences, rather than the differences in physical activity, could explain their different cancer risk. For example, if someone does not feel well, they may not exercise much, and sometimes people do not feel well because they have undiagnosed cancer.

How might physical activity be linked to reduced risks of cancer?

Exercise has a number of biological effects on the body, some of which have been proposed to explain associations with specific cancers, including:

1. Lowering the levels of hormones, such as insulin and estrogen, and of certain growth factors that have been associated with cancer development and progression [23] [breast, colon]
2. Helping to prevent obesity and decreasing the harmful effects of obesity, particularly the development of insulin resistance (failure of the body's cells to respond to insulin)
3. Reducing inflammation
4. Improving immune system function
5. Altering the metabolism of bile acids, resulting in decreased exposure of the gastrointestinal tract to these suspected carcinogens [24, 25] [colon]
6. Reducing the amount of time it takes for food to travel through the digestive system, which decreases gastrointestinal tract exposure to possible carcinogens [colon]
Is being sedentary linked to health risks?
Yes. Sedentary behavior, such as prolonged periods of television viewing, sitting, and lying down, is a risk factor for developing chronic conditions, including cancer, cardiovascular disease, and type 2 diabetes, and for premature death [26, 27]. In some studies, the association of sedentary behavior with these outcomes is independent of physical activity—that is, the increased risks of disease associated with being sedentary are not lessened by physical activity. However, in one large meta-analysis [28] an increase in cancer mortality was seen only in those sedentary people with the least physical activity.

How much physical activity is recommended for general health benefits?
The U.S. Department of Health and Human Services 2008 Physical Activity Guidelines for Americans recommends that, for substantial health benefits, adults engage in at least 150 minutes (2 hours and 30 minutes) of moderate-intensity aerobic physical activity, 75 minutes (1 hour and 15 minutes) of vigorous-intensity aerobic physical activity, or an equivalent combination of moderate- and vigorous-intensity activity, every week. Aerobic physical activity should be performed in episodes of at least 10 minutes, preferably spread throughout the week. Examples of moderate-intensity and vigorous-intensity physical activities can be found on CDC’s Physical Activity website.
For children and adolescents, the guidelines recommend at least 60 minutes (1 hour) of physical activity daily. Most of the 60 or more minutes a day should be either moderate- or vigorous-intensity aerobic physical activity, and should include vigorous-intensity physical activity at least 3 days a week. As part of their 60 or more minutes of daily physical activity, children and adolescents should include muscle-strengthening physical activity on at least 3 days of the week and bone-strengthening physical activity on at least 3 days of the week.

Is physical activity beneficial for cancer survivors?
Research indicates that physical activity may have beneficial effects for several aspects of cancer survivorship—specifically, weight gain, quality of life cancer recurrence or progression, and prognosis (likelihood of survival) [29, 30]. Most of the evidence for the potential benefits of physical activity in cancer survivors comes from people diagnosed with breast, prostate, or colorectal cancer [26].

Weight gain.
Both reduced physical activity and the side effects of cancer treatment can contribute to weight gain after a cancer diagnosis. In a cohort study (a type of epidemiologic study), weight gain after breast cancer diagnosis was linked to worse survival [31]. In a 2012 meta-analysis of randomized controlled clinical trials examining physical activity in cancer survivors, physical activity was found to reduce both body mass index and body weight [32].

Quality of life.
A 2012 Cochrane Collaboration systematic review of controlled clinical trials of exercise interventions in cancer survivors indicated that physical activity may have beneficial effects on overall health-related quality of life and on specific quality-of-life issues, including body image/self-esteem, emotional well-being, sexuality, sleep disturbance, social functioning, anxiety, fatigue, and pain [33]. In a 2012 meta-analysis of randomized controlled trials examining physical activity in cancer survivors, physical activity was found to reduce fatigue and depression and to improve physical functioning, social functioning, and mental health [32].

Recurrence, progression, and survival.
Being physically active after a cancer diagnosis is linked to better cancer-specific outcomes for several cancer types [34].

Breast cancer
Consistent evidence from epidemiologic studies links physical activity after diagnosis with better breast cancer outcomes [35, 36]. For example, a large cohort study found that women who exercised moderately (the equivalent of walking 3 to 5 hours per week at an average pace) after a breast cancer diagnosis had approximately 40% to 50% lower risks of breast cancer recurrence, death from breast cancer, and death from any cause compared with more sedentary women [37]. The potential physical activity benefit with regard to death from breast cancer was most apparent in women with hormone receptor–positive tumors [37].

Another prospective cohort study found that women who had breast cancer and who engaged in recreational physical activity roughly equivalent to walking at an average pace of 2 to 2.9 mph for 1 hour per week had a 35% to 49% lower risk of death from breast cancer compared with women who engaged in less physical activity [38].

Colorectal cancer
Evidence from multiple epidemiologic studies suggests that physical activity after a colorectal cancer diagnosis is associated with reduced risks of dying from colorectal cancer [39]. In a large prospective cohort of patients with colorectal cancer, those who engaged in leisure-time physical activity had a 31% lower risk of death than those who did not, independent of their leisure-time physical activity before diagnosis [40].

Prostate cancer: Limited evidence from a few epidemiologic studies has suggested a possible link between physical activity and better outcomes among men diagnosed with prostate cancer. In one study, men with nonmetastatic prostate cancer who engaged in vigorous activity for at least 3 hours per week had a 61% lower risk of death from prostate cancer compared with men who engaged in vigorous activity for less than 1 hour per week [41]. Another study of men with localized prostate cancer found that higher levels of physical activity were associated with reduced overall and prostate cancer-specific mortality [42]. Findings from epidemiologic studies cannot completely exclude reverse causation as a possible explanation of the link between physical activity and better cancer outcomes. That is, people who feel good are more likely to exercise and be physically active than people who do not feel good.

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