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Article

ARTICLE

The Role of Physical Activity in Oncology Care

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A growing body of evidence suggests that physical activity provides a panoply of health benefits for cancer survivors. Observational studies suggest that engaging in regular physical activity after a cancer diagnosis may be associated with a lower risk of cancer recurrence and cancer-specific mortality. Interventional trials demonstrate that physical activity reduces symptoms in cancer survivors and improves quality of life. Translational research also suggests that physical activity may influence biologic pathways linked to cancer risk and outcomes. This accumulation of evidence has led various organizations to recommend regular physical activity for individuals diagnosed with cancer. This commentary provides an overview of the evidence supporting the efficacy of physical activity to improve patient-reported outcomes during and after cancer therapy, discusses observational studies that have correlated physical activity with cancer prognosis, describes randomized trials of physical activity that have examined biomarkers hypothesized to influence cancer prognosis, and reviews guidelines for physical activity among cancer survivors.

Benefits of Physical Activity Interventions in Cancer Survivors

Physical activity interventions improve quality of life and other patient-reported outcomes during and after cancer therapy. A Cochrane review of 56 randomized controlled trials that included 4068 cancer survivors (1) demonstrated that physical activity led to a significant reduction in cancer-related fatigue compared with usual care (standardized mean difference [SMD] = −0.27, $P < .001$). Another Cochrane review of 40 randomized controlled trials that included 3694 cancer survivors (2) demonstrated that physical activity improved overall health-related quality of life (SMD = 0.48, $P < .001$) and physical functioning (SMD = 0.36, $P < .001$), and reduced anxiety (SMD = −0.26, $P = .006$) and depressive symptoms (SMD = −0.41, $P < .001$). Reviews also suggest that physical activity interventions lead to improvements in cardiopulmonary fitness, muscular strength, and body composition (3–5).

Physical Activity and Cancer Outcomes

Physical activity after a diagnosis of cancer is associated with a lower risk of cancer recurrence and cancer-specific mortality in survivors of several common cancers. Two reviews of more than two dozen observational cohort studies including 35 522 cancer survivors concluded that postdiagnosis physical activity was associated with a lower risk of mortality in breast, colorectal, and prostate cancers (6,7). Among breast cancer survivors, physical activity was associated with a 32% and 38% lower risk of cancer recurrence and breast cancer–specific mortality, respectively. In colorectal cancer survivors, physical activity was associated with a 40% reduction in recurrence and a 38% reduction in colorectal cancer–specific mortality, and in prostate cancer survivors, physical activity was associated with a 23% lower risk of progression and 38% lower risk of prostate cancer–specific mortality. However, the observations from these studies warrant a conservative interpretation as they are not randomized comparisons and causality cannot be assumed.

Biologic Mechanisms Through Which Physical Activity Could Impact Cancer

Physical activity is associated with favorable alterations in physiologic biomarkers that are associated with cancer risk and outcomes. For example, elevated insulin concentrations (hyperinsulinemia) at the time of cancer diagnosis have been correlated with a worsened prognosis in a number of cancers, including breast and colon. Studies in patients with and without cancer suggest that physical activity lowers insulin concentrations, leading to the hypothesis that these biomarkers may mediate the relationship between physical activity and cancer recurrence and survival (6). Understanding the mechanisms that underpin the relationship between physical activity and cancer outcomes is useful to provide novel insight to cancer biology. Commonly targeted physiologic biomarkers include insulin, insulin-related growth factors and binding proteins, inflammation, and immune function pathways. Dysregulation

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of these biomarkers may create a host environment capable of promoting malignant cell growth and progression, thereby increasing the risk of disease recurrence and mortality in a variety of cancers. Future research is necessary to empirically validate surrogate biomarker measures of cancer prognosis.

Physical Activity Guidelines

The American College of Sports Medicine, American Cancer Society, and National Comprehensive Cancer Network advise cancer survivors to engage in 150 minutes per week of moderate-intensity aerobic activity or 75 minutes per week of vigorous-intensity aerobic activity and complete two to three weekly sessions of muscle strengthening, complemented by flexibility activities (3–5). Recommendations also advise that patients avoid inactivity and return to exercise as quickly as possible after surgery and other intensive treatments. Of note, much of the research in physical activity and cancer survivorship to date has been collected in North American, European, and Australian populations. Considerably less evidence documenting the benefits of physical activity exist for South American, Asian, and African populations. It is recognized that the efficacy and effectiveness of physical activity interventions are maximized when tailored to the cultural, geographic, social, and economic environments in which they are utilized (8). A framework to guide the design, tailoring, and population-based scaling of physical activity interventions has been developed that can guide future research efforts related to physical activity in understudied populations of cancer survivors around the globe (9).

Impact of Physical Activity Interventions on Cancer Prognosis

Data from observational studies and small randomized trials with biomarker end points have prompted the development of international phase III clinical trials testing the impact of physical activity interventions on cancer recurrence and mortality. The Colon Health and Life-Long Exercise Change (CHALLENGE) trial (NCT00819208) will randomly assign 962 high-risk stage II and stage III colon cancer survivors to a 36-month physical activity intervention or health education materials to determine the impact of the intervention on colorectal cancer–free survival. The Intense Exercise for Survival among Men with Metastatic Castrate-Resistant Prostate Cancer (INTERVAL) trial (NCT02730338) will randomly assign 866 men with advanced prostate cancer to a vigorous-intensity aerobic and muscle strengthening program or psychosocial support to determine the impact of physical activity on overall survival. These trials will provide guidance regarding the role of physical activity as a complementary modality to conventional oncology care.

Collectively, these data suggest that physical activity is uniquely positioned as an integrative oncology modality that may improve both the quality and duration of life after cancer diagnosis. Additional research documenting the health benefits that physical activity provides to cancer survivors across diverse cultural, geographic, social, and economic environments will help to establish and solidify the importance of this treatment modality in contemporary oncology care around the globe.

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