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Abstract

A major objective of the emerging field of exercise-oncology research is to determine the efficacy of, and biological mechanisms by which, aerobic exercise affects cancer incidence, progression, and/or metastasis. There is a strong inverse association between self-reported exercise and the primary incidence of several forms of cancer; similarly, emerging data suggest that exercise exposure after a cancer diagnosis may improve outcomes for early-stage breast, colorectal, or prostate cancer. Arguably, critical next steps in the development of exercise as a candidate treatment in cancer control require preclinical studies to validate the biological efficacy of exercise, identify the optimal "dose", and pinpoint mechanisms of action. To evaluate the current evidence base, we conducted a critical systematic review of in vivo studies investigating the effects of exercise in cancer prevention and progression. Studies were evaluated on the basis of tumor outcomes (e.g., incidence, growth, latency, metastasis), dose-response, and mechanisms of action, when available. A total of 53 studies were identified and evaluated on tumor incidence (n = 24), tumor growth (n = 33), or metastasis (n = 10). We report that the current evidence base is plagued by considerable methodologic heterogeneity in all aspects of study design, endpoints, and efficacy. Such heterogeneity precludes meaningful comparisons and conclusions at present. To this end, we provide a framework of methodologic and data reporting standards to strengthen the field to guide the conduct of high-quality studies required to inform translational, mechanism-driven clinical trials.

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