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Exercise in Cardio-oncology, evidence and perspective

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Cancer treatments, including chemotherapy and radiation, stand out as highly potent agents that have significantly improved oncologic outcomes. Nevertheless, the administration of these cancer treatments can trigger detrimental effects on cardiac health and function, a phenomenon referred to as cardiotoxicity. This term encapsulates a sequence of cardiovascular challenges compounded by lifestyle-related risk factors. Consequently, the likelihood of both immediate and enduring impairment of cardiac function, as well as the onset of cardiovascular ailments, escalates, potentially culminating in premature mortality following successful cancer recovery. Hence, addressing the issue of cancer therapy-induced heart toxicity represents a pressing and unmet requirement within the clinical domain. Exercise therapy, as a non-pharmacological intervention, stimulates a range of biochemical and physiological adaptations. These adaptations encompass heart-protective benefits achieved through the enhancement of the cardiovascular system and cardiac musculature. As a result, exercise has emerged as a viable clinical strategy with the potential to shield against, or even reverse, the cardiac toxicity arising from cancer treatment, a concept termed "exercise cardio-oncology." Current scientific evidence suggests that exercise cardio-oncology interventions may serve as effective non-pharmacological approaches to protect against or reverse cardiotoxicities. Preclinical studies support the benefits of exercise through various biological mechanisms of chemotherapy, in conjunction with the physiological effects of exercise, ranging from cellular signaling in cardiac cells to systemic adaptations in the cardiovascular system, while the mechanisms of action in clinical studies need to be elucidated. Furthermore, several clinical studies have concentrated on the effects of exercise throughout treatment trajectories. Collectively, these studies support the utilization of exercise as a feasible and safe modality that can prevent treatment-induced alterations in cardiorespiratory fitness, biomarkers associated with cardiac damage, and cardiac function. However, further large-scale, multi-center studies with long-term follow-ups are required to provide comprehensive evidence considering different exercise modalities, timings, intensities, implementations, and dissemination strategies, especially for more vulnerable and understudied subgroups of cancer survivors before, during, and after cancer treatment.