

Exercise as Medicine in Cancer Care: A 2024–2025 Evidence-Informed Perspective



Over the past decade, and accelerating rapidly through 2024–2025, exercise has emerged as one of the **most consistently supported supportive therapies in oncology**. While physical activity does not replace surgery, chemotherapy, radiation, immunotherapy, or targeted agents, it is increasingly regarded as a **biologically active intervention** - one that favorably influences cancer risk, treatment tolerance, symptom burden, functional recovery, and long-term survival.

In this context, exercise is no longer viewed as optional wellness advice. It is best understood as **adjunctive medicine**, capable of modifying disease trajectories and improving both short - and long-term outcomes when appropriately prescribed and supervised.

Cancer Prevention and Risk Reduction

Large population-based studies published through 2024 and 2025 continue to demonstrate a **dose-responsive relationship between physical activity and reduced cancer incidence**, including breast, colorectal, endometrial, prostate, lung, and bladder cancers. Notably, recent accelerometer-based data confirm that **even light-intensity**

activity - such as walking - confers measurable protection, challenging earlier assumptions that only vigorous exercise is beneficial.

Mechanistically, exercise influences cancer risk through multiple pathways:

- Improved insulin sensitivity and glycemic control
- Reduction in chronic systemic inflammation
- Favorable modulation of sex hormones and adipokines
- Enhanced immune surveillance
- Improved body composition and visceral fat reduction

These effects are particularly relevant in obesity-associated malignancies, where physical inactivity and metabolic dysfunction significantly elevate risk.

Improved Treatment Tolerance and Completion

Cancer treatments often result in fatigue, muscle wasting, neuropathy, cardiotoxicity, and diminished functional capacity. Evidence from recent randomized trials and pragmatic clinical studies shows that **structured aerobic and resistance exercise during treatment** can mitigate these effects.

Patients who engage in supervised exercise programs demonstrate:

- Reduced severity of cancer-related fatigue
- Preservation of physical function and strength
- Improved treatment tolerance
- Fewer interruptions or dose reductions in therapy

Maintaining treatment intensity is clinically meaningful, as treatment completion is strongly associated with improved oncologic outcomes.

Immune and Inflammatory Modulation

Exercise exerts **immune-regulating effects** that are increasingly relevant in modern oncology, particularly in the era of immunotherapy. Regular physical activity improves circulation of immune cells, enhances natural killer cell activity, and reduces pro-tumor inflammatory signaling.

Emerging 2024–2025 data suggest that exercise may create a more favorable immune environment by:

- Enhancing immune cell trafficking
- Reducing chronic inflammation
- Supporting immune system resilience during treatment

While research is ongoing, these findings reinforce exercise as a supportive strategy that works *with* the immune system rather than taxing it.

Cardiovascular Protection in Cancer Survivors

Cardiovascular disease remains a leading cause of morbidity and mortality among cancer survivors, often surpassing cancer itself. Many cancer treatments increase cardiovascular risk through direct cardiotoxicity, metabolic disruption, or accelerated vascular aging.

Exercise is one of the most effective tools available to:

- Preserve cardiorespiratory fitness
- Improve endothelial function
- Reduce treatment-related cardiovascular risk markers
- Support long-term heart health

Oncology-specific exercise interventions are now recognized as a key component of **cardio-oncology prevention strategies**.

Muscle Preservation, Bone Health, and Physical Function

Cancer-related sarcopenia and treatment-induced muscle loss are strongly associated with poorer outcomes, increased fall risk, and reduced independence. Resistance and functional training are particularly effective in counteracting these effects.

Benefits include:

- Preservation of lean muscle mass
- Improved strength and balance
- Reduced fall and fracture risk

- Maintenance of independence and daily function

Weight-bearing exercise also plays a critical role in preserving bone mineral density, especially for individuals receiving hormone-depleting therapies or corticosteroids.

Psychological and Cognitive Health

Cancer affects far more than the body. Anxiety, depression, cognitive changes, and fear of recurrence are common and often under-treated. Exercise consistently demonstrates **moderate to large effects** on mental well-being.

Regular physical activity:

- Reduces anxiety and depressive symptoms
- Improves sleep quality
- Enhances cognitive function
- Restores confidence and sense of control

These benefits are not secondary - they are central to quality survivorship care.

Exercise and Long-Term Survival

One of the most significant developments in recent years is the growing body of evidence linking **post-diagnosis physical activity with improved cancer-specific and overall survival**. Updated analyses through 2025 show meaningful reductions in recurrence and mortality for several cancers, particularly breast, colorectal, and prostate cancer.

Importantly, survival benefits are observed with **moderate, sustainable activity levels**, reinforcing that exercise medicine is accessible and scalable when appropriately supported.

Clinical Implementation and Safety

Exercise must be **individualized**, particularly in oncology populations where treatment status, comorbidities, and symptom burden vary widely. Screening, monitoring, and progression should be guided by professionals with oncology-specific training.

Referral to an oncology-trained specialist - such as a **CETI OncoVie™ Cancer Exercise Specialist** through the Cancer Exercise Training Institute - ensures that exercise prescriptions are safe, evidence-based, and aligned with current clinical standards.

When properly implemented, exercise is not merely safe - it is **therapeutic**.

Pros & Cons: Exercise as Medicine in Cancer Care

Pros	Cons / Considerations
Improves treatment tolerance	Requires individualization and screening
Reduces fatigue and deconditioning	Not a substitute for medical treatment
Enhances immune and cardiovascular health	Access to trained specialists may vary
Preserves muscle and bone	Requires adherence and consistency
Improves quality of life and mental health	Needs modification during acute complications
Associated with improved survival	Must be supervised in high-risk cases



Exercise is no longer a supportive “extra” in oncology - it is **foundational medicine**. The 2024-2025 evidence base clearly supports integrating structured, supervised exercise across prevention, treatment, and survivorship. When prescribed with the same rigor as other therapies, exercise improves outcomes, preserves dignity, and enhances life during and after cancer.

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