



CANADIAN CANCER
SURVIVOR NETWORK

The 5Ws of Exercise and Cancer

Dr. Daniel Santa Mina RKin CSEP-CEP PhD

Professor | University of Toronto // Director | UHN Surgical
Prehabilitation Program // Co-Founder | PrehabRx



Roles & Disclosures

- Professor, University of Toronto, Faculty of Kinesiology and Physical Education
- Clinician Investigator, Toronto General Hospital Research Institute
- Director, Research and Programming, Surgical Prehabilitation Program, UHN
- Research Lead, GoodHope Exercise and Rehabilitation (GEAR) Program, EDS Clinic, UHN
- Co-Founder | CEO, PrehabRx

After this talk, I hope you will be able to...

01

Why

Understand why exercise is important and the various benefits it can provide for people with cancer

02

Who

Know WHO can safely exercise after a cancer diagnosis

03

When

Know WHEN it is appropriate to exercise and WHEN it's appropriate to seek additional support

04

What

Know the guidelines for what exercises are recommended for people with cancer

05

Where

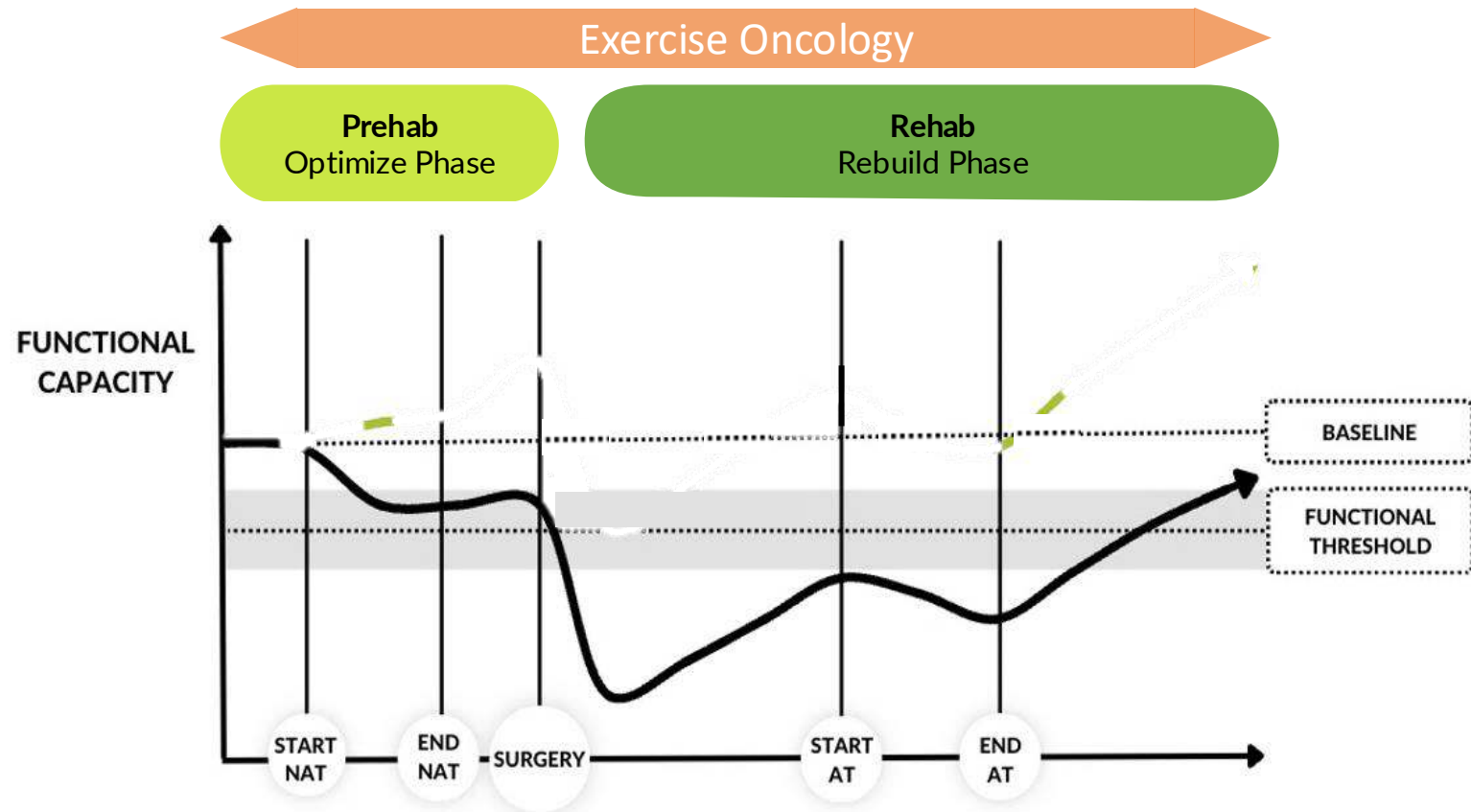
Be aware of programs that are designed to help people with cancer exercise safely

WHY should people with
cancer exercise?



Exercise Oncology

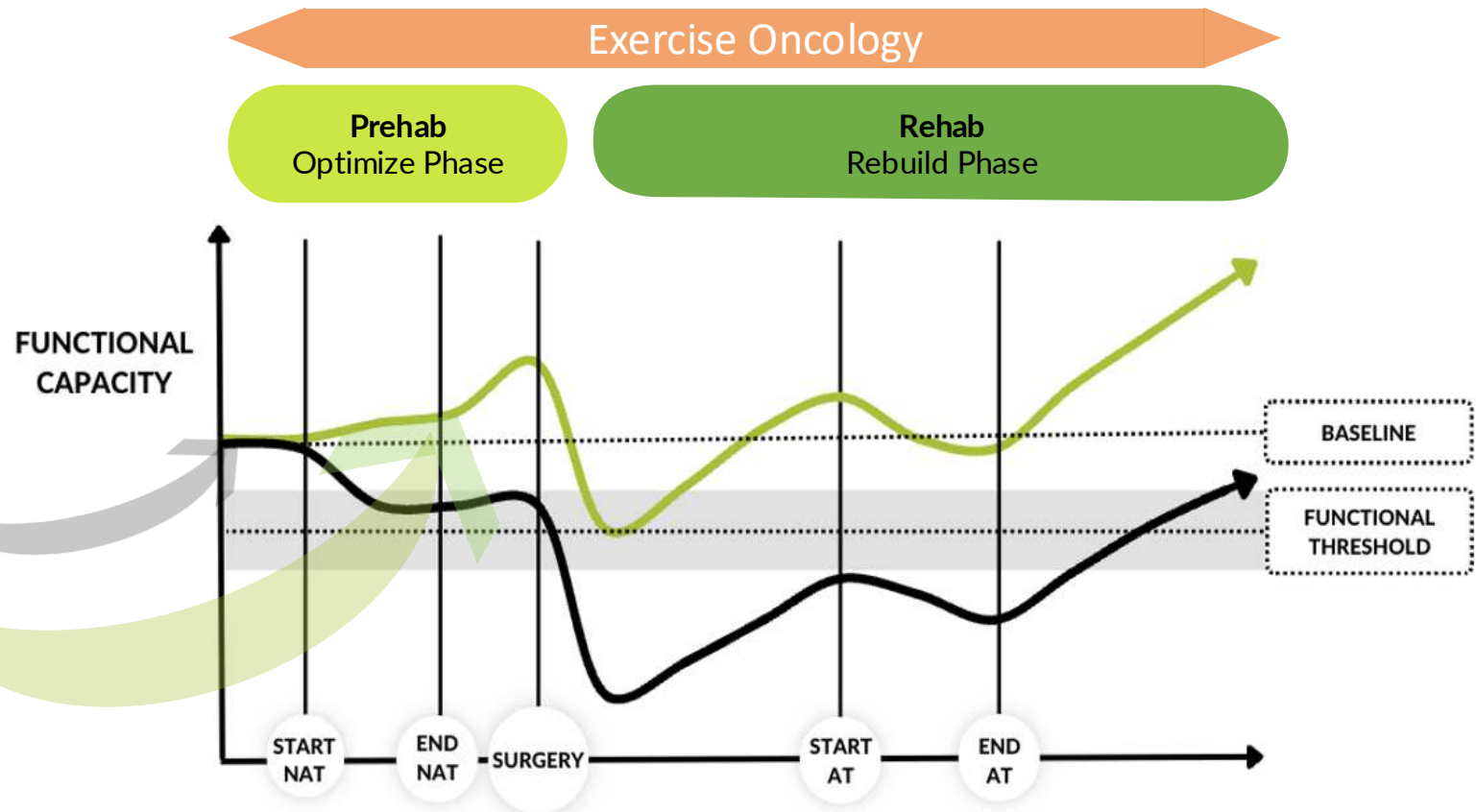
Exercise oncology is the field that studies and applies structured physical activity and exercise interventions as part of cancer prevention, treatment, and survivorship, with the goal of improving health outcomes, managing side effects, and enhancing quality of life for people with cancer



Exercise Oncology

Exercise oncology is the field that studies and applies structured physical activity and exercise interventions as part of cancer prevention, treatment, and survivorship, with the goal of improving health outcomes, managing side effects, and enhancing quality of life for people with cancer

Ultimately, we're trying to keep patients *off of this line* and put them *onto this line*



ORIGINAL ARTICLE

Structured Exercise after Adjuvant Chemotherapy for Colon Cancer

Kerry S. Courneya, Ph.D.,¹ Janette L. Vardy, M.D., Ph.D.,^{2,3} Christopher J. O'Callaghan, D.V.M., Ph.D.,⁴ Sharlene Gill, M.D.,⁵ Christine M. Friedenreich, Ph.D.,^{6,7} Rebecca K.S. Wong, M.B., Ch.B.,⁸ Haryana M. Dhillon, Ph.D.,⁹ Victoria Coyle, M.B., B.Ch., Ph.D.,¹⁰ Neil S. Chua, M.D.,¹¹ Derek J. Jonker, M.D.,¹² Philip J. Beale, Ph.D.,¹³ Kamal Haider, M.D.,¹⁴ Patricia A. Tang, M.D.,¹⁵ Tony Bonaventura, M.D.,¹⁶ Ralph Wong, M.D.,¹⁷ Howard J. Lim, M.D., Ph.D.,^{5,18} Matthew E. Burge, M.B., B.S.,^{19,20} Stacey Hubay, M.D.,²¹ Michael Sanatani, M.D.,²² Kristin L. Campbell, Ph.D.,^{18,23} Fernanda Z. Arthuso, Ph.D.,¹ Jane Turner, M.Phil.,³ Ralph M. Meyer, M.D.,²⁴ Michael Brundage, M.D.,²⁵ Patti O'Brien, M.Sc.,⁴ Dongsheng Tu, Ph.D.,⁴ and Christopher M. Booth, M.D.,²⁵ for the CHALLENGE Investigators*

ABSTRACT

BACKGROUND

Preclinical and observational studies suggest that exercise may improve cancer outcomes. However, definitive level 1 evidence is lacking.

METHODS

In this phase 3, randomized trial conducted at 55 centers, we assigned patients with resected colon cancer who had completed adjuvant chemotherapy to participate in a structured exercise program (exercise group) or to receive health-education materials alone (health-education group) over a 3-year period. The primary end point was disease-free survival.

RESULTS

From 2009 through 2024, a total of 889 patients underwent randomization to the exercise group (445 patients) or the health-education group (444 patients). At a median follow-up of 7.9 years, disease-free survival was significantly longer in the exercise group than in the health-education group (hazard ratio for disease recurrence, new primary cancer, or death, 0.72; 95% confidence interval [CI], 0.55 to 0.94; $P=0.02$). The 5-year disease-free survival was 80.3% in the exercise group and 73.9% in the health-education group (difference, 6.4 percentage points; 95% CI, 0.6 to 12.2). Results support longer overall survival in the exercise group than in the health-education group (hazard ratio for death, 0.63; 95% CI, 0.43 to 0.94). The 8-year overall survival was 90.3% in the exercise group and 83.2% in the health-education group (difference, 7.1 percentage points; 95% CI, 1.8 to 12.3). Musculoskeletal adverse events occurred more often in the exercise group than in the health-education group (in 18.5% vs. 11.5% of patients).

CONCLUSIONS

A 3-year structured exercise program initiated soon after adjuvant chemotherapy for colon cancer resulted in significantly longer disease-free survival and findings consistent with longer overall survival. (Funded by the Canadian Cancer Society and others; CHALLENGE ClinicalTrials.gov number, NCT00819208.)

Author affiliations are listed at the end of the article. Dr. Courneya can be contacted at kerry.courneya@ualberta.ca or at the Faculty of Kinesiology, Sport, and Recreation, College of Health Sciences, University of Alberta, Edmonton, AB, Canada T6G 2H9. Dr. Booth can be contacted at booth@queensu.ca or at the Department of Oncology, Queen's University, Kingston, ON, Canada K7L 3N6.

*A complete list of the CHALLENGE investigators is provided in the Supplementary Appendix, available at [NEJM.org](https://www.nejm.org).

This article was published on June 1, 2025, at [NEJM.org](https://www.nejm.org).

DOI: 10.1056/NEJMoa2502760
Copyright © 2025 Massachusetts Medical Society.

Exercise Oncology is Having a *Moment*

THE GLOBE AND MAIL
International clinical trial
exercise improves survival
cancer patients
KRISTY KIRKPATRICK • HEALTH REPORTER
PUBLISHED JUNE 1, 2025



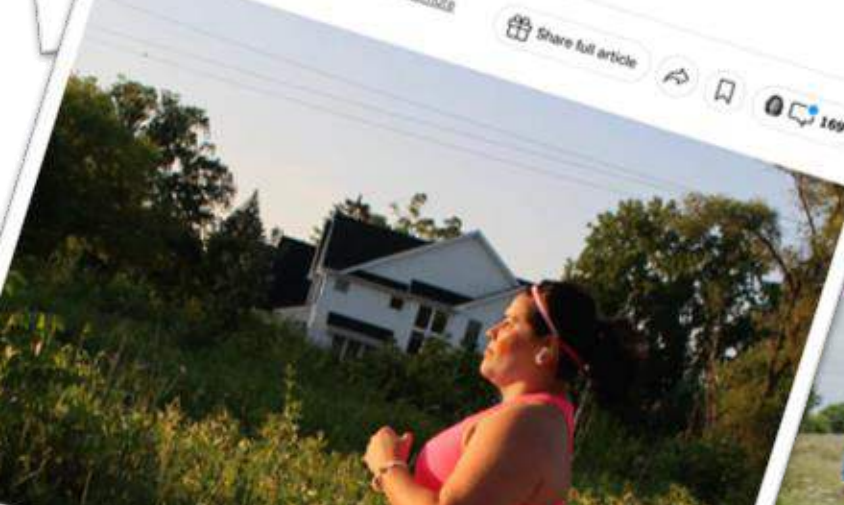
The ASCO Post
Structured Exercise Program Improves Survival Outcomes in Patients With Stage III or High-Risk Stage II Colon Cancer
By Jo Casella
June 11, 2025
Get Permission

A 3-year structured exercise program initiated soon after completion of adjuvant chemotherapy improved disease-free survival, as well as patient-reported physical functioning and health-related fitness, in patients with stage III or high-risk stage II colon cancer. These findings from the phase III CHALLENGE trial, conducted by Christopher M. Booth, MD, Director of Division of Cancer Care and Epidemiology at Queen's Cancer Research Institute, Kingston, Ontario, Canada, and colleagues, are presented at an estate press briefing at the 2025 ASCO Annual Meeting.

According to the World Health Organization, colorectal cancer is the third most common cancer worldwide, accounting for about 10% of all cancers, and is the second leading cause of cancer-related deaths globally. This year, it is estimated that 154,270 new cases of colorectal cancer will be diagnosed in the United States and that nearly 53,000 individuals will die of the disease.

The New York Times
Exercise Extends Life for People With Cancer, Study Shows
The trial, in people treated for colon cancer, showed clear evidence that an exercise program lowered the risk of disease recurrence and death.

Listen to this article - 6:41 min [Listen](#)
Share full article
169



Structured Exercise Program Improves Survival Outcomes in Patients With Stage III or High-Risk Stage II Colon Cancer
A new study shows benefits of physical activity for colon cancer survivors



BBC
Exercise improves colon cancer survival, major study shows
2 June 2025
James Gallagher Health and science correspondent



An exercise programme for colon cancer patients is the focus of a major international trial. The researchers said it was 'not just about swimming to calve class'.

sky news
Exercise may benefit colon cancer patients as much as some drugs, study finds
The large trial has been hailed as an 'exciting breakthrough' that could 'transform' medical practice. But its recommendations may not be adopted.
Victoria Sedgwick
Clinical reporter @BBCNewsHealth
13 minutes 2 June 2025 12:42:18



QW Health Life. But Better
HAPPENING NOW
White House holds press briefing on Day
HEALTH • FITNESS • 3-MIN READ
The link between exercise and cancer survival
JUL 1, 2025
By Kaitia Hether



Study shows benefits of physical activity for colon cancer survivors
A new study called the CO2 trial showed that a structured exercise program improved survival outcomes in patients with stage III or high-risk stage II colon cancer after colon cancer treatment.
Author: Dr Panagiotis Mitrakakis
Published: 30 June 2025

ICYMI

In a nutshell:

- BIG HIGH-QUALITY STUDY
- Colon cancer who completed adjuvant chemo
- 3-yr structured exercise program vs. education
- People who exercised
 - lived longer
 - Had better physical function

So, what's the big deal with CHALLENGE?

**First Level 1 Evidence
Showing Survival
Benefit from Exercise
in People with Cancer**

**\$600-\$1000
per patient per year**

Putting CO.21 Effect Size on Context

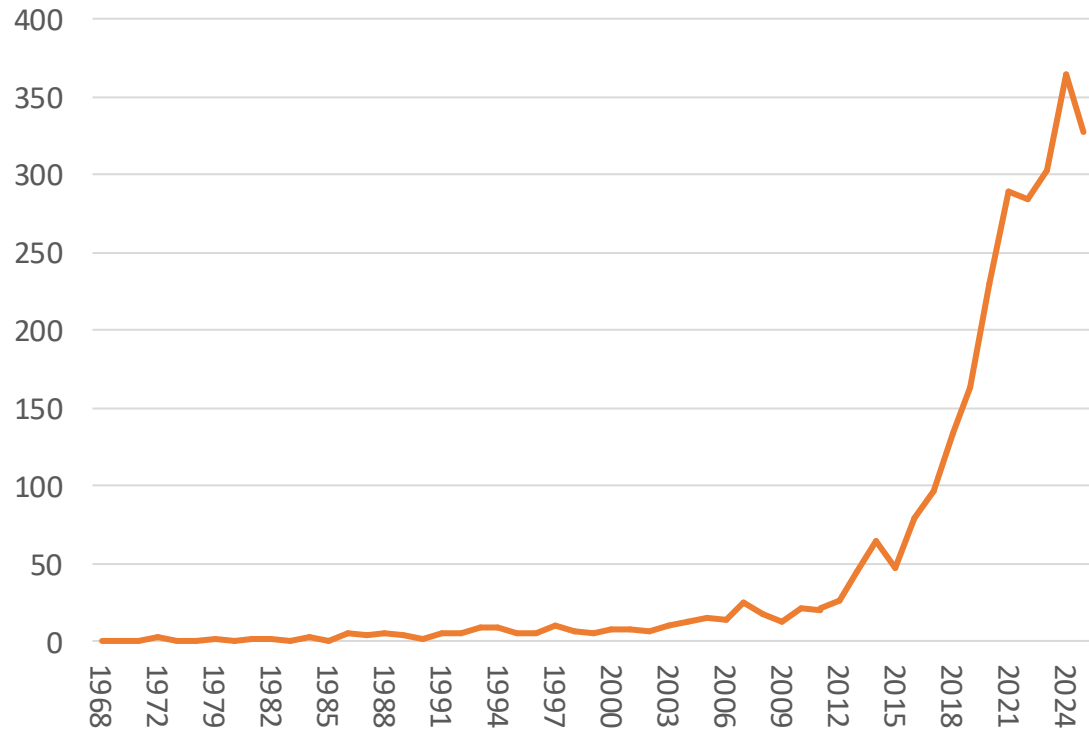
Intervention	Disease	Absolute OS Gain
Adjuvant Exercise	Colon	7% at 8 years
Adjuvant Oxaliplatin	Colon	5% at 10 years
Adjuvant Osimertinib	NSCLC	8% at 5 years
Consolidation Durvalumab	NSCLC	10% at 5 years
Adjuvant Trastuzumab	Breast	5% at 5 years
Peri-op Pembrolizumab	TNBC	5% at 5 years
Adjuvant Pertuzumab	Breast	1.8% at 10 years

Canadian Cancer
Trials Group  Groupe canadien
des essais sur le cancer

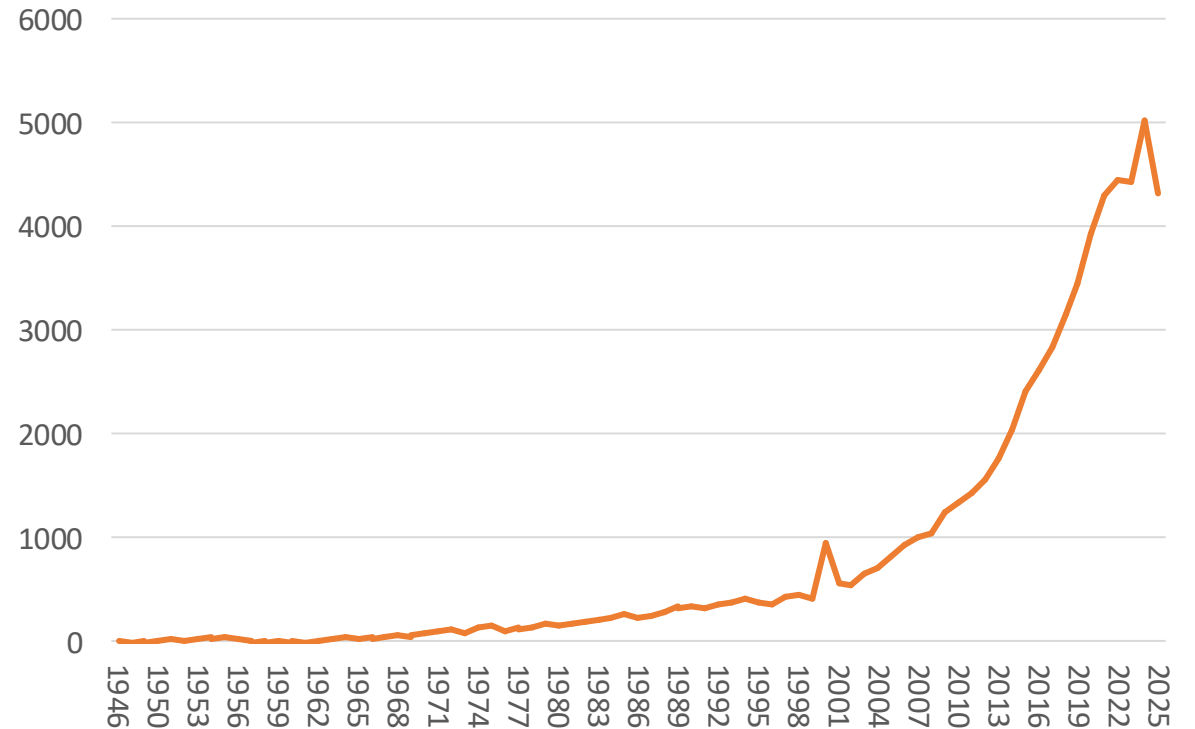
Presented at ASCO 2025

The exercise oncology evidence (prehab and rehab) has decades of supporting evidence

of Studies Per Year on Prehabilitation & Cancer



of Studies Per Year on Exercise and Rehab & Cancer



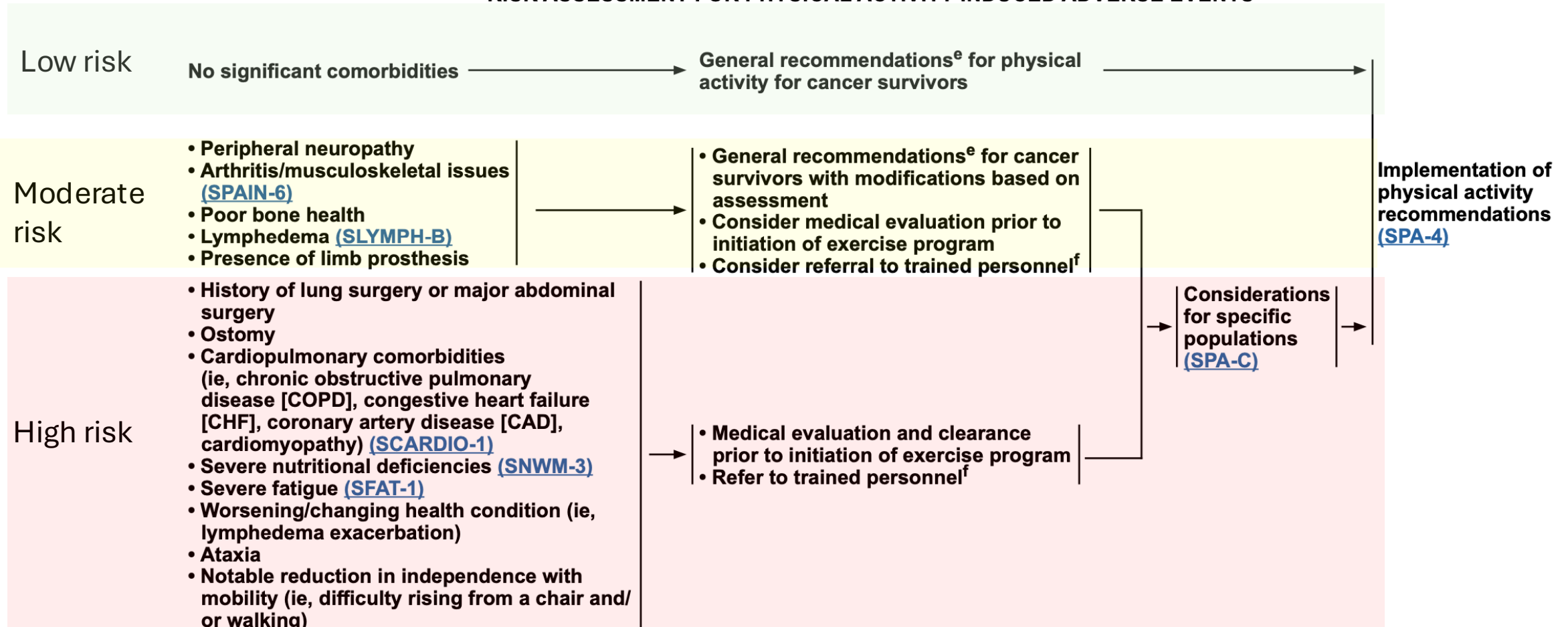
Beyond survival, the benefits of exercise for people are vast and continue to expand...

- Pain
- Fatigue
- Aerobic capacity
- physical strength
- Range of motion
- Cardiotoxicity protection
- Lymphedema
- Bone Loss
- Mood disorders including depression and anxiety
- Shorter length of stay
- Fewer treatment complications
- Work productivity
- Social functioning
- Metabolic syndrome risk
- Second malignancies
- Recurrence of primary malignancy
- Body image concerns
- Sexual Dysfunction
- Cognitive dysfunction
- Social isolation
- Better work productivity

A photograph of a doctor and a patient in a clinical setting. The doctor, on the left, is wearing a white lab coat over a black top and has a stethoscope around her neck. She is holding a clipboard and looking towards the patient. The patient, on the right, is wearing a black tank top and is looking back at the doctor. The background shows a typical medical office with white walls and some equipment.

Among people with cancer,
WHO can and should
exercise?

RISK ASSESSMENT FOR PHYSICAL ACTIVITY-INDUCED ADVERSE EVENTS



^e [General Principles of Physical Activity \(SPA-1\)](#).

^f Trained personnel can include physical and occupational therapists, certified exercise professionals, and rehabilitation specialists. Specialized training in working with survivors is available for both physical therapists and exercise professionals: ACSM [<http://www.acsm.org/get-stay-certified>] and American Physical Therapy Association [APTA] Oncology section [<http://oncologypt.org>].


Almost everyone with cancer can exercise.

There are some circumstances that increase risk of exercise which should be addressed by a healthcare professional.

Although rare, there may be instances when exercise not advised.

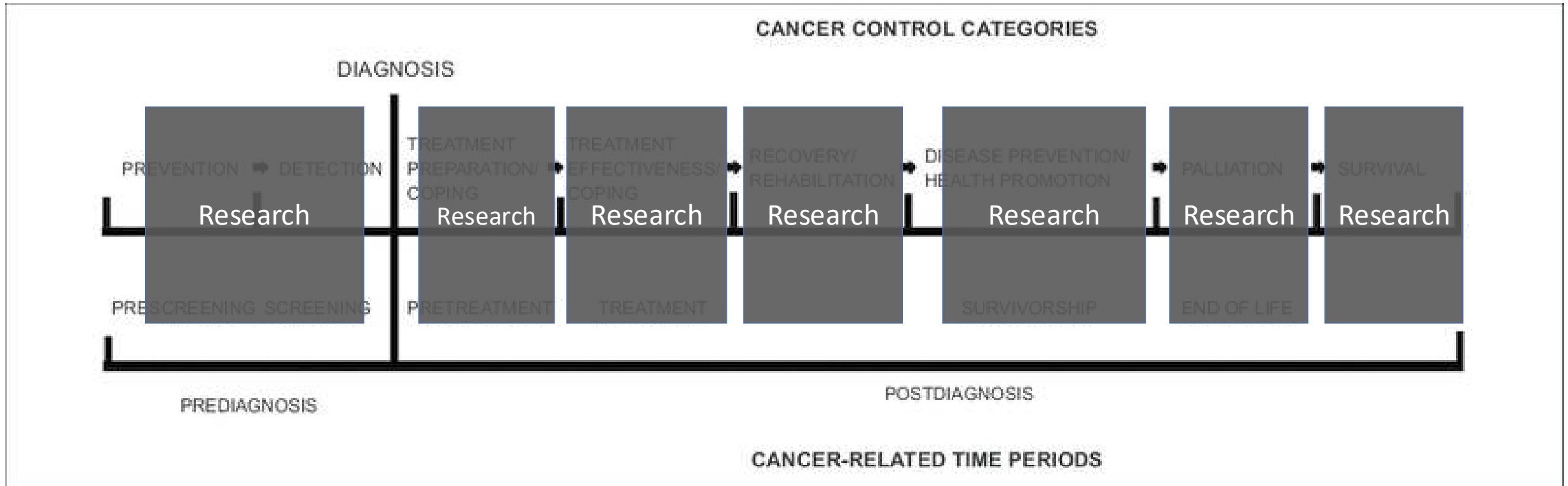
Talking with your healthcare team is the best place to start if you're concerned about exercise.



A photograph of four women of diverse ages and ethnicities laughing joyfully outdoors. They are all holding rolled-up purple yoga mats. The woman on the far left is blonde and wearing a light green tank top. The woman next to her has short grey hair and is wearing a black tank top. The woman next to her has dark hair in a ponytail and is wearing a grey tank top. The woman on the far right has curly brown hair and is wearing a pink tank top. The background shows green foliage and a clear sky. The text 'WHEN can people with cancer exercise?' is overlaid in white on the image.

WHEN can people with
cancer exercise?

Exercise Evidence Spans the Cancer Continuum





Relative to active treatments

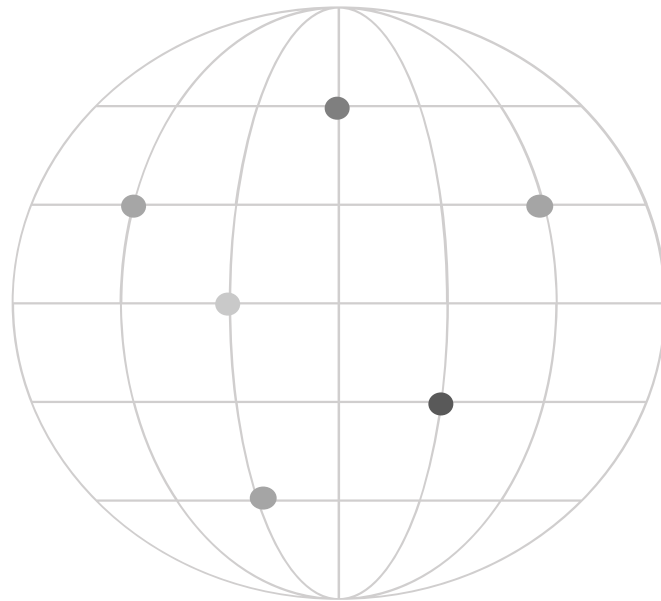
Research has show that exercise can be safe and effective during:

- Chemotherapy
 - Radiation therapy
 - Immunotherapy
 - Hormone therapy
-
- Exercise during infusion have largely only been conducted in trials
 - Symptoms may determine ability to exercise at a given time, e.g.,
 - Fatigue
 - Nausea
 - Infection risk
 - hospitalization



WHAT Exercise Should I do?

Health authorities endorse exercise after a cancer diagnosis, including *before, during, and after* cancer therapy



Your Exercise Oncology PRESCRIPTION



Aerobic Exercise

- 3x per week
- 30 min per session
- Moderate Intensity



Resistance Exercise

- 2x per week
- 30 min per session
- 2-3 sets per muscle group

Some Examples



Aerobic Exercise

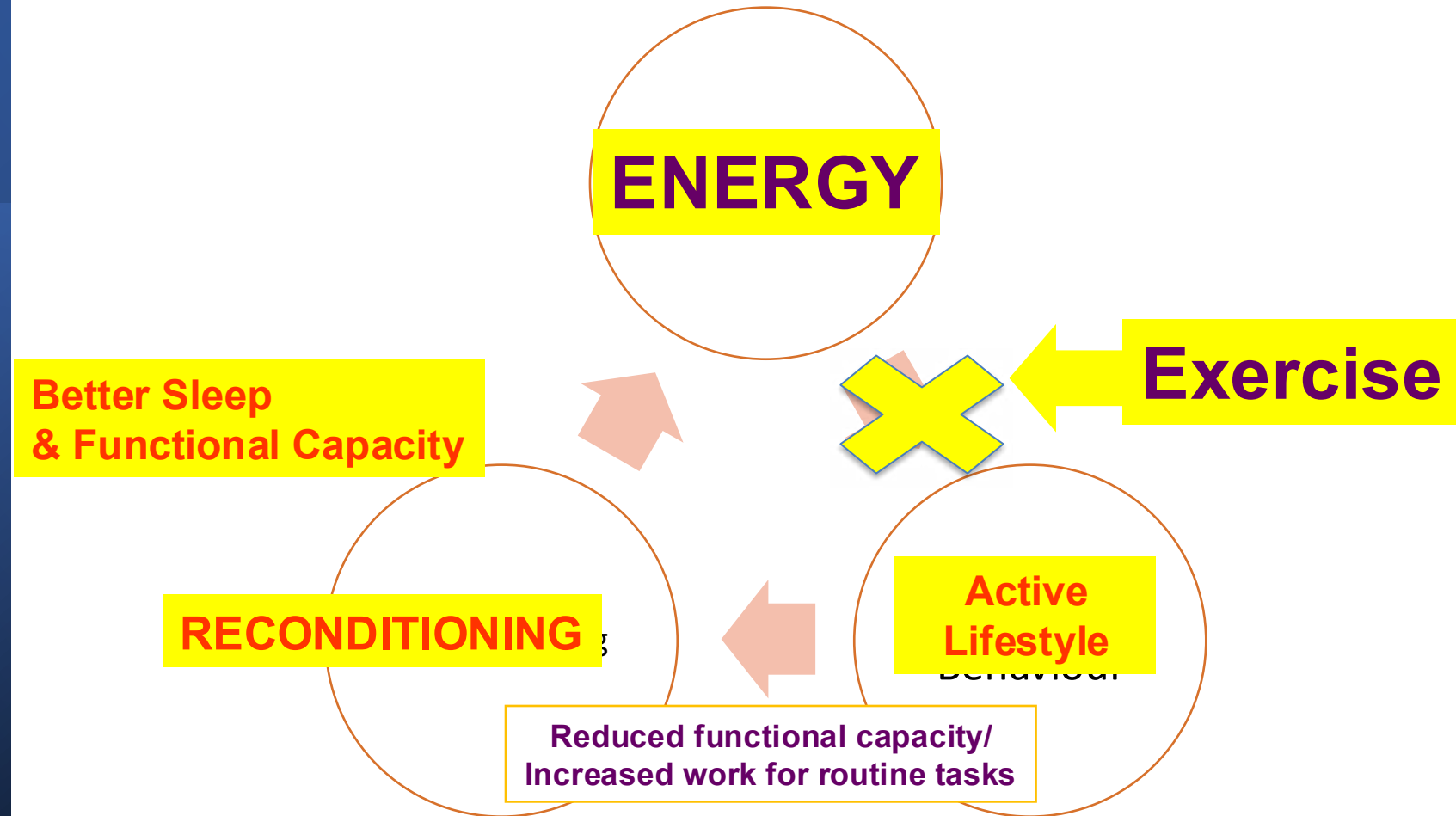
- Brisk walking outdoors or on a treadmill.
- Light jogging or stationary cycling.
- Swimming laps or using an elliptical machine.
- Low-impact aerobics or marching in place.



Resistance Exercise

- Bodyweight squats or seated leg presses.
- Wall push-ups or dumbbell chest presses.
- Seated rows or resistance band pulls for back.
- Bicep curls or shoulder raises with light weights.

Exercising with Fatigue



Exercising with Bone Metastases

cancerexercise.med.ubc.ca/bmehub/

The screenshot shows the top navigation bar of the UBC Cancer Exercise Research website. It features the UBC logo and the text 'THE UNIVERSITY OF BRITISH COLUMBIA'. Below this is a blue bar with 'Faculty of Medicine' and 'Cancer Exercise Research'. A light grey navigation bar contains the following items: 'Home', 'About' (with a dropdown arrow), 'Research', 'People with Cancer' (with a dropdown arrow), 'Healthcare Professionals' (with a dropdown arrow), 'Participate in a Study', 'Lab Services', and 'Project ECHO'. A second light grey bar contains 'ISEO Webinar Series' (with a dropdown arrow) and 'Bone Metastases and Exercise (BME) Hub'.

Bone Metastases and Exercise (BME) Hub

Please scroll down to see translated materials, available for 26 countries to date.

About BME Hub

BME Hub Bone Metastases and Exercise Hub

The Bone Metastases and Exercise Hub provides access to resources on exercise recommendations for people with bone metastases. These resources created by the Bone Metastases and Exercise Knowledge Mobilization Team are intended to work together to inform and support patients, exercise professionals and health care professionals.

Find out more about the Bone Metastases and Exercise Knowledge Mobilization Team and the International Bone Metastases Exercise Working Group here.

[About BME Hub](#)



Try to make Exercise 'sticky'

Sticky behaviours are actions or habits that are routine and are difficult to change or break.

1. They are attractive despite the barriers
2. They feel good or rewarding when you do them.

Ultimately, two things make exercise *unsticky*:

1. Insufficient motivation to exercise.
2. The challenges or barriers to exercise exceed the capacity.

1. Be as active as you can.

90 min of aerobic exercise and 2 sessions per week of resistance training.



A photograph of a group of people in a fitness studio. In the foreground, two women are laughing and talking. The woman on the left has long brown hair and is wearing a red tank top. The woman on the right has dark hair in a bun, wears glasses, and a grey t-shirt. They are both smiling and appear to be in a joyful mood. The background is slightly blurred, showing other people in the studio.

2. Do what works for you.

90 min of aerobic exercise and 2 sessions per week of resistance training.



3. Work out with Partner



4. Digitally-Supported / Guided Workouts



5. Be where you are comfortable.

Concerns Related to Exercise During and After Cancer Treatment

- **Physical Barriers:**

- Fatigue
- Pain and physical limitations (shoulder mobility, lymphedema, bone mets)
- Concerns about safety, fear of injury or worsening symptoms.

- **Psychological Barriers:**

- Anxiety related to exercise and cancer progression.
- Low motivation and confidence in ability to exercise.
- Feelings of vulnerability and fear related to treatment side effects.

- **Knowledge and Information Gaps:**

- Uncertainty about what types, intensity, and timing of exercise are safe and effective.
- Lack of clear guidance from healthcare providers on exercise.

- **Emotional and Behavioural Concerns:**

- Feelings of isolation or shame impacting exercise engagement.
- Difficulty developing sustainable exercise habits amidst cancer challenges.

- **Social and Environmental Barriers:**

- Limited access to suitable exercise facilities or programs.
- Lack of social support and encouragement.
- Time constraints due to treatment schedules, caregiving, or work.

- Smith-Turchyn, et al, 2016, Physiother Can
- Andersen, et al, 2023, Support Care Cancer
- Chan, et al, 2023, Psychooncology
- Wilson, et al, 2025, JAMA Netw Open
- Yeon, et al, 2022, BMJ Open
- Sweegers, et al, 2023, Breast Cancer Res Treat
- Wurz, et al, 2015, Support Care Cancer

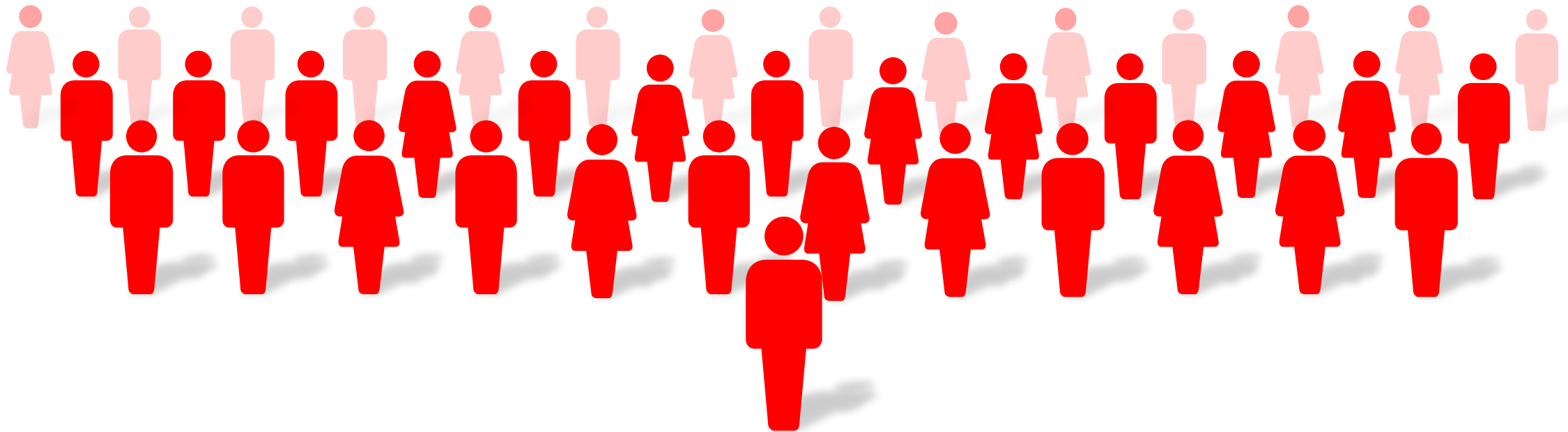


Start with empathy.

It's not easy to exercise routinely.

It's REALLY hard when you have cancer.

Overall access to
Oncology Prehab and Rehab Access
<5%



A photograph of two women in a gym or fitness studio. The woman on the left is older, with blonde hair in a ponytail, wearing a pink tank top and holding a blue exercise ball. She is smiling and looking towards the younger woman. The woman on the right is younger, with long brown hair, wearing a pink long-sleeved top. She has her hand on her lower back, suggesting discomfort or pain. The background shows gym equipment like exercise balls and machines.

WHERE can I get some help
across Canada?



Canadian
Cancer
Society

Community Services Locator

Exercise

Location



Distance

Search

Did you mean: [Rehabilitation and exercise](#)

Services category ▾

Service type ▾

Free service? ▾

Cancer type ▾

Services for ▾

Language ▾

Affiliation ▾

[Clear all](#) [Show map](#)



111 Results

Results per page: 10 ▾

Gitsegukla Community Health Centre

Gitsegukla First Nation

We provide Our Wisdom, Our Kindness, Our Strength to gain respect

271 km

Services offered

Emotional support Home care Rehabilitation and exercise Transportation



Save this

165 Howe Street Gitsegukla, BC, V0J 2J3

(250) 849-5231 ext. 225

<http://www.gitsegukla.net>

Professional Counselling Services

Inner Pathways

Writing Through Cancer: A four-week (2 hours per session) expressive writing and discussion course.

447 km

Services offered

Provincewide Service Emotional support Grief support



Save this

Provincewide Service

(780) 837-6064

<https://www.innerpathways.ca/>

Health and Wellness Center

Fort Nelson First Nations

The newest FNFN building is the Health and Wellness Center which houses the Health and Community Services staff.

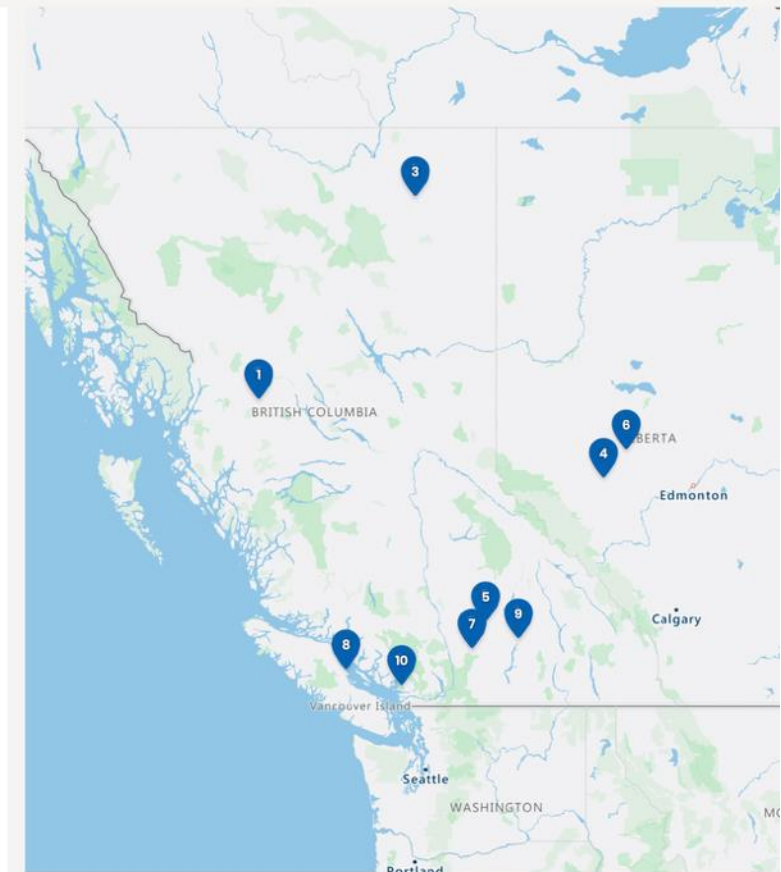
473 km

Services offered

5001 Dene Etene Road Fort Nelson, BC, V0C 1R0

(250) 774-2300

<https://fortnelsonfirstnation.org/he...>



Free Exercise Oncology Programs Across Canada



EXCEL

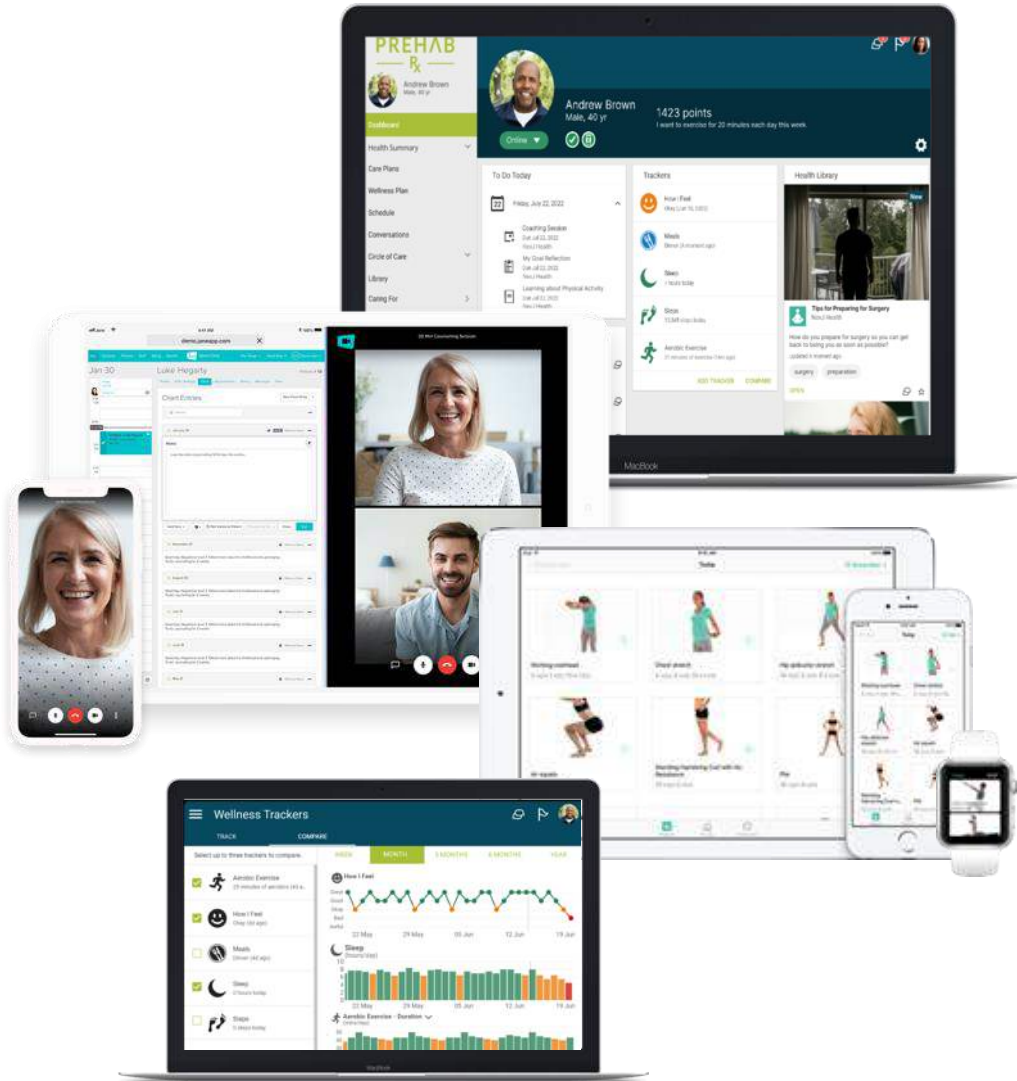
EXercise for Cancer to Enhance Living Well



- Free, 12-week program for people with limited access (typically rural communities)
 - 2x/week, 1 hour each
- Group-based Program
 - New cohorts start every **January, April, and September**
- Circuit-style
 - Tailored to individual needs
- Zoom platform
 - Moderator plus instructor
 - Safety, set-up, build rapport, deliver effective fitness training
- Developing the EXCEL community
 - Pre-post class time for discussion
 - Education webinars for pt
- More information:
 - exercise.research@ubc.ca
 - Daniel.santamina@utoronto.ca

PREHAB Rx

FREE
personalized,
evidence-based,
accessible,
scalable,
virtual (online),
clinician-led
Prehabilitation and Exercise
Oncology



Easy to start.

PrehabRx.ca

PREHAB

Programs ▾ About Blog Contact Us

Virtual Exercise Programs

Treatment-Specific Streams

Choose the pathway relevant to current care needs

Cancer Care

Build strength, energy, and resilience before, during, and after cancer treatment.

[Learn more >](#)


Pre-Surgery

Optimize readiness prior to surgery for a better recovery trajectory.

[Learn more >](#)

Both programs are free of charge through our partners and sponsors.

[Learn more about our funding.](#)



PREHAB

Programs ▾ About Blog Contact Us

About Benefits How It Works Getting Started Contact

Cancer Exercise Program

Build Strength Through Your Cancer Journey

Building strength, energy, and resilience before, during, and after cancer treatment with personalized exercise programs designed specifically for cancer patients and survivors.


Reduced Side Effects
Evidence-backed results

Personalized Care
Cancer-specific plans

Improved Quality of Life
For 90% of participants

[Start Your Journey](#)

[How It Works](#)



Thank you! Questions?

 daniel.santamina@utoronto.ca

 Connect with me on LinkedIn

 www.prehabrx.ca

