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EXERCISE ONCOLOGY LAB
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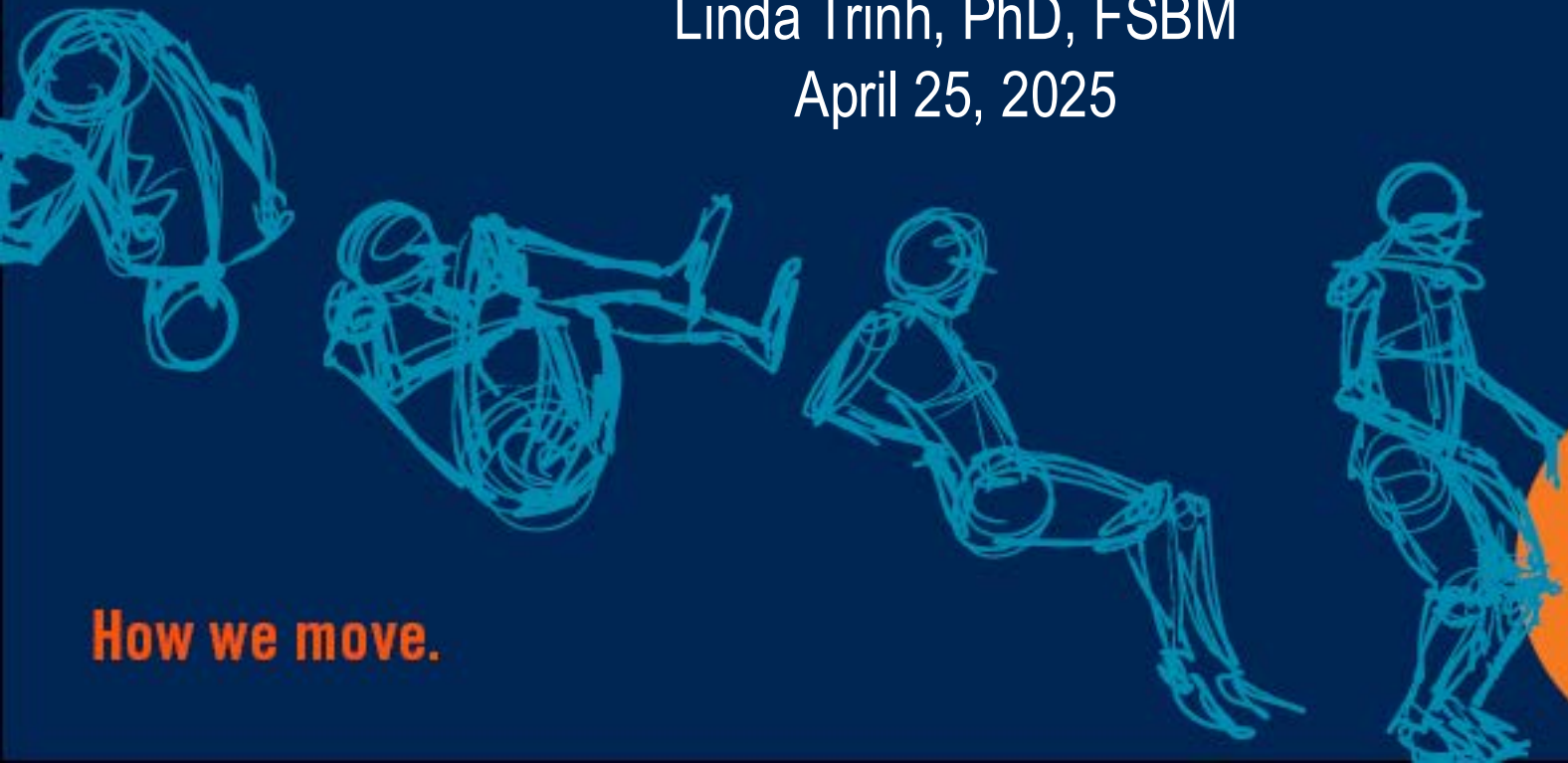
Movement and Exercise for Chronic Lymphocytic Leukemia (CLL) Patients

Linda Trinh, PhD, FSBM

April 25, 2025



How we move.

KPE @ UofT

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Research Goal: To study physical activity as it relates to cancer control and survivorship

Research Questions:

1) Can physical activity help manage treatment-related side effects?

2) What is the optimal physical activity program for benefits?

3) How do we maintain physical activity levels from diagnosis to survivorship?

How many of you are aware of the national physical activity guidelines for the general population?

Canadian Society for Exercise Physiology (CSEP)

How many of you are aware of the physical activity guidelines for cancer survivors?

How many of you are aware of the physical activity guidelines for cancer survivors?

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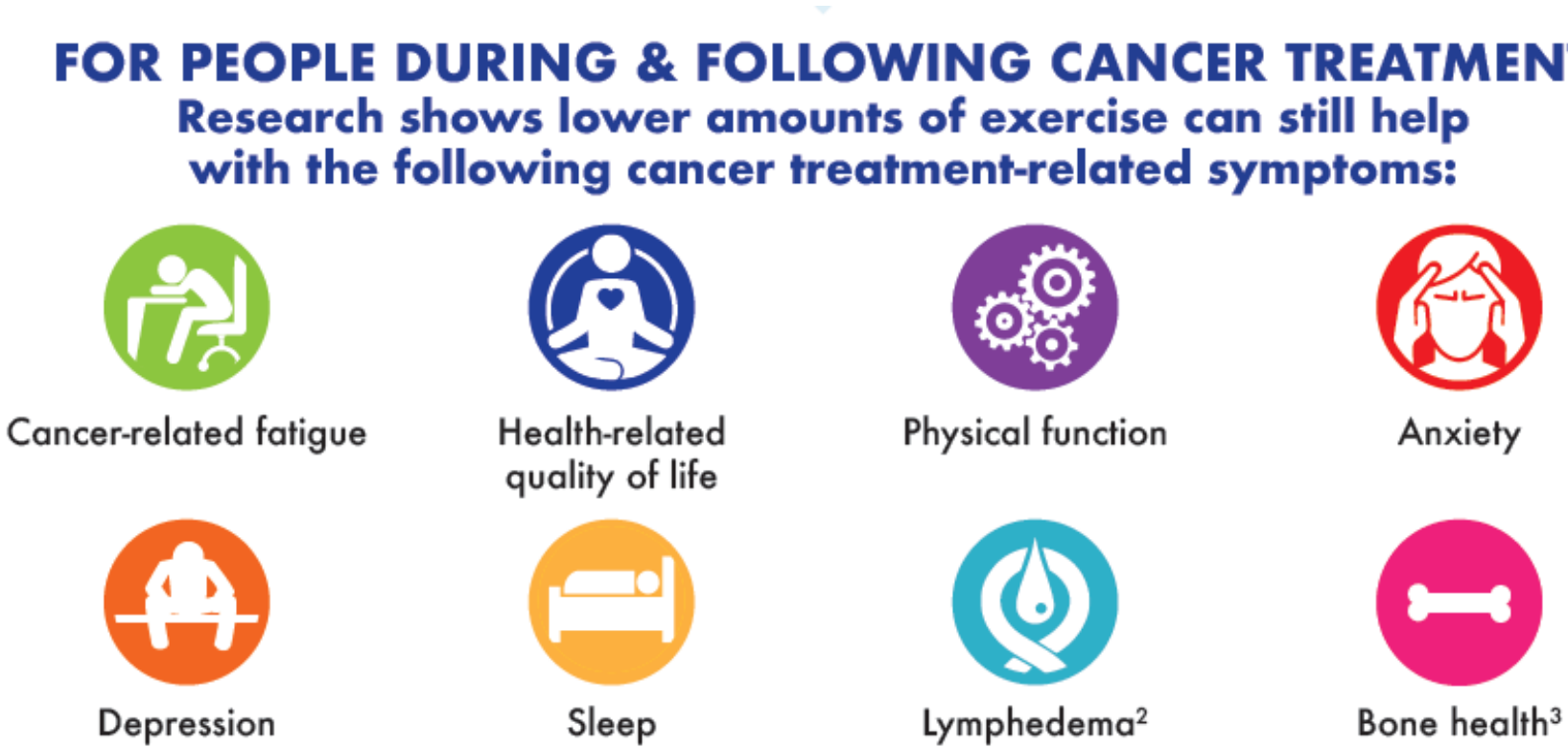
Benefits of Physical Activity



American College of Sports Medicine (ACSM)

Effects of Exercise on Health-Related Outcomes in Those with Cancer

What can exercise do?

- **Prevention of 7 common cancers***
  Dose: 2018 Physical Activity Guidelines for Americans: 150-300 min/week moderate or 75-150 min/week vigorous aerobic exercise
- **Survival of 3 common cancers****
  Dose: Exact dose of physical activity needed to reduce cancer-specific or all-cause mortality is not yet known; Overall more activity appears to lead to better risk reduction

**bladder, breast, colon, endometrial, esophageal, kidney and stomach cancers*
***breast, colon and prostate cancers*

Overall, avoid inactivity, and to improve general health, aim to achieve the current physical activity guidelines for health (150 min/week aerobic exercise and 2x/week strength training).

Outcome	Aerobic Only	Resistance Only	Combination (Aerobic + Resistance)
Strong Evidence	Dose	Dose	Dose
Cancer-related fatigue	**3x**/week for **30** min per session of moderate intensity	**2x**/week of **2** sets of **12-15** reps for major muscle groups at moderate intensity	**3x**/week for **30** min per session of moderate aerobic exercise, plus **2x**/week of resistance training **2** sets of **12-15** reps for major muscle groups at moderate intensity
Health-related quality of life	**2-3x**/week for **30-60** min per session of moderate to vigorous	**2x**/week of **2** sets of **8-15** reps for major muscle groups at a moderate to vigorous intensity	**2-3x**/week for **20-30** min per session of moderate aerobic exercise plus **2x**/week of resistance training **2** sets of **8-15** reps for major muscle groups at moderate to vigorous intensity
Physical Function	**3x**/week for **30-60** min per session of moderate to vigorous	**2-3x**/week of **2** sets of **8-12** reps for major muscle groups at moderate to vigorous intensity	**3x**/week for **20-40** min per session of moderate to vigorous aerobic exercise, plus **2-3x**/week of resistance training **2** sets of **8-12** reps for major muscle group at moderate to vigorous intensity
Anxiety	**3x**/week for **30-60** min per session of moderate to vigorous	Insufficient evidence	**2-3x**/week for **20-40** min of moderate to vigorous aerobic exercise plus **2x**/week of resistance training of **2** sets, **8-12** reps for major muscle groups at moderate to vigorous intensity
Depression	**3x**/week for **30-60** min per session of moderate to vigorous	Insufficient evidence	**2-3x**/week for **20-40** min of moderate to vigorous aerobic exercise plus **2x**/week of resistance training of **2** sets, **8-12** reps for major muscle groups at moderate to vigorous intensity
Lymphedema	Insufficient evidence	**2-3x**/week of progressive, supervised, program for major muscle groups does not exacerbate lymphedema	Insufficient evidence
Moderate Evidence			
Bone health	Insufficient evidence	**2-3x**/week of moderate to vigorous resistance training plus high impact training (sufficient to generate ground reaction force of **3-4** time body weight) for at least **12** months	Insufficient evidence
Sleep	**3-4x**/week for **30-40** min per session of moderate intensity	Insufficient evidence	Insufficient evidence

Citation: bit.ly/cancer_exercise_guidelines

Moderate intensity (40%-59% heart rate reserve or VO_2R) to vigorous intensity (60%-89% heart rate reserve or VO_2R) is recommended.

ExeRxcise is Medicine® | AMERICAN COLLEGE of SPORTS MEDICINE®

blood
Volume 132, Supplement 1, 29 November 2018, Page 5540

641. CLL: Biology and Pathophysiology, excluding Therapy

Exercise and Chronic Lymphocytic Leukemia (CLL) - Relationships Among Physical Activity, Fitness, & Inflammation, and Their Impacts on CLL Patients

Andrea Sitlinger MD [1], Dana P Thompson PhD + [2], Michael A Deal BS + [1], Erwin Garcia PhD + [4], Tiffany Stewart BS + [1], Eross Guadalupe BS + [1], J. Brice Weinberg MD [7,8], David A Bartlett PhD + [1,9], Danielle M. Brander MD [10]

www.nature.com/scientificreports

scientific reports

OPEN

A pilot study of high-intensity interval training in older adults with treatment naïve chronic lymphocytic leukemia

Grace MacDonald[1,2], Andrea Sitlinger[1], Michael A. Deal[1,2], Erik D. Hanson[3], Stephanie Ferraro[3], Carl F. Pieper[3], J. Brice Weinberg[4], Danielle M. Brander[1] & David B. Bartlett[1,2,5,6]

Received: 19 January 2023 | Revised: 15 March 2023 | Accepted: 20 March 2023
DOI: 10.1111/ejh.13958

ORIGINAL ARTICLE

European Journal of Haematology

Relationships between T-lymphocytes and physical function in adults with chronic lymphocytic leukemia: Results from the HEALTH4CLL pilot study

Justin C. Crane[1] | Max J. Gordon[2] | Karen Basen-Engquist[2,3,4,5,6] | Alessandra Ferrajoli[2,7] | Melissa M. Markofski[1] | Che Young Lee[2,3] | Sara Fares[2,3] | Richard J. Simpson[8,9,10,11] | Emily C. LaVoy[1]

Journal of Geriatric Oncology
Volume 14, Issue 1, January 2023, 101373

Research Paper

Effects of high-intensity interval training on health-related quality of life in chronic lymphocytic leukemia: A pilot study

Ashley L. Artese [a,b], Andrea Sitlinger [c], Grace MacDonald [b,d], Michael A. Deal [b,d], Erik D. Hanson [e], Carl F. Pieper [a], J. Brice Weinberg [f], Danielle M. Brander [c], David B. Bartlett [a,b,d,g]

frontiers in Oncology

Front Oncol. 2024 Dec 5;14:1472551. doi: 10.3389/fonc.2024.1472551

A 16-week progressive exercise training intervention in treatment-naïve chronic lymphocytic leukaemia: a randomised-controlled pilot study

Frankie F Brown [1,2], Rebecca Oliver [1,3], Rachel Eddy [1], Adam J Causer [1], Annabelle Emery [1], Harrison D Collier-Bain [1], David Dutton [4], Josephine Crowe [3], Daniel Augustine [1,5], John Graby [1,3], Daniel Rees [1], Daniela Rothschild-Rodriguez [6], Oliver J Peacock [1], Sally Moore [3], James Murray [3], James E Turner [1,7], John P Campbell [1,8,*]

Journal of Cancer Survivorship
https://doi.org/10.1007/s11764-024-01555-w

Optimization of mHealth behavioral interventions for patients with chronic lymphocytic leukemia: the HEALTH4CLL study

Che Young Lee[1] · Max J. Gordon[2] · Melissa M. Markofski[3] · Emily C. LaVoy[3] · Susan K. Peterson[4] · Liang Li[5] · Sara Fares[1] · Miranda Baum[1] · Margaret Pace[2] · Danielle Walsh[2] · Alessandra Ferrajoli[2] · Karen Basen-Engquist[1]

Effects of a strength physical exercise program in chronic lymphocytic leukemia patients on quality of life, mental health, and frailty: a randomized controlled trial study protocol

Juan Luis Sánchez-González[1*], Eduardo José Fernández-Rodríguez[1*], Roberto Méndez-Sánchez[1,2], Luis Polo-Ferrero[1,2], Ana Silvia Puente-González[1,2], Cristina de Ramón[1,2], Sara Marcos-Asensio[1,2], Patricia Blázquez-Benito[1], Almudena Navarro-Ballón[1,3,4*], Fermín Sánchez-Guijo[1,2,4,5] and Carlos Martín-Sánchez[1,2]

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European Journal of Haematology WILEY

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- N=24 CLL patients
- The HEALH4CLL study provided weekly educational materials about exercise, diet, and weight management
- Randomly assigned to one of 16 combinations of intervention components based on four categories:
  - 1) aerobic exercise only (AE) or aerobic exercise with resistance training (AERT)
  - 2) telephone coaching vs. no telephone coaching
  - 3) text messages vs. no text messages
  - 4) self-monitoring 4 – 7 days/week vs. 1 day/week

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Table 5.

Correlation between change in physical function and change in T cell subsets. Data are displayed as correlation coefficient τ (p).

	Δ CD4+	Δ HLADR+ CD4+	Δ PD1+ CD4+	Δ HLADR+ PD1+ CD4+	Δ CD8+	Δ HLADR+ CD8+	Δ PD1+ CD8+	Δ HLADR+ PD1+ CD8+	Δ CD4:CD8 Ratio
Δ Weight (kg)	0.17 (0.26)	−0.04 (0.79)	−0.25 (0.09)	−0.13 (0.38)	−0.21 (0.16)	−0.41 (0.01)*	0.03 (0.86)	−0.19 (0.21)	0.17 (0.25)
Δ Godin PA	0.18 (0.24)	−0.11 (0.46)	0.24 (0.12)	0.10 (0.52)	0.24 (0.11)	0.04 (0.79)	0.23 (0.14)	0.15 (0.34)	0.35 (0.02)*
Δ FACT Fatigue	0.16 (0.30)	−0.37 (0.01)*	−0.21 (0.17	−0.37 (0.01)*	−0.22 (0.15)	−0.07 (0.63)	−0.16 (0.30)	−0.06 (0.67)	0.36 (0.02)*
Δ 6min Walk Test (m)	−0.10 (0.49)	0.11 (0.46)	0.05 (0.73)	0.16 (0.28)	0.04 (0.77)	0.07 (0.62)	0.30 (0.04)*	0.02 (0.88)	−0.18 (0.22)

* indicates significant correlation ($p<0.05$) (2-tail)

FACT: Functional Assessment of Cancer Therapy, PA: physical activity

↑ **in physical activity and** ↓ **in fatigue** following an exercise intervention in CLL patients are correlated with an improved T-cell ratio and reduced proportion of T-cell subsets associated with poor prognosis

Crane et al. (2023). Eur J Haematol;110(6):732-742

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- 15 CLL patients (HIIT+RT: *n* = 9; Control: *n* = 6)
- 12-week HIIT and RT (HIIT+RT) intervention on quality of life in adults with treatment naïve CLL
- *Findings:* HIIT+RT also resulted in clinically meaningful improvements in functional well-being, general well-being, and symptoms specific to CLL (e.g., pain, swelling, tiredness)

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How Do I Achieve the Recommendations?

Accumulate in *any amount of time* throughout the day

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What Type of Activities Should I Do?

- **Moderate intensity exercises:**
  - makes you breathe harder without feeling out of breath
  - **should still be able to carry out a conversation, but you can't sing**
  - Examples: walking quickly as if you were late for an appointment, easy bicycling, easy swimming, dancing, canoeing, golfing

- **Vigorous intensity exercises:**
  - breathing should be rapid and deep
  - **Can't say more than a few words without pausing for a breath**
  - Examples: jogging, running, aerobics class (videos), cross country skiing, vigorous swimming, vigorous bicycling, skating

The activities that you do is completely up to you, and should be ***fun and enjoyable!***

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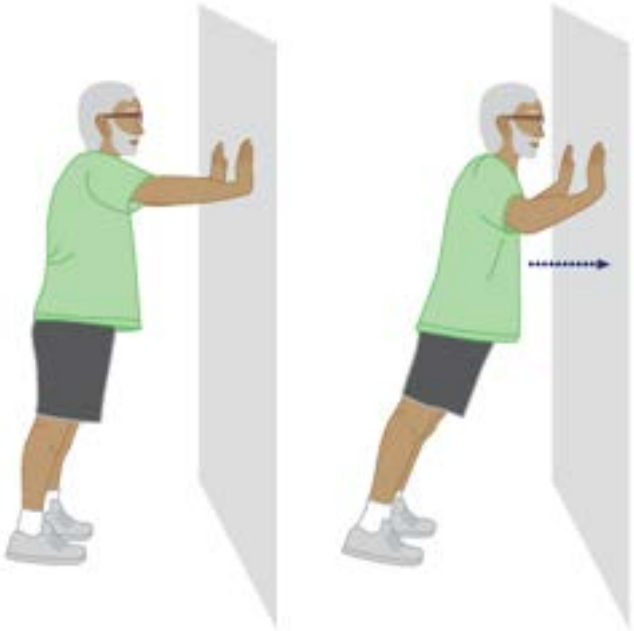
Strength Training

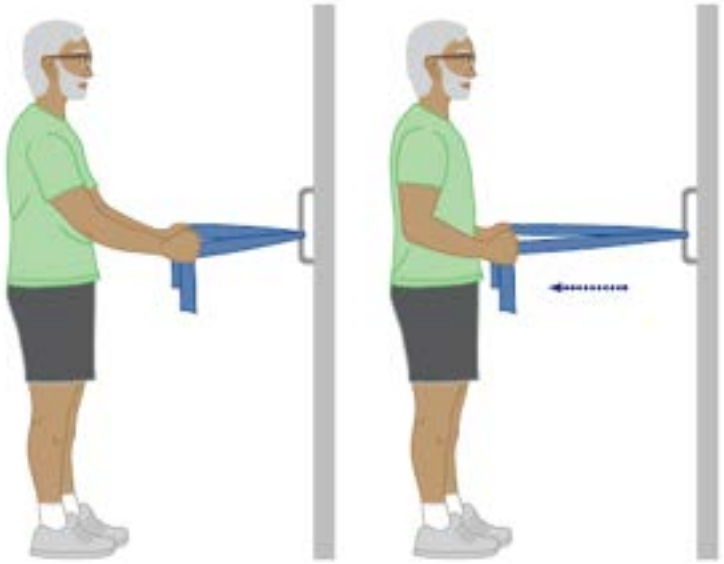
The weights or resistance that can be used include:

- **your own body weight** – push-ups, pull-ups and squats, yoga and matwork Pilates
- **free weights** – dumbbells and barbells, hand weights and weighted bags which you hold, or wrist and ankle weights
- **weight machines** –have adjustable seats with handles attached to either weights or hydraulics, weight stacks, levers and pulleys to provide resistance
- **elastic resistance bands** – sometimes called TheraBands or stretch bands, they are like giant rubber bands that provide resistance when stretched; colour-coded according to the level of resistance

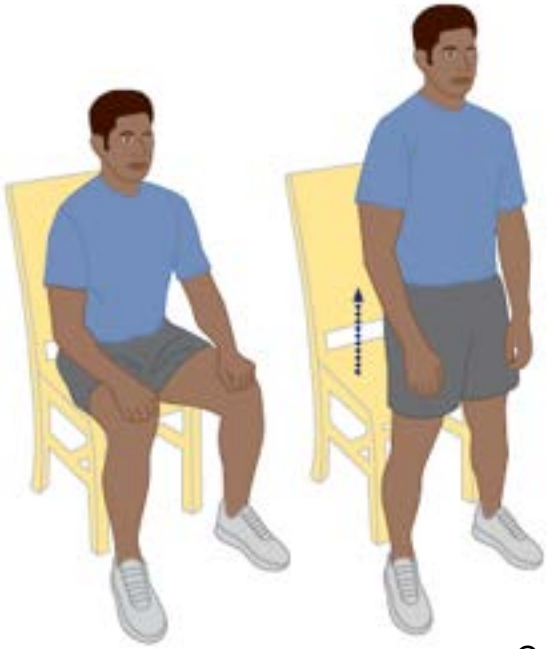
Cancervic.org



Standing Wall Push-Up



Standing Row



Chair Rise

https://www.cancervic.org.au/downloads/resources/booklets/exercise-and-cancer.pdf

Cancervic.org

What physical activities do you prefer?

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Overcoming Common Barriers

"I have no time!"

- Exercise first thing in the morning
- Use exercise as transportation
- Exercise for longer duration during weekends
- Schedule workout in agenda

"But I have to work during the day!"

- Be active during lunch hour
- Start walking to work or getting off a few stops early

"I am too tired!"

- Exercise on days and during times when fatigue is lowest
- Can reduce intensity and duration, but avoid inactivity
- Accumulate exercise in any amount throughout the day

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Overcoming Common Barriers

"What if I have health/medical problems?"

- Exercise at a level you can tolerate
- Choose low impact activities such as recumbent bike and swimming
- Accumulate activity in any amount throughout the day

"It's too hot! It's too cold!"

- Mall walking
- Be active in middle of day when weather is warmest or later in the day when it is coolest

"I don't have a gym by where I live!"

- Choose activity that involve minimal equipment such as walking
- Locate parks and trails
- Consider buying a bike or treadmill at home

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What are your main barriers to physical activity?

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Planning For Physical Activity

Activities	When will I do it?							
	Mon	Tues	Wed	Thurs	Fri	Sat	Sun	Total
Walking 	• 5 min (morning) • 10 min (lunch) • 15 min (evening)					30 min		**60 min**
Swimming 			30 min					**30 min**
Strength training 		✓		✓				**2 days**
								90 minutes + 2 days of strength training

I will complete my activities at the following location(s):___walking trail, swimming facility_____

I am planning on being physically active with:___members of my household for walking_____

Building a Supportive Environment

Friends, family, and spouse can help motivate you to start and maintain your exercise program

- Active outings with household
- Encouragement
- Reminders
- Buddy system to be accountable
- Online exercise classes

Setting "SMART" Goals

- Provide a sense of direction, purpose, and motivation when working towards change

- Short-term goals
  - Near future or within a few weeks or months
  - Building blocks

- Long-term goals
  - Between 3 months to one year, or longer

Activity Break: Goal Setting & Planning

Here is an example of a walking goal:

Starting on Monday, I am going to walk for 15 minutes, 3 days this week (Monday, Wednesday, and Friday). I am going to ask my co-worker to see if she will walk with me at lunch time. Eventually, I would like to be able to walk 30 minutes, 5 days a week (Monday to Friday). If I can do this for 2 weeks, I will reward myself by going out to dinner at my favorite restaurant.

Now it's your turn to set your goal!

Step 1:

Write a goal for this week by filling in the blanks below:

Starting on _____
(day of the week)

I am going to _____
(type of exercise)

for _____ minutes.

I am going to do this _____ days this week.

Safety Considerations

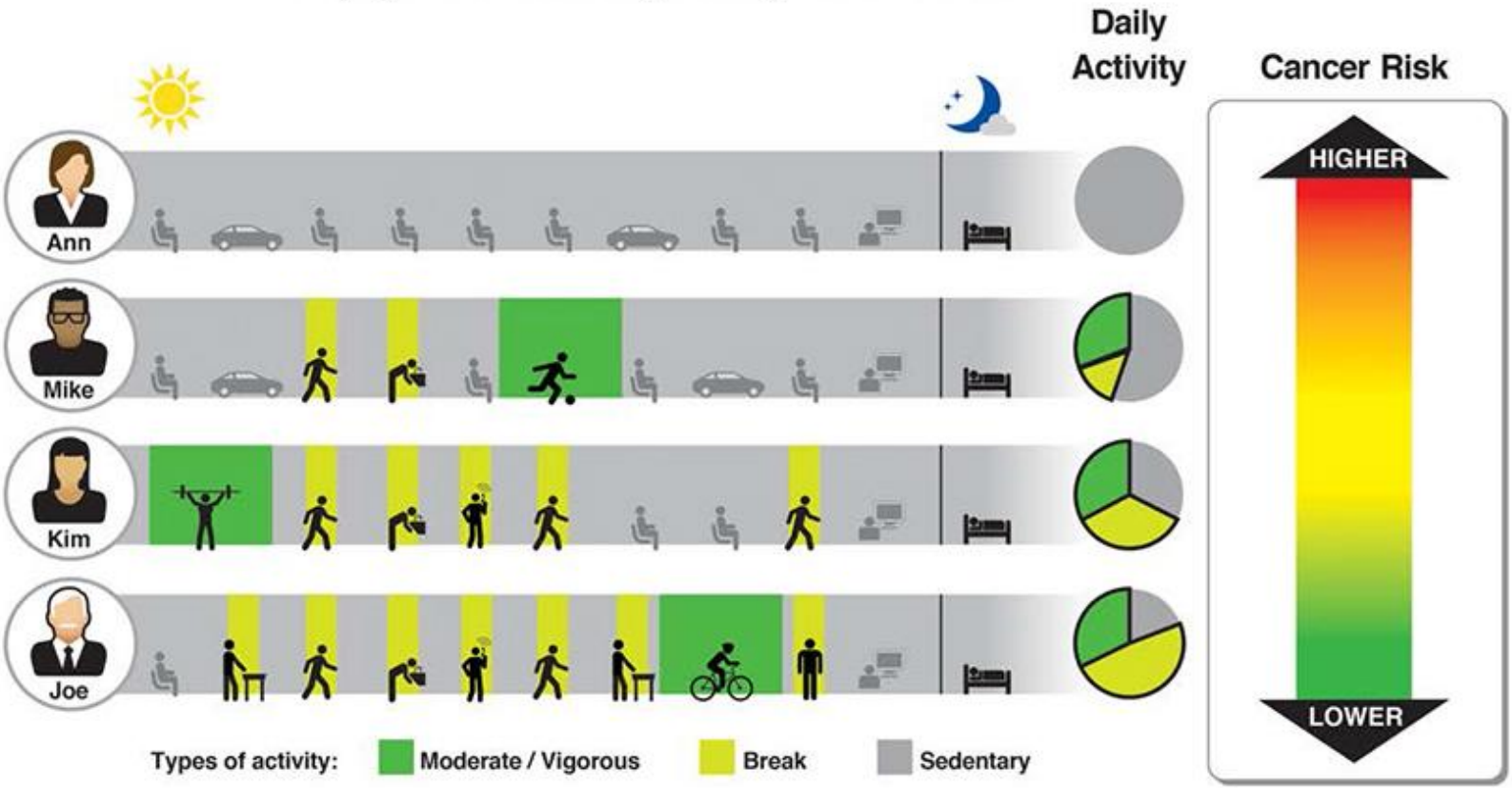
- Consult your doctor before beginning any exercise program

- Stop exercising if you notice any of the following:
  - An irregular pulse (heart seems to skip a beat)
  - Unusual muscle weakness
  - Joint or bone pain
  - Leg pain or cramps
  - Chest pain
  - Dizziness, blurred vision, fainting
  - Shortness of breath or difficulty breathing
  - Numbness or loss of feeling in hands or feet

- Stay hydrated!

Make Time for Break Time

This graphic illustrates how different amounts of activity influence certain much-studied indicators of cancer risk. Other factors like eating smart, staying lean and not smoking also may lower cancer risk.



American Institute for Cancer Research

Take Home Messages

- Physical activity is safe and tolerable for most cancer survivors including CLL patients, even during treatment
- Achieve at least 90 minutes of moderate intensity activity per week + at least 2 days of resistance exercise per week
- Avoid inactivity and limit your sitting time
- Select an activity that is fun and enjoyable
- Make a plan for exercise based on your goals
- Anticipate barriers and strategies to overcome them

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Research Study

Adults Living With and Beyond Cancer Needed for Research Study

Researchers at the University of Toronto are trying to learn more about how to help individuals living with and beyond cancer increase their physical activity levels from the comfort of their own home.

WHO CAN PARTICIPATE?

We are looking for individuals:

- Diagnosed with cancer (stages I- III)
- 18+ years old
- Engaging in less than 90 minutes of physical activity per week
- Have completed primary treatment

WHAT'S INVOLVED?

- **Remote delivery:** All sessions and assessments are completed at home.
- **Weekly exercise sessions:** Initially 3 supervised sessions per week over Zoom before tapering to 1supervised session per week with additional unsupervised sessions. Includes both aerobic exercise and resistance training.
- **Weekly counselling:** 1day per week over Zoom.
- **Five assessments:** Surveys, physical function test, and wearing an activity monitor device for 7 days at each time point.
- **24-week Program:** You will be randomly assigned to receive a 24-week exercise program with either behavioural or exercise counselling that provides you with helpful tips to adopt and maintain physical activity.

You will be compensated $50 for each assessment for a total of $250.

INTERESTED?

Contact us to find out more about the research study and if you're eligible to participate!

E: exercise.oncology@utoronto.ca **T:** 416-946-5856

Please note that communication via e-mail is not absolutely secure. Thus, please do not communicate personal sensitive information via e-mail.

This study has been approved by the Research Ethics Board of University of Toronto.

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What am I asked to do?

Free cancer-specific exercise trainer for 6 months

Remote Assessments
Questionnaires,
Sit to stand tests,
Wearable activity tracker

Remotely- delivered physical activity program

\+ 1:1 exercise counseling and group webinars

Remotely- delivered physical activity program

\+ 1:1 behavioural counseling and group webinars

24 weeks

Remote Assessments
Questionnaires,
Sit to stand tests,
Wearable activity tracker

Remote Assessments
Questionnaires,
Sit to stand tests,
Wearable activity tracker

6 months and 1-year follow-up

Are you living with or beyond cancer? Do you want to get active?

Join one of our exercise oncology programs that provide tailored support to individuals living with and beyond cancer, TODAY!

What to expect?

A free 8-12-week exercise program, for Canadians undergoing or recovering from cancer treatment. This evidence-based program is taught by fitness professionals trained in exercise oncology.

- Classes are delivered either online (via Zoom) or in-person.
- 60 minutes, twice a week
- Variety of class days and times to choose from.

Still not sure what to expect? Flip to the other side of the poster, to see some examples of exercises we use in class!

> "Dianne - Participant
>
> "EXCEL changed my life! It didn't take me long to realize I couldn't live without it. Each week I grew stronger and had more energy. The accountability to the group was so motivating and I never considered missing a class."

Contact Information

University of Calgary

Phone Number
403-210-8482

E-mail Address
wellnesslab@ucalgary.ca

Website
ucalgary.ca/excel-cancer-exercise-program

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FACULTY OF KINESIOLOGY
Health and Wellness Lab

Funded by: Canadian Cancer Society, Canadian Institutes of Health Research, Alberta Cancer Foundation
Ethics ID: HREBA.CC-25-0029, 20250227, V1

Movement Break

Interested in Research Studies?

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For more information, please contact:

exercise.oncology@utoronto.ca

P: (416) 946-5856