

# Exercise & Enhancing Health Outcomes In Cancer Survivors CCO Exercise Guidelines



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# Objectives

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- Review the pathophysiology around aging and deconditioning
- Review the evidence for exercise or lifestyle interventions
- Suggestions for clinical implementation

# Introduction

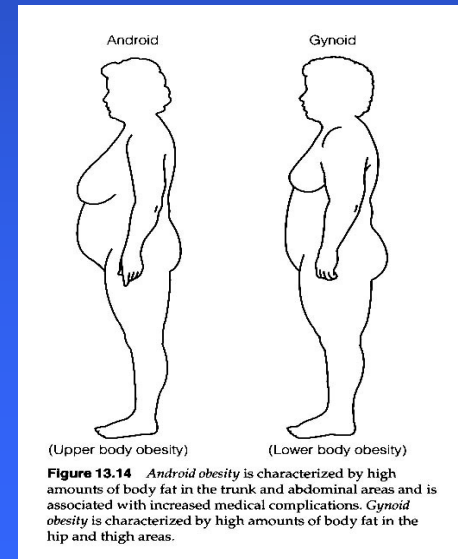
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- Improvements in health, sanitation and social conditions, there will be an increase in the average life expectancy
- Result in an increased proportion of adults living beyond 75 years of age
- Given that aging is a risk factor for malignancy, additional cases are to be expected
- Muscle mass, strength/power, maximal exercise capacity
  - determinants of physical functioning
  - all decline with age
  - facilitates accumulation of body fat and insulin resistance

# Background

## Aging in the Healthy Adult

- Negative lifestyle choices or illness:
  - Disability
    - difficulty in carrying out or performing ADL
  - Frailty
    - stage of decreased physiological reserves
    - associated with risk of disability
- Syndrome:
  - unintentional weight loss (10 pounds/year)
  - exhaustion
  - slow walking speed
  - low physical activity
  - increase in body fat



# Background

## Aging in the Healthy Adult

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- Determinants of physical performance:
  - muscle power
  - aerobic capacity
- Aging associated with decline:
  - muscle mass
    - qualitative & quantitative
    - atrophy of type II fibers/impairment of metabolic capacity
  - strength
  - aerobic exercise capacity



# Benefits of Exercise

## General Population

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- Exercise capacity and anabolic hormones are necessary for muscle tissue:
  - compromised in the older adult
  - *rendered near castrate in many cancer therapies*
- Exercise can improve muscle function/exercise capacity in older adults and those with chronic disease
- *Aging is inevitable; the slope of the decline can be modified*

# Benefits of Exercise General Population

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- **Exercise capacity** is necessary for muscle tissue are compromised in the older adult
- Exercise improves:
  - muscle function
  - exercise capacity
- **Exercise programs whether resistance or aerobic** must be of sufficient intensity and duration



# Components of Fitness

## Cardio-Respiratory Fitness

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- Physical activities which:
  - increase in the transport and uptake of oxygen
  - level of skeletal muscle
- To improve CR fitness\*:
  - Frequency: 3-5 days/week
  - Intensity: 60-90% of maximal H.R.
  - Time: 20-60 minutes/session
  - Type: Aerobic (continuous)





# Benefits of Increasing CR Activities

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- Decreased fatigue
  - Improve sleep
- Improve physical function
- Improve blood lipid profile
- Improve immune function
- Improve glucose tolerance
- Improve body composition
- Enhanced well-being
- Reduced risk of:
  - CAD
  - Hypertension
  - NIDDM
  - Osteoporosis
  - Anxiety/Depression

# Components of Fitness

## Muscular Fitness- Resistance

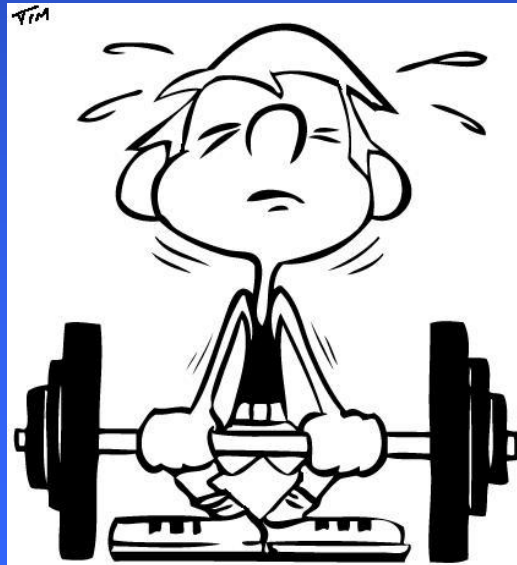
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- Strength and endurance
- Activities that require the body's musculature to move against a resistance
- Overload and specificity are fundamental precepts
- 40-90% of one repetition maximum (1RM)
- 8-12 repetitions  
2 days/week
- 48 hr. recovery
- Adaptation occurs only in the overloaded muscle

# Benefits of Resistance Training

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- ↑ muscle size
- ↑ strength/endurance
- ↑ size & strength of connective tissue elements
- ↑ bone mass & density
- ↑ lean body weight
- ↓ fat weight
- ↓ % body fat
- Improved speed, power, balance, agility & flexibility



# Exercise

*Are cancer patients  
any different than  
aging adults?*



# ACSM Guidelines (2009)

## Individuals With Cancer

	Aerobic	Resistance	Flexibility
US Physical Activity Guidelines for Americans (PAGA)	150 min/week of moderate-intensity or 75 min/week of vigorous-intensity activity, or an equivalent combination.	Muscle-strengthening activities of at least moderate intensity at least 2 days/week for each major muscle group.	Stretch major muscle groups and tendons on days other activities are performed.
Breast	Follow US PAGA.	Start with supervised program and progress slowly.	Follow US PAGA.
Prostate	Follow US PAGA.	Follow US PAGA.	Follow US PAGA.
Colon	Follow US PAGA.	Follow US PAGA except with stoma, where lower resistance and slower progression are recommended to avoid herniation.	Follow US PAGA, taking care to avoid excess abdominal pressure if patient has ostomy.
Gynecologic	Morbidly obese women may require additional supervision.	Data on safety and benefits are not available for women with lower limb lymphedema.	Follow US PAGA.
Hematologic, no HSCT	Follow US PAGA.	Follow US PAGA.	Follow US PAGA.
Hematologic with HSCT	Recommend starting with lighter intensity and slower progression to greater intensity and duration.	Follow US PAGA. Resistance training may have particular benefits in this population.	Follow US PAGA.

# Cancer Care Proposed Guideline

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- Would the response to exercise expected to be any different for an adult undergoing treatment for cancer ?
- Would it be safe for these individuals to exercise?
- Is there any special screening required?
- Are the different types of exercise more or less likely to bring about differential results?

# Methods: Instrument

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- AGREE II instrument (Brouwers et al., 2010)
- Ensure methodological rigour and transparency
- Internationally-recognized tool
  - Canadian PA Guidelines (Tremblay et al., 2011)
  - Canadian Sedentary Behaviour Guidelines (Tremblay et al., 2011)
  - PA Guidelines for Adults with Spinal Cord Injury (Martin Ginis et al., 2011)
  - PA Guidelines for Adults with Multiple Sclerosis (Latimer-Cheung et al., 2013)



# Methods:

## Guideline Development Group



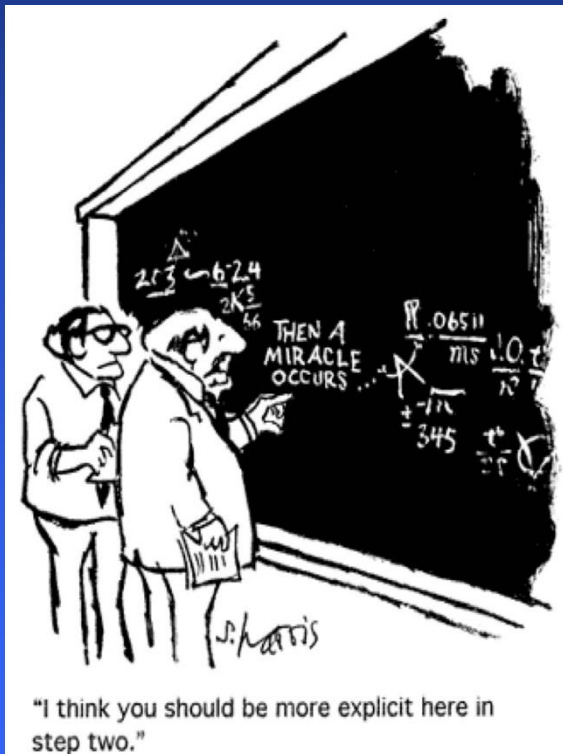
**WORKING  
GROUP (6)**

**EXPERT  
PANEL (8)**

Guideline Development Group	<i>n</i>
Research methodologist	1
Provincial Psychosocial Oncology Director	1
Oncologists	
Radiation	1
Medical	4
Physiotherapist	1
Exercise/rehab program directors	2
Exercise scientists/researchers	3
Patient representative	1



# Methods: Review process



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- Internal content experts

3

- Guideline methodology experts

5

- External content experts

69

- Potential end users

# Cancer Care Ontario Guidelines Questions

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1. Pre-screening requirements
2. Safety concerns
3. To provide guidance for clinicians with respect to exercise for patients living with cancer
4. Benefits of specific types of exercise
5. Guidance around:
  - delivery models
  - exercise regimens

# Cancer Care Ontario Guidelines

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1. **Pre-screening requirements**
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# What type of Pre Screening is Required?

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- ACSM guideline Expert Panel developed pre-exercise medical assessments
- One systematic review found that cardiopulmonary exercise testing (CPET) was safe
- None of the RCTs reported any adverse events during pre-screening or baseline assessments before initiation of the study intervention



# Pre-Screening Interpretation

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- Standard recommendation for healthy adults in the general population to undergo a fitness assessment before initiating exercise
- Reasonable that people living with cancer should do so as well:
  - evaluation of comorbidities
  - latent effects from treatment
  - person's ability to engage in exercise
- Allow the exercise consultant to modify an exercise program

# Cancer Care Ontario Guidelines

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2. **Safety concerns**
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5. Guidance around:
  - delivery models
  - exercise regimens

# Safety

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- Two guidelines (ACSM/NCNN):
  - exercise is safe both during active & post treatment
- Few adverse events reported:
  - systematic reviews
  - randomized controlled trials
- In particular, those post MRM/AND with or without lymphedema can safely perform resistance exercise

# Weight Lifting Breast Cancer Lymphedema

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**Previous ESBCA/AND  
Dx: 1-15 years previous  
Stable Lymphedema  
(N=141)**



**Control Group  
N=71**

**Resistance Intervention  
N=71**

Primary Endpoint: ↑ 5 points in interlimb vol.

Schmidt: NEJM2009;361:664-73



# Lymphadema-12 Months

	Weight Lifting No (%)	Control No (%)	Mean Difference ( 95%CI)	P Value
Change Volume >5% increase no (%)	8 (11%)	8 (12%)	1.0 (.88-1.13)	1.0
>5% decrease no (%)	13 (19%)	15 (22%)	.96 (.81-1.14)	.680
Exacerbation	9 (14%)	19 (29%)	.47 (.23-.97)	.04
Change No Symptoms	-1.8+/-2.16	-1.17+/-1.94	-.63 (-1.32-.06)	.07
Severity Symptoms	-.51+/- .8	-.22+/- .71	-.29 (-.54-.08)	.03

Schmidt: NEJM2009;361:664-73

# Cancer Care Ontario Guidelines

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1. Pre-screening requirements
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- 4. Benefits of specific types of exercise**
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  - delivery models
  - exercise regimens

# Muscular & Aerobic Fitness

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- All systematic reviews found positive changes:
  - muscular and aerobic fitness
- 15 RCTs
  - 11 found significant positive changes in the exercise groups
  - systematic review found substantial increases in muscular strength and endurance with resistance

# Can exercise improve QoL?

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- Fourteen systematic reviews found an improvement in QoL for patients performing exercise intervention during or post-treatment periods
- 16 studies with patients in active treatment:
  - 7 had significant differences between the intervention and control groups
  - 13 post treatment intervention studies

# Cancer Care Ontario Guidelines

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1. Pre-screening requirements
2. Safety concerns
3. To provide guidance for clinicians with respect to exercise for patients living with cancer
4. Benefits of specific types of exercise
5. **Guidance around:**
  - **delivery models**
  - **exercise regimens**

# Exercise Delivery Models

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- Where possible individuals should exercise:
  - group or supervised setting
  - may provide a superior benefit/outcome in QoL and muscular and aerobic fitness
- *Key Evidence*
  - Four systematic
  - Two RCTs

# Interpretation

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- ***Studies*** detected a greater and more consistent benefit when the intervention occurred:
  - group versus a home setting



# Exercise Programs

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- Exercise at a moderate intensity
  - three to six times baseline resting state
  - on an ongoing basis
  - as a part of their lifestyle so that improvements in QoL and muscular and aerobic fitness can be maintained for the long term
- *Key Evidence*
  - 3 systematic reviews



# Interpretation

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- No studies that directly compared different intensities or length of exercise interventions with people with cancer
- The systematic reviews detected a benefit for increasing intensities up to a moderate level (6-9 METs)
- Higher or greater amounts of exercise did not necessarily further improve outcomes including *QoL*

# Aerobic Based Exercise Prescriptions

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## Objectives

↑ physical/physiological/psychological  
↓ risk treatment induced-co morbidities

- Type
  - Large muscle groups
  - 3-5 times/week
  - Moderate
    - 50-75%  $\text{VO}_2^{\text{max}}$ . HR. reserve
    - 60-80%  $\text{HR}^{\text{max}}$ .
- Duration
  - 20-30 min. continuous
    - Deconditioned short bouts/rest
- Progression
  - Depends on stage of disease and current treatment status

# Resistance Based Exercise Prescriptions

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- Type
  - Large muscle groups
    - machine weights, free weights
    - body weights, therabands
- Frequency
  - 1-3 times/week
- Intensity
  - 50-80% 1RM; 6-12 repetition max.
- Duration
  - 6-10 exercises(muscle groups)
    - 1-4 sets per group
- Progression
  - Depends on stage of disease and current treatment status

# General Recommendations

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Exercise Level	Moderate Intensity	Overall Health Benefit
Inactive	No activity	None: unhealthy
Low	Some activity but < 150 min/week	Some: preferable to an inactive lifestyle
Medium	Between 150-300 mins/week	Substantial
High	Greater than 300 min/week	Additional health benefits for higher levels of activity

# How much exercise do I have to do ?

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- 150 minutes of moderate intensity exercise /week
  - OR
- 75 minutes of vigorous- intensity exercise per week
  - OR
- An equivalent combination of moderate-vigorous intensity exercise
- If you are already there—gradual increase by either increasing amount (days) or intensity

# How do I achieve these recommendations?

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- 30 minutes/day x 5 days per week
  - 150 minutes of moderate intensity exercise/week
- Do not have to do the entire 30 minutes in one session
  - 10 minute bouts and activity through out the day to attain the 30 minutes
- Example:
  - 10 minutes of a brisk walk morning-noon-evening

# CCO Recommendations

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- Guidelines concluded that exercise was safe
- Exercise is beneficial for enhancing QoL, aerobic and muscular fitness.
- Harm or adverse events may happen:
  - *not negatively influenced by the cancer diagnosis or its therapy*
  - similar to events in the general adult population
- Recommendations allow for individuals to determine what mode of exercise they would prefer

# Conclusions

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- Energy balance appears to be important in both prevention and cancer specific outcomes
- Moderate intensity exercise programs are safe and provide clinical benefit
- Prudent diets and caloric moderation may have benefit
- Future research to understand the metabolic changes perhaps with a view to optimize therapy is warranted