Benefits of Exercise and Rehabilitation

Philip Chang, DO

9/12/21
Disclaimer

This presentation is for informational purposes only and should not be taken as customized medical advice.

Specific exercise recommendations and precautions should be discussed with your healthcare provider as indicated.
Disclosures

None
Objectives

- Recognize benefits of therapeutic exercise
- Discuss precautions
- Review exercise intensity targets
- Discuss benefits of rehabilitation
Cancer Prevention

Percentages indicate relative risk reduction

Bladder (15%)
Breast (12-21%)
Colon (19%)
Endometrial (20%)
Esophageal (21%)
Kidney (12%)
Stomach (19%)

Increased Survival

Breast (48% reduction in risk for all cause mortality)

Colon (42% reduction in risk for all cause mortality)

Prostate (37-49% reduction in risk for all cause mortality)

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

**What can exercise do?**
- **Prevention of 7 common cancers**
  - Diet: 2018 Physical Activity Guidelines for Americans: 150-300 min/week moderate or 75-150 min/week vigorous aerobic exercise
  - Survival of 3 common cancers**
    - Diet: Exact dose of physical activity needed to reduce cancer-specific or all-cause mortality is not yet known; Overall exercise appears to lead to better risk reduction
    - *Specificially breast, colon, and prostate cancers
  - *Lifestyle: breast, colon, endometrial, nephropathy, kidney and stomach 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).**

<table>
<thead>
<tr>
<th>Outcome</th>
<th>Aerobic Only</th>
<th>Resistance Only</th>
<th>Combination (Aerobic + Resistance)</th>
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<tbody>
<tr>
<td><strong>Strong Evidence</strong></td>
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| Moderate Evidence | | | |
| **Liese health** | Insufficient evidence | Insufficient evidence |
| **Sleep** | 3-4x/week for 30-60 min per session of moderate intensity | Insufficient evidence |

Citation: [bit.ly/cancer_exercise_guidelines](https://bit.ly/cancer_exercise_guidelines)

Note: Insufficient evidence indicates the evidence is not yet sufficient to recommend a specific level of activity. More research is needed to determine the optimal dose and intensity of exercise for improving health-related outcomes in those with cancer.
Exercise Guidelines for Cancer Survivors: Consensus Statement from International Multidisciplinary Roundtable

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<table>
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<tr>
<th>Bone health</th>
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<th>2-3x/week of moderate to vigorous resistance training plus high impact training (sufficient to generate ground reaction force of 3-4 times body weight) for at least 12 months</th>
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**Exercise Guidelines for Cancer Survivors: Consensus Statement from International Multidisciplinary Roundtable**
ACSM 2019 Exercise Recommendations

150 minutes per week of moderate intensity aerobic exercise

2-3 days per week of strength training targeting major muscle groups
NCCN 2021 Guidelines for Physical Activity

- Activity/exercise recommendations should be tailored to individual abilities and preferences

- Aim for **150** of moderate intensity or **75 minutes** of vigorous intensity activity throughout the week

- Resistance training of major muscle groups **2-3x** per week

- Stretching of major muscle groups **2x** per week

- Avoid prolonged sedentary behavior
NCCN Guidelines: Initial Prescription

Frequency: 1-3 days per week

Intensity: Light to moderate

Type: Aerobic activity and/or resistance training

Initial time goal based on baseline level of fitness and exercise tolerance
ACSM 2019 Guidelines: Exercise Testing

“...a comprehensive physical fitness assessment before starting exercise may create an unnecessary barrier...”

“...no assessments are required to start low-intensity aerobic training (i.e, walking or cycling), resistance training with gradual progression, or a flexibility program in most survivors.”

“Medical clearance may still be indicated as previously described depending on exercise and health history...”

“...we have referred to the National Comprehensive Cancer Network (NCCN) Survivorship Guidelines to frame recommendations...”
NCCN Guidelines: Risk Assessment

Peripheral Neuropathy
Arthritis
Musculoskeletal Issues
Poor Bone Health
Lymphedema

History of lung surgery
History of major abdominal surgery
Ostomy
Heart Failure/Coronary Artery Disease/COPD
Ataxia
Severe Fatigue
Severe Nutritional Deficiencies
Worsening/Changing Physical Condition

Recommend pre-exercise medical evaluation
Modify recommendations based on assessments
Consider referral to trained personnel

Pre-exercise medical evaluation
Clearance by physician before exercise
Referral to trained personnel
A Note About COVID-19

The CDC recognizes that having cancer increases the risk of severe illness from COVID-19.

Recommend use of masks, social distancing, and vaccination if able.
## Effects of Exercise on Health-Related Outcomes in Those with Cancer

### What can exercise do?
- Prevention of 7 common cancers
- 2018 Physical Activity Guidelines for Americans: 150-300 mins/week moderate or 75-150 mins/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
- *Breast, breast, endometrial, colorectal, kidney and stomach cancers

### Overall, avoid inactivity, and to improve general health, aim to achieve the current physical activity guidelines for health: 150 mins/week aerobic exercise and 2x/week strength training

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<td>3x/week for progressive, supervised, program for major muscle groups does not exacerbate lymphedema</td>
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### Moderate Evidence
- Insufficient evidence
- Insufficient evidence
- Insufficient evidence
- Insufficient evidence

### Sleep
- 3x/4x/week for 30-60 min per session of moderate intensity
- Insufficient evidence
- Insufficient evidence

### Excerise is Medicine

[Excerise is Medicine](https://www.americancollegeofsportsmedicine.org)

Citation: [bit.ly/cancer_exercise_guidelines](https://bit.ly/cancer_exercise_guidelines)
Moderate intensity (40%-59% heart rate reserve or \(\text{VO}_2\text{R}\)) to vigorous intensity (60%-89% heart rate reserve or \(\text{VO}_2\text{R}\)) is recommended.
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<th>Age</th>
<th>Target HR Zone 50-85%</th>
<th>Average Maximum Heart Rate, 100%</th>
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<td>100-170 beats per minute</td>
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Calculating Heart Rate by Age

\[ HR_{\text{Max}} = 220 - \text{Age} \]

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Calculating Target Heart Rates
Heart Rate Reserve (HRR)

\[ \text{HRR} = \text{HR}_{\text{Max}} - \text{HR}_{\text{Rest}} \]

\[ \text{HR}_{\text{Max}} = 220 - \text{Age} \]
Calculating Target Heart Rate

Age: 40

Resting Heart Rate: 70

\[ \text{HR}_{\text{Max}} = 220 - \text{Age} \]

\[ 220 - 40 = 180 \]

\[ \text{HR}_{\text{Max}} = 180 \]

\[ \text{HRR} = \text{HR}_{\text{Max}} - \text{HR}_{\text{Rest}} \]

\[ 180 - 70 = 110 \]

\[ \text{HRR} = 110 \]
Calculating Target Heart Rate: Karvonen Formula

\[
HR_{\text{Rest}} = 70
\]

Heart Rate Reserve = 110

Moderate Intensity
- Target Lower Limit: \((0.40 \times \text{HRR}) + HR_{\text{Rest}}\)
  \[- (0.40 \times 110) + 70 = 114\]
- Target Higher Limit: \((0.59 \times \text{HRR}) + HR_{\text{Rest}}\)
  \[- (0.59 \times 110) + 70 = 134.9\]

**Target Heart Rate for moderate intensity exercise should be between 114 and 135**
**VO2 Reserve**

\[
VO2 \text{ Reserve} = VO2_{\text{Max}} - VO2_{\text{Rest}}
\]

\[
VO2_{\text{Rest}} \sim 3.5 \text{ mL/min/kg}
\]
Calculating VO2 Targets

Moderate Intensity
- Target Lower Limit: \((0.40 \times VO2_R) + VO2_{Rest}\)
- Target Higher Limit: \((0.59 \times VO2_R) + VO2_{Rest}\)

Vigorous Intensity
- Target Lower Limit: \((0.60 \times VO2_R) + VO2_{Rest}\)
- Target Higher Limit: \((0.89 \times VO2_R) + VO2_{Rest}\)
<table>
<thead>
<tr>
<th>How you might describe your exertion</th>
<th>Borg rating of your exertion</th>
<th>Examples (for most adults &lt;65 years old)</th>
</tr>
</thead>
<tbody>
<tr>
<td>None</td>
<td>6</td>
<td>Reading a book, watching television</td>
</tr>
<tr>
<td>Very, very light</td>
<td>7 to 8</td>
<td>Tying shoes</td>
</tr>
<tr>
<td>Very light</td>
<td>9 to 10</td>
<td>Chores like folding clothes that seem to take little effort</td>
</tr>
<tr>
<td>Fairly light</td>
<td>11 to 12</td>
<td>Walking through the grocery store or other activities that require some effort but not enough to speed up your breathing</td>
</tr>
<tr>
<td>Somewhat hard</td>
<td>13 to 14</td>
<td>Brisk walking or other activities that require moderate effort and speed your heart rate and breathing but don’t make you out of breath</td>
</tr>
<tr>
<td>Hard</td>
<td>15 to 16</td>
<td>Bicycling, swimming, or other activities that take vigorous effort and get the heart pounding and make breathing very fast</td>
</tr>
<tr>
<td>Very hard</td>
<td>17 to 18</td>
<td>The highest level of activity you can sustain</td>
</tr>
<tr>
<td>Very, very hard</td>
<td>19 to 20</td>
<td>A finishing kick in a race or other burst of activity that you can’t maintain for long</td>
</tr>
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<td>Light Exercise</td>
<td>Moderate Exercise</td>
<td>Vigorous Exercise</td>
</tr>
<tr>
<td>------------------------------------</td>
<td>-------------------------------------------------------</td>
<td>-------------------------------------------------</td>
</tr>
<tr>
<td>Leisurely biking (≤5 MPH)</td>
<td>Ballroom dancing</td>
<td>Fast dancing</td>
</tr>
<tr>
<td>Light housework (sweeping)</td>
<td>Biking on level ground</td>
<td>Biking faster than 10 MPH</td>
</tr>
<tr>
<td>Bowling</td>
<td>Gardening</td>
<td>Heavy gardening</td>
</tr>
<tr>
<td>Playing catch</td>
<td>Baseball/softball</td>
<td>Hiking uphill</td>
</tr>
<tr>
<td>Slow walking</td>
<td>Brisk walking</td>
<td>Martial arts</td>
</tr>
<tr>
<td>Child care</td>
<td>Using a manual wheelchair</td>
<td>Race walking</td>
</tr>
<tr>
<td>Tai Chi</td>
<td>Water aerobics</td>
<td>Jogging/running</td>
</tr>
<tr>
<td>Yoga</td>
<td>Pilates</td>
<td>Swimming</td>
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<tr>
<td><strong>No noticeable change in breathing</strong></td>
<td><strong>Can talk but can’t sing</strong></td>
<td><strong>Can say a few words without stopping to catch a breath</strong></td>
</tr>
</tbody>
</table>

Adapted from NCCN Guidelines Survivorship: Physical Activity
Be Active

“image: Freepik.com”. These images were taken from Freepik.com
Benefits of Rehabilitation
Amputation

FIGURE 12-1 Types of upper extremity amputations.
Radiation Fibrosis

Radiation Fibrosis: The progressive tissue hardening and dysfunction that occurs in response to radiation

Radiation Fibrosis Syndrome: The symptoms that occurs due to this hardening
- Tightness
- Loss of range of motion
- Swelling
- Muscle loss, numbness
Radiation Fibrosis

Acute: Effects occur during or immediately after treatment

Early Delayed: Effects occur up to 3 months after completion of treatment

Late Delayed: Effects occur more than 3 months after completion of treatment
Radiation Fibrosis Treatment

Hyperbaric oxygen therapy

Pentoxifylline with or without Vitamin E
Nerve Injury
Nerve Injury
Sequelae From Amputation, Radiation Fibrosis and Nerve Injury

Pain

Weakness

Loss of range of motion

Difficulty with walking

Difficulty with transfers

Difficulty performing everyday activities (showering, getting dressed, etc)
<table>
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<tr>
<th>Medications</th>
<th>Interventions</th>
<th>Modalities</th>
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<td>Topicals</td>
<td>Nerve blocks</td>
<td>Heat</td>
</tr>
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<td>Muscle relaxants</td>
<td>Botox</td>
<td>Cold</td>
</tr>
<tr>
<td>Cannabinoids</td>
<td>Plexus blocks</td>
<td>Electrical stimulation</td>
</tr>
<tr>
<td>Gabapentinoids</td>
<td>Nerve stimulators</td>
<td>Massage</td>
</tr>
<tr>
<td>SNRI’s (serotonin and norepinephrine reuptake inhibitor)</td>
<td>Trigger point injections</td>
<td>Osteopathic</td>
</tr>
<tr>
<td>TCAs (tricyclic antidepressants)</td>
<td>Epidural steroid injections</td>
<td>manipulative treatment</td>
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<tr>
<td>NSAIDs</td>
<td>Nerve ablations</td>
<td>Phonophoresis</td>
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<tr>
<td>Acetaminophen</td>
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<td>Desensitization therapy</td>
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<tr>
<td>Steroids</td>
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<td>Stretching/ROM</td>
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Integrative Medicine
- Supplements
- Acupuncture
Prosthetics
Orthotics
Physical Therapy

- Relearning to walk
- Transfer training
- Regaining range of motion
- Modalities (electrical stimulation, heat, ultrasound, cold)
- Strengthening
- Stretching
- Soft tissue techniques
Occupational Therapy

- Relearning everyday activities (showering, dressing, eating, driving, preparing a meal)
- Strengthening
- Stretching
- Regaining range of motion
- Modalities (electrical stimulation, heat, ultrasound, cold)
- Soft tissue techniques
Hand Therapy

- Focused on hand function
- Strengthening
- Stretching
- Regaining range of motion
- Modalities (fluidotherapy, paraffin wax)
- Bracing
Lymphedema Therapy

Complete Decongestive Therapy
- Lymphatic massage
- Skin care
- Therapeutic exercise
- Compression wrapping
- Compression garments

https://www.clt-lana.org/
Questions

- Exercise is recommended for most people

- Seek medical clearance if indicated

- Aim for **150 minutes** of moderate intensity or **75 minutes** of vigorous intensity activity throughout the week

- Improves fatigue, physical function, anxiety, depression, and health-related quality of life

Email: philip.chang@cshs.org