Physical Activity and Rehabilitation

*Cancer Prevention and Wellness Promotion for Cancer Survivors*

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Cancer: Burden of Disease in the US

**Cancer Incidence Rates**

*Estimated New Cancer Cases* in the US in 2018

<table>
<thead>
<tr>
<th>Cancer Type</th>
<th>Males</th>
<th>Females</th>
</tr>
</thead>
<tbody>
<tr>
<td>Prostate</td>
<td>19%</td>
<td>30%</td>
</tr>
<tr>
<td>Lung &amp; bronchus</td>
<td>14%</td>
<td>13%</td>
</tr>
<tr>
<td>Colon &amp; rectum</td>
<td>9%</td>
<td>7%</td>
</tr>
<tr>
<td>Urinary bladder</td>
<td>7%</td>
<td>7%</td>
</tr>
<tr>
<td>Melanoma of skin</td>
<td>6%</td>
<td>5%</td>
</tr>
<tr>
<td>Kidney &amp; renal pelvis</td>
<td>5%</td>
<td>4%</td>
</tr>
<tr>
<td>Non-Hodgkin lymphoma</td>
<td>5%</td>
<td>4%</td>
</tr>
<tr>
<td>Oral cavity &amp; pharynx</td>
<td>4%</td>
<td>3%</td>
</tr>
<tr>
<td>Leukemia</td>
<td>4%</td>
<td>3%</td>
</tr>
<tr>
<td>Liver &amp; intrahepatic bile duct</td>
<td>4%</td>
<td>3%</td>
</tr>
<tr>
<td>All other sites</td>
<td>22%</td>
<td>21%</td>
</tr>
</tbody>
</table>

*Includes two patients with cancer and three patients with melanoma.

**Cancer Survivors**

- Female breast: 2,717,608 (20%)
- Prostate: 2,714,032 (20%)
- Other: 2,715,790 (20%)
- Colon/rectum: 1,118,740 (9%)
- Melanoma: 972,350 (7%)
- Bladder: 565,387 (4%)
- Corpus uterus: 606,913 (5%)
Cancer Prevention

Seven cancers with “strong” evidence*
  - Evidence of “dose-response” implied

Colon
Breast
Endometrial

Kidney
Bladder

Esophageal adenocarcinoma
Gastric

*Dose-response: Translational Questions

I want to lower my risk of developing cancer...

What type of PA should I do?  
Exercise! Best/most evidence for LTPA

How much is enough?  
Current recommendations = significantly lower risk for several cancers

Is there an optimal amount?  
Doing more than recommended associated with even lower risk (linear relations)

Can I do too much?  
No erosion of benefit up to 30 MET- hrs/wk

How many ways can I get there?  
A broad range of activities associated with lower risk (work, household, transport, walking)

- different types (mixtures)
- big bouts vs. short frequent bouts
Types of physical activity included

Leisure-time

Moderate intensity e.g. walking and/or Vigorous intensity e.g. hiking, jogging
### Main results

(Not adjusted for BMI)

<table>
<thead>
<tr>
<th>Cancer</th>
<th>Cases</th>
</tr>
</thead>
<tbody>
<tr>
<td>Esophageal adenocarcinoma</td>
<td>899</td>
</tr>
<tr>
<td>Gallbladder</td>
<td>382</td>
</tr>
<tr>
<td>Liver</td>
<td>1,384</td>
</tr>
<tr>
<td>Lung</td>
<td>19,133</td>
</tr>
<tr>
<td>Kidney</td>
<td>4,548</td>
</tr>
<tr>
<td>Small Intestine</td>
<td>503</td>
</tr>
<tr>
<td>Gastric cardia</td>
<td>790</td>
</tr>
<tr>
<td>Endometrial</td>
<td>5,346</td>
</tr>
<tr>
<td>Esophageal squamous</td>
<td>442</td>
</tr>
<tr>
<td>Myeloid leukemia</td>
<td>1,692</td>
</tr>
<tr>
<td>Myeloma</td>
<td>2,161</td>
</tr>
<tr>
<td>Colon</td>
<td>14,160</td>
</tr>
<tr>
<td>Head and neck</td>
<td>3,985</td>
</tr>
<tr>
<td>Rectum</td>
<td>5,531</td>
</tr>
<tr>
<td>Bladder</td>
<td>9,073</td>
</tr>
<tr>
<td>Breast</td>
<td>35,178</td>
</tr>
<tr>
<td>Non-Hodgkin lymphoma</td>
<td>6,953</td>
</tr>
<tr>
<td>Thyroid</td>
<td>1,829</td>
</tr>
<tr>
<td>Gastric non-cardia</td>
<td>1,428</td>
</tr>
<tr>
<td>Soft tissue</td>
<td>851</td>
</tr>
<tr>
<td>Pancreas</td>
<td>4,186</td>
</tr>
<tr>
<td>Lymphocytic leukemia</td>
<td>2,160</td>
</tr>
<tr>
<td>Ovary</td>
<td>2,880</td>
</tr>
<tr>
<td>Brain</td>
<td>2,110</td>
</tr>
<tr>
<td>Prostate</td>
<td>46,890</td>
</tr>
<tr>
<td>Malignant melanoma</td>
<td>12,438</td>
</tr>
</tbody>
</table>

Hazard ratio (90th vs. 10th percentile)

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What role does obesity play?
Associations after BMI adjustment

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<tr>
<td>Breast</td>
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</tbody>
</table>

**Conclusions on Cancer Prevention (Risk Reduction)**

- In the past decade, considerable evidence has accumulated suggesting that physical activity has a broad protective effect on cancer risk.
- There are 8 cancers for which physical activity is currently believed to be protective.
- Additional studies are needed to further refine our understanding of dose-response relationships and the role of physical activity type.
Exercise for Cancer Survivors

*Cancer Survivor
Anyone diagnosed with, being treated for, or with a history of cancer.

American College of Sports Medicine Exercise Guideline for Cancer Survivors*
Moderately intense cardio 30 min/day, 5 x/week
Or
Vigorously intense cardio 20 min/day, 3 x/week
And
Eight to ten strength-training exercises, 8-12 repetitions of each, twice a week.

Moderate-intensity physical activity: working hard enough to raise your heart rate, break a sweat, carry on a conversation.
*For the average healthy adult to maintain health and reduce the risk for chronic disease.

Exercise along the continuum of cancer care
Prehabilitation: “...occurs between the time of cancer diagnosis and the beginning of acute treatment and includes physical and psychological assessments that establish a baseline functional level, identify impairments, and provide interventions that promote physical and psychological health to reduce the incidence and/or severity of future impairments.”

Enhanced Recover After Surgery (ERAS)
Multimodal perioperative care pathway that enhances early recovery after surgical procedures by reducing the stress of surgery components include:

- Family and care giver education
- Nutrition interventions
- Prehabilitation exercise and mobility protocols
- Pain medication management
- Smoking cessation
## Prehabilitation Indications

<table>
<thead>
<tr>
<th>Cancer Population</th>
<th>Exercise Prescription</th>
<th>Outcomes</th>
</tr>
</thead>
</table>
| Lung                   | Supervised program 3-4 weeks 2-3 x/week (30-40 minutes) Moderate intensity exercise | • Improves pulmonary function prior to surgery  
                          |                                                                          | • Reduction in hospital LOS  
                          |                                                                          | • Reduced rate of infection  
                          |                                                                          | • Improved tolerance to chemotherapy |
| Colorectal and other GI| Supervised program 2-3 weeks 2-3 x/week (30-40 minutes) Moderate intensity exercise | • Reduced hospitalization and reduced rate of readmission after discharge  
                          |                                                                          | • Enhanced physical performance in elderly patients preoperatively  
                          |                                                                          | • Improves functional capacity prior to chemotherapy |
| Gynecological Cancers  | Supervised program w/home component 2-3 weeks 2-3 x/week (40-60 minutes) Moderate intensity exercise Pelvic floor muscle training | • Improves time to return to continence  
                          |                                                                          | • Improves cardiorespiratory fitness  
                          |                                                                          | • Improves functional walking capacity |


### Exercise to maintain functional performance

ACSM Guideline for Cancer Exercise

### Exercise for reconditioning

Shorter duration activities (e.g. 2-3 low intensity/low resistance PRE’s)  
Adequate monitoring of vital signs and self-reported response to exercise.

### Exercise to alleviate functional impairment

*Prospective surveillance* to monitor for early onset of impairment and promote early intervention
Prospective Surveillance

- Screening and Repeat of Baseline Measures
  - Risk-based
  - Frequency of Interval Assessment
  - Trajectory of Cancer Care
- Triage
  - Exercise and Rehabilitative Interventions
  - Home-based exercise
  - Monitoring
  - Education

Exercise to restore functional performance

ACSM Guideline for Cancer Exercise
Impairment-based, targeted interventions

Survivorship is essentially the remaining lifespan of the individual
Ongoing prospective monitoring for optimal physical function and to enable targeted exercise. Adherence to exercise and healthy lifestyle behaviors is key.
Exercise Indications:
- Maintain independence
- Enhance safety through better endurance and strength
- Prevent falls
- Optimize patient self-management

Exercise Prescription:
- Low to moderate intensity aerobic or resistive exercise, symptom limited with consideration of disease status
- Frequent reassessment and prescription adaptations when medical treatment changes or disease status progresses

### Preliminary Framework for Exercise Guideline

<table>
<thead>
<tr>
<th>At Cancer Diagnosis Pre-Treatment/ Prehabilitation</th>
<th>During Cancer Treatment</th>
<th>After Cancer Treatment</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>ALL Patients</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Assess physical activity level</td>
<td>• Repeat baseline endurance and functional measures</td>
<td>• Repeat baseline endurance and functional measures</td>
</tr>
<tr>
<td>• Clinical measures of endurance and function</td>
<td>• Screen for side effects causing impairment</td>
<td>• Screen for late effects and emerging impairment</td>
</tr>
<tr>
<td><strong>Prehabilitation Exercise</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Moderate intensity aerobic, 3-5x/week, +/- Resistive exercise for populations of interest</td>
<td>Exercise to Maintain</td>
<td></td>
</tr>
<tr>
<td>• Supervised individual or group setting or unsupervised</td>
<td>• Moderate aerobic exercise, +/- resistive exercise, 3-5x/week (150 min/wk)</td>
<td>• Home-based or community-based</td>
</tr>
<tr>
<td></td>
<td>• Supervised or unsupervised</td>
<td>Exercise for Reconditioning</td>
</tr>
<tr>
<td></td>
<td>Exercise for Reconditioning</td>
<td>• Movement-based exercises/PRE’s</td>
</tr>
<tr>
<td></td>
<td>• Supervised</td>
<td>• Supervisor</td>
</tr>
<tr>
<td></td>
<td>Therapeutic Exercise</td>
<td>• Intensity specific to level of deconditioning</td>
</tr>
<tr>
<td>• Indicated based on impairments</td>
<td>Therapeutic Exercise</td>
<td>Therapeutic Exercise</td>
</tr>
<tr>
<td>• Supervised</td>
<td>• Indicated based on impairments</td>
<td>• Indicated based on impairments</td>
</tr>
<tr>
<td>• Preconditioning for select populations</td>
<td>• Supervised</td>
<td>• Supervised</td>
</tr>
<tr>
<td></td>
<td>Proactive for select populations</td>
<td>• Screening and triage based</td>
</tr>
</tbody>
</table>

Stout NL, Baima J, et al 2017 *PMR*
Impairment-driven exercise indications

Cancer treatment-related Impairments  
*Common and Persistent*

<table>
<thead>
<tr>
<th>Systemic Changes</th>
<th>Surgery</th>
<th>Chemotherapy</th>
<th>Radiation</th>
<th>Hormonal</th>
<th>Exercise Benefit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pain</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fatigue</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>Cardiovascular</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pulmonary</td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Neuropathic</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cognitive changes</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Increased adiposity</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lean mass loss</td>
<td></td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Bone fragility</td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Lymphatic congestion</td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Soft tissue scarring</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cytopenia</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Exercise Prescription: Cancer-Related Fatigue

**Indication:** Self-reported fatigue >4/10 on Visual Analog Scale*

**Intervention:** Moderate intensity exercise +/- resistance exercise through the duration of cancer adjuvant treatment
- 14 week duration, 2-3 x/week
- 60 minute exercise sessions
- Supervised

Exercise during adjuvant therapy has greater impact than following treatment completion

**Clinical Measures:**
- Modified Brief Fatigue Inventory
- Cancer-related Fatigue Distress Scale
- 10 point Visual Analog Score
- Multidimensional Fatigue Symptom Inventory

*National Comprehensive Cancer Network Guideline

Exercise Prescription: Lymphedema

**Indication:** Cancer-related deconditioning or loss of strength

**Intervention:** Moderate intensity exercise +/- resistance exercise
- Fit for, and advise use of, compression garment during all exercise interventions
- Close monitoring for limb pain or swelling exacerbation with exercise program
- Load progression over time only when tolerated without symptoms

**Clinical Measures:**
- Lymphedema Life Inventory Score (LLIS)
- Circumferential limb measures
- Bioelectrical impedance spectroscopy
Exercise Prescription: Depression and Anxiety

**Indication:** Clinical diagnosis based on reported feelings of sadness or mood change, sleep disturbance, feelings of guilt, extreme fatigue.

**Intervention:** Low intensity exercise, supervised and guided
- Yoga, Qui gong with meditation and breathing
- 8 – 12 weeks, 3-4 x/week

**Clinical Measures:**
- NCCN Distress Thermometer
- Subscales of European Organization for the Research and Treatment of Cancer Quality of Life Questionnaire (EORTC QLQ)
- Patient-Reported Outcomes Measurement Information System (PROMIS)


Exercise Prescription: Bone Fragility

**Indication:** Osteopenia, Osteoporosis, or clinically diagnosed bone metastasis with ongoing active treatment, deconditioning or loss of strength

**Intervention:** Weight bearing aerobic exercise and resistance training.
- Load tolerance directed, pain free, and with consideration for osseous risk
- Slowly progressive and supervised

**Clinical Measures:**
- Grip strength
- 6 minute walk test
- Timed up and go
- Physical Performance Battery (or short PPB)
Exercise Prescription: Sarcopenia

**Indication:** Loss of strength or muscle mass related to prolonged disease treatment or other interventions such as Androgen Deprivation Therapy

**Intervention:** Resistance training exercise, following ACSM guideline with 8-10 exercises.
- Self-directed load tolerance, progressive
- Protein supplementation and nutrition intervention

**Clinical Measures:**
- Grip strength
- 6 minute walk test
- Timed up and go
- Physical Performance Battery (or short PPB)

Exercise Dosing

Frequency, Intensity, Time, Type
The questions isn’t “Should we prescribe exercise for individuals with cancer?”

The questions is: “How do we optimally prescribe exercise in the context of cancer treatment and survivorship?”

**Exercise Prescription**

**Moderate to High Intensity**
- Safe and effective for most individuals with cancer
- Mitigates side effect impact on function
- May prevent some late effects
- Aerobic +/- Resistive

**Low Intensity**
- Effective to impact fatigue, anxiety, mood, and affective domains.
- Yoga / Qi gong / Tai Chi

Exercise Prescription

**Aerobic**
- 50 – 70 % HR max
- Vital sign and RPE monitoring
- Progressive
- Supervised or unsupervised
- Duration ranges 4–30 wks

**Resistive**
- 8 – 10 strength training exercises
- Load tolerance dependent
- Progressive
- Supervised
- Duration ranges 8–20 wks

**Low Intensity**
- Walking program
- Yoga/Tai Chi
- Freq Range: 3 – 6 days/wk
- Duration ranges 4 to 30 wks


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**Exercise Prescription**

<table>
<thead>
<tr>
<th>Provider</th>
<th>Engagement Level</th>
</tr>
</thead>
<tbody>
<tr>
<td>Physician</td>
<td>Aware, supportive. Prescription improves participation.</td>
</tr>
<tr>
<td>Exercise Physiologist</td>
<td>Monitors response to exercise program. Education for safety with exercise, education for self management.</td>
</tr>
<tr>
<td>Community-based exercise center</td>
<td>Monitors participation in exercise program. Documents any changes in status and refers to health care provider with status changes.</td>
</tr>
<tr>
<td>Self-Directed exercise</td>
<td>Home monitoring, phone call follow up for tolerance and adherence, video and skype follow up.</td>
</tr>
</tbody>
</table>
Safety Considerations

Exercise Safety

*Exercise is safe and effective for all individuals going through cancer treatment or with a history of cancer therapies.*

- Be aware of current disease status, ongoing and anticipated medical treatments.
- Understand systemic treatment side effects and impact on function.
- Adapt exercise program to accommodate changes in medical therapies, systemic changes and individual needs.
- Include family and care givers when possible.
- Assure patient understanding of precautions and risks.
- Recognize precautions and contraindications to exercise based on treatment responses.

Maltser S et al 2017 *PMR*
Blood Counts

*Thrombocytopenia* (<150K \(10^9/L\))

Platelet deficiency. Risk for bleeds, abnormal clotting.

*Neutropenia* (ANC <1.5 \(10^9/L\))

Suppressed immune response. Infection risk.

*Anemia (Hgb ♀ <12 g/dL / ♂ <14 g/dL)*

Hemoglobin deficiency. Reduced oxygen to cells.

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Thrombocytopenia

<table>
<thead>
<tr>
<th>Blood Count ((10^9/L))</th>
<th>Considerations</th>
<th>Exercise Activities</th>
</tr>
</thead>
<tbody>
<tr>
<td>50K - 150K</td>
<td>Symptom-based approach, monitor response to exercise and tolerance to activity.</td>
<td>Resistive or aerobic exercise</td>
</tr>
<tr>
<td>20K – 50K</td>
<td>Monitor for symptoms of bleeding, assess fall risk and implement mobility safety plan.</td>
<td>Movement-based exercise without resistance (walking, biking, swimming)</td>
</tr>
<tr>
<td>&lt;20K</td>
<td>Fall prevention, monitor for symptoms of bleeding.</td>
<td>ADL's and ambulation</td>
</tr>
<tr>
<td>&lt;10K*</td>
<td>Exercise withheld, close monitoring with ADLs, transfers, and mobility.</td>
<td>Restricted mobility</td>
</tr>
</tbody>
</table>

*Highest risk is below 10,000- internal bleeding or brain bleeding*
# Neutropenia

<table>
<thead>
<tr>
<th>Blood Count (10^9/L)</th>
<th>Clinical Presentation</th>
<th>Exercise Activities</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt;1.5*</td>
<td>Mild neutropenia, monitor for fever. Reduce infection risk.</td>
<td>No restrictions</td>
</tr>
<tr>
<td>0.5– 1.0</td>
<td>Moderate neutropenia, monitor for fever.</td>
<td>Symptom-based approach for exercise prescription.</td>
</tr>
<tr>
<td>&lt;0.5</td>
<td>Severe neutropenia</td>
<td>Symptom-based approach for exercise prescription.</td>
</tr>
</tbody>
</table>

*follow facility guidelines for infection prevention

# Anemia

<table>
<thead>
<tr>
<th>Blood Count (g/dL)</th>
<th>Clinical Presentation</th>
<th>Exercise Considerations</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt;8</td>
<td>Severe anemia. Significantly reduced tolerance to activity.</td>
<td>Supervision with exercise, monitor vital signs. Short bouts of exercise. Low exertion activities. Encourage energy conservation strategies.</td>
</tr>
</tbody>
</table>
Osseous Fragility

- Osteoporosis with prolonged hormonal therapy use
  - Breast Cancer – Aromatase Inhibitors
  - Prostate Cancer – Androgen Deprivation Therapy
- Bone metastasis
  - Bone avid primary cancers
    - Breast
    - Lung
    - Thyroid
    - Kidney
    - Prostate

Fracture Risk Assessment

<table>
<thead>
<tr>
<th>Factors</th>
<th>Risk Stratification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Presence of Osteoporosis</td>
<td>Osteoporosis + hx of osteoporotic fracture Osteoporosis + hx radiotherapy &gt;45 Gy</td>
</tr>
<tr>
<td></td>
<td>Osteoporosis (&lt; -2.5 SD)</td>
</tr>
<tr>
<td>Type of Metastatic Lesion</td>
<td>Lytic</td>
</tr>
<tr>
<td>Location of Metastatic Lesion</td>
<td>Weight bearing bone</td>
</tr>
<tr>
<td>Bone Loading</td>
<td>Torque-like forces</td>
</tr>
<tr>
<td>% Bone Erosion</td>
<td>&gt;60%</td>
</tr>
<tr>
<td>Lifestyle/Behavior</td>
<td>Smoker</td>
</tr>
</tbody>
</table>
General Activity Guidelines

- **0 – 25 % cortex involved**
  - Full weight bearing

- **25 – 50 % cortex involved**
  - No resistive or isometric stretching
  - Light aerobic activity
  - Partial weight bearing
  - Lifting precautions – avoid strain on long lever arm

- **> 50 % cortex involved**
  - No exercises
  - Touch down or non-weight bearing (pain dependent)
  - Assistive devices for mobility
  - AROM only, no torsional forces

O’Toole et al. in Stubblefield Cancer Rehabilitation Principles and Practice

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Red Flags with Exercise

<table>
<thead>
<tr>
<th>Symptoms</th>
<th>Considerations</th>
</tr>
</thead>
<tbody>
<tr>
<td>New onset of pain with exercise</td>
<td>Localized with resistive exercise- assess bone stability</td>
</tr>
<tr>
<td></td>
<td>Diffuse abdominal – consider blood counts</td>
</tr>
<tr>
<td></td>
<td>Neuropathic – consider treatment side effects, positioning with exercise.</td>
</tr>
<tr>
<td></td>
<td>Localized to the limb – consider thromboembolic issue</td>
</tr>
<tr>
<td>New onset of swelling with exercise</td>
<td>Compromised cardiac status, new onset lymphedema, deep vein thrombosis, cellulitis infection</td>
</tr>
<tr>
<td>Loss of balance/gait stability during exercise</td>
<td>Visual or vestibular compromise, proprioceptive deficits related to chemotherapy induced neuropathy, overstimulation from surroundings,</td>
</tr>
<tr>
<td>Change in cognitive status with exercise</td>
<td>Hydration status, oxygen saturation, overstimulation from surroundings,</td>
</tr>
<tr>
<td>Rate of Perceived Exertion &gt;17 and symptomatic</td>
<td>Blood counts, compromised cardiac or pulmonary status, oxygen saturation, immunosuppression</td>
</tr>
</tbody>
</table>
Guidelines for implementation

- Exercise is recommended to improve quality of life, and muscular and aerobic fitness in individuals with cancer.
- Pre-Exercise Assessment should be conducted to evaluate effects of disease treatment or comorbidities that require tailored interventions.
- Exercise in group or supervised settings improves outcomes.
- Moderate Intensity exercise is recommended ongoing throughout cancer treatment and through survivorship.

• Exercise to be embedded as a part of standard practice in cancer care and to be viewed as an adjunct therapy that helps counteract the adverse effects of cancer and its treatment;

• All members of the multidisciplinary cancer team should promote physical activity and recommend that people with cancer should adhere to exercise guidelines; and

• Best practice cancer care should include referral to an accredited exercise physiologist or physiotherapist with experience in cancer care.

Cormie P, Atkinson M, et al. (2018) MJA, published online 07/05/2018

ASCO 2018: Practical Assessment and Management of Vulnerabilities in Older Patient’s Receiving Chemotherapy.

• Pre-treatment assessment of:
  • Function
  • Falls
  • Comorbidity
  • Cognition
  • Depression
  • Nutrition

• Repeated interval assessment
## ASCO: Geriatric Assessment – Guided Interventions

<table>
<thead>
<tr>
<th>Geriatric Assessment Measure</th>
<th>Guided Interventions</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Function and Falls</strong></td>
<td>Referral to PT/OT for strength &amp; balance training, assistive device, home program and safety evaluation</td>
</tr>
<tr>
<td>• IADL deficit</td>
<td>Fall prevention discussion</td>
</tr>
<tr>
<td>• History of Falls</td>
<td></td>
</tr>
<tr>
<td><strong>Comorbidity</strong></td>
<td>Involvement of care giver/primary care provider for management of comorbidities, medications, and medical treatment decision making</td>
</tr>
<tr>
<td>• Comorbidity and polypharmacy considerations</td>
<td></td>
</tr>
<tr>
<td><strong>Cognition</strong></td>
<td>Assess decision making capacity and need for proxy</td>
</tr>
<tr>
<td>• Deficits validated on screening</td>
<td>Review medications to minimize risk of delirium</td>
</tr>
<tr>
<td><strong>Depression</strong></td>
<td>Referral for psychiatry or cognitive-behavioral therapy</td>
</tr>
<tr>
<td>• Geriatric Depression Scale &gt;5</td>
<td>Social work involvement</td>
</tr>
<tr>
<td><strong>Nutrition</strong></td>
<td>Referral to nutritionist/dietician</td>
</tr>
<tr>
<td>• Weight Loss &gt; 10 %</td>
<td>Assess need for supportive meal preparation</td>
</tr>
</tbody>
</table>

### National Academies of Sciences, Engineering, and Medicine Report

**LONG-TERM SURVIVORSHIP CARE AFTER CANCER TREATMENT**

**BOX 1 Continued**

**Improving Symptom Management and Rehabilitation**

- Disseminate evidence-based practice guidelines to manage cancer symptoms and treatment side effects. (Jacobsen)
- Integrate evidence-based psychosocial services into care for cancer survivors and caregivers and improve access to behavioral and mental health services. (Franco, Ganz, O’Rourke)
- Provide evidence-based interventions to cancer survivors with persistent fatigue or sleep problems (e.g., exercise, cognitive behavioral therapy, sleep hygiene measures, psychoeducation). (Jacobsen)

- Use cancer rehabilitation to maintain and restore function, reduce symptom burden, maximize independence, and improve quality of life. (Ganz)

- Offer cancer rehabilitation services to certain patients prior to initiating cancer treatment to minimize toxicity and mortality. (Ganz, Kirch, Silver)
Call to Action:

- Implement models of prospective care.
- Develop targeted education and training initiatives to assure the knowledge and skills of our workforce.
- Understand the effectiveness of rehabilitation services in improving costs, utilization, and meaningful functional outcomes.
Proposed Framework for Risk Stratification


EXPERT PANEL
Kathryn H. Schmitz, PhD, MPH, FACSM
Kerry S. Courneya, PhD
Charles Matthews, PhD, FACSM
Wendy Demark-Wahnefried, PhD
Daniel A. Galván, PhD
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Melinda L. Irwin, PhD, FACSM
Kathleen Y. Wolin, ScD, FACSM
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Alejandro Lucia, MD, PhD
Carole M. Schneider, PhD, FACSM
Vivian E. von Gruenigen, MD
Anna L. Schwartz, PhD, FAAN

American College of Sports Medicine Roundtable on Exercise Guidelines for Cancer Survivors

SPECIAL COMMUNICATIONS
Roundtable Consensus Statement

0195-9131/10/4207-1409/0

MEDICINE & SCIENCE IN SPORTS & EXERCISE
Copyright © 2010 by the American College of Sports Medicine
DOI: 10.1249/MSS.0b013e3181e0c112
2010 Roundtable Recommendations
Limitations

• Primarily research focused on early stage breast cancer

• Little evidence to provide insight on other cancer sites, phase of treatment, or in advanced cancers

• The outcome recommendations are very general – a public health based health maintenance recommendation

• Driven solely by ACSM with no input from other exercise or medical professional disciplines

American College of Sports Medicine
Cancer and Exercise Roundtable

• Review new evidence since 2010 Roundtable

• Role of exercise in:
  • Cancer prevention
  • Cancer treatment-related side effects
  • Survivorship and end of life

• Models of care for implementation

• Anticipate new publications for exercise guideline and prescription Spring of 2019
APTA and AAPM&R Cosponsored the event
Rehabilitation Representation

- Kristin Campbell PT, PhD
- Lynn Gerber MD
- Stephen Morris PT, PhD
- Catherine Alfano PhD
- Leighton Chan MD
- Andrea Cheville MD
- Jonas Sokolof MD
- Joachim Wiskemann PT
- Martijn Stuiver PT, PhD
- David Zucker MD
- Julie Silver MD
- Nicole Stout PT, DPT, FAPTA

Characterizing the Evidence

“Cancer treatment has one outcome: Survival

Cancer prevention has one outcome: Incidence

Cancer survivorship has > 100 outcomes!” ~ Kerry Courneya

How do we characterize the evidence?
What is important, yes…but what is most useful?
What is primary?

- Time Frame
- Diagnosis
- Treatment
- Outcome/Symptom

Guiding principles

Triage & Risk Stratification

- More of a safety / implementation recommendation
- We can modify based on best practices, but probably less on evidence in cancer
- Risk stratification emerging area in literature
- Collaboration with rehabilitation medicine and physical therapy

Slide courtesy of ACSM 2018
Guiding principles

Specificity

**General mode**: aerobic, resistance, flexibility, agility, balance
- How do we categorize multi-modal exercise? Is aerobic + resistance its own mode?
- What do we do with “non-traditional” modes such as tai chi, pilates, soccer, etc.

**Specific mode**: cycling vs. walking, free vs. machine weight, etc.

**Level of evidence**
- Head to head trials
- Comparison across trials / Systematic reviews

Slide courtesy of ACSM 2018
Where do you go from here?

Go To Resources

Special Issue
September 2017

Quarterly Journal

Special Issue
February 2017

Special Issues:
April 2012
May 2013

Special Issues:
October 2015
July 2011

Cancer Rehabilitation Text
Despite Uncertainty...

Never doubt that you:

- can diagnose problems and progression that other caretakers will miss
- have the capacity to do great good and to bring much comfort and relief

Rehabilitation didn’t save my life, it gave me my life back after cancer.
Bibliography

High Priority Reads


Additional References


Brief Case #1
Cervical Cancer

46 y/o woman with locally advanced cervical cancer. Has received 2 cycles of chemotherapy with concurrent radiation therapy.
Chemotherapy agents: Cisplatin and 5 Fluorouracil
Developed neutropenic fever and was hospitalized for antibiotic treatment after 2nd cycle.
Upon discharge from the hospital, a referral was made for a rehabilitation consult due to fatigue and difficulty walking.
Self-reported fatigue: 6-7/10 most days, napping 1-2 hours daily
Reports constant ‘buzzing sensation’ in hands and feet

Chemotherapy-Related Symptoms:
  • Chemotherapy-induced peripheral neuropathy
  • Clinically significant fatigue
  • History of neutropenia

Prior to being diagnosed with cervical cancer, she was extremely active participating in daily cross fit classes and training for her next triathlon.
She breaks down in tears explaining to you how frustrated she is with her treatment and how her body is responding. “The more I try to do things, the worse I feel” “I can’t remember anything, I forget simple things” She shares her fear of being disabled for the rest of her life.
She is married with two daughters; 5 and 8 yrs old and she feels disgusted with knowing that they see her struggling and weak.

Questions for Discussion:
What cancer treatment-related impairments are you identifying?
Are there any red flags?
What are some points of education that you might consider?
What assessment tools will you choose?
Are other referrals indicated?
Brief Case #2
Ovarian Cancer

A 76 year-old woman has completed 4 of 6 cycles of chemotherapy (carboplatinum and Taxotere) for ovarian cancer. You are seeing her for consultation in her home, where she lives alone and reports that she is having difficulty going up and down the stairs since her last chemotherapy infusion (10 days ago). She feels unsteady on her feet, especially in the afternoon when she says she is too tired to get off of the sofa.

She used to walk to her mailbox at the end of the street every day to get the mail, but stopped after her first chemotherapy cycle as she felt less safe walking outside. She has also given up her bridge group, which she used to play in twice weekly at her club.

Clinical Findings:
- Hgb 8.4 g/dL
- Platelets 145K
- White Blood Cells 0.75 10^9/L
- Resting heart rate 102, BP 105/70, O₂ sat 95%
- Height 5’ 2”, Weight 96 lbs
- Timed up and go test 24 seconds (age reference value: 9.2 sec)
- Self-reported pain 0-2/10 mostly in her knees when doing stairs
- Self-reported Fatigue 5-6/10 (VAS)

Upon assessment of her living conditions, you identify that she has moved all of her artifacts of interest (her knitting materials, her check book, a stack of magazines, the TV remote, several books, a deck of cards, her phone) into the living room surrounding her sofa. There are dishes piled in the sink which she notes she ‘tries to get to on her good days’.

Questions for Discussion:
What cancer treatment-related impairments are you identifying?
Are there any red flags?
Indications and special considerations with exercise?
What would an exercise prescription look like?
What strategies might you try to encourage adherence to exercise?
Brief Case #3
Breast Cancer

Part 1
A 62 year-old post-menopausal woman completed chemotherapy and radiation therapy 18 months ago for Stage III ER/PR + breast cancer. She has been on Anastrozole since completing radiation. Her recent DEXA scan reveals a Z score drop of 2.5 SD and she is now osteoporotic. She is very upset as she has been walking 45 – 60 minutes most days in her neighborhood and is devastated that this has happened.

Clinical Findings:
• Pain 0-1/10 (VAS), Self-reported joint stiffness, generalized throughout shoulders, hips, and knees. Her walking program seems to alleviate the stiffness.
• BMI = 19.8
• Short Physical Performance Battery demonstrates minimal limitations
• 6 min walk test is within age-matched means

Questions for Discussion:
What does your assessment entail today?
Are there any red flags?
What would an exercise prescription look like?

Part 2
6 months later she returns, noting that she was doing well with the program until last week when she started having new pain symptoms in her left hip. Pain is greater later in the day and standing or walking makes it worse. Pain symptoms at worst are 5-6/10. She has stopped the rest of her exercises and is hopeful that there are some stretches or some advice that you can give her to help with these symptoms.

Questions for Discussion:
What are the differential diagnoses for her presentation?
What do you do for her continued exercise program?
Is medical referral indicated? To whom? And what test do you recommend?
Brief Case #4
Prostate Cancer

A 69 year-old man with stage II prostate cancer underwent a prostatectomy 6 months ago and has been on Lupron (a primary anti-androgen therapy) monthly. A recent medical oncology exam reveals elevated prostate-specific antigen (PSA) levels. He is slated to start chemotherapy (Taxotere) in 2 weeks and will start Casodex (a secondary anti-androgen therapy). Prior to being diagnosed with prostate cancer he was active, playing in a tennis league weekly and volunteering at the library helping with internet searches for patrons. Over the last 6 months he plays tennis less frequently but still keeps up with his volunteer work.

Clinical Findings:
- Clinically significant fatigue 5/10 (VAS)
- 6 minute walk test: 1 standard deviation below age-matched means
- Sensation: normal in distal upper and lower extremities
- Static balance deficits when visual input is limited
- Cognitive changes: minimal memory recall deficits with complex scenarios
- Lower extremity strength: 4-5/5 throughout
- DEXA reveals osteopenia, with reduced Z score (less than 0.5 SD) from his initial diagnosis
  - No evidence of metastatic disease

Questions for Discussion
- What baseline measures do you want to take today?
- What other cancer treatment-related information would you like to have prior to initiating a plan of care?
- What does your plan of care entail as far as exercise?
- How frequently will you see him?
- Are other referrals indicated?
Brief Case #5
Head and Neck Cancer

68 y/o man diagnosed with regionally advanced stage III head and neck cancer. He completed radiation therapy 7 days ago to the right lateral cervical, supraclavicular, chest wall, and right axillary regions. He developed cellulitis in his right arm and is 5 days into an antibiotic regimen. Over the course of the last 3 weeks he has experienced progressive weight loss, (>18 lbs in 3 weeks) he reports night sweats and worsening neck and mid back pain.

Clinical Findings:
- Elevated liver function tests
- Dressed open wound in the right axilla
- Radiation-related telangectasia to the lateral cervical region
- Marked decrease in cervical ROM in all planes
- Self-reported fatigue 7-8/10, worse as the day progresses

Questions for Discussion
- What do you think is happening here?
- Are other referrals indicated?
- Is rehabilitation indicated?
- What assessment would you conduct today?
- What would an exercise program look like for him? Frequency? Intensity?
- What other information will inform your plan of care?
Brief Case #6
Hematological Cancer, post hematopoietic stem cell transplant (HSCT)

A 45 year-old man 9 months s/p HSCT due to acute lymphocytic leukemia. He is being tapered gradually from his immunosuppression drugs but remains on prednisone. He is very motivated to return to work as he and his brother own a construction company. He has tried to get back onto job sites for ½ days, but finds that his fatigue is limiting him from work. He is also noting that he has trouble following conversations at work, and difficulty keeping his attention focused in planning meetings. He is able to go into work in the morning until about 11/12:00 then has to come home. In the afternoon, he naps for 2-3 hours and says that he is sleeping 9 hours at night.

Clinical Findings:
- Hgb: 8.9
- Platelets: 145K
- Self-reported pain 0/10
- Self-reported fatigue, 4/10 in the morning and progressing to 6-7/10 in the afternoon
- Cognitive assessment reveals attention deficit and short-term memory lapses
- State-Trait Anxiety Inventory reveals high measures of anxiety about his cancer diagnosis and current situation

Questions for Discussion:
- What is the primary cancer treatment-related impairment?
- Are there any red flags?
- What type of exercise program is indicated base on these findings?
- How would you structure his exercise prescription? Timing? Dose? Frequency?
- Are other referrals indicated and if so, to whom?