CVD Prevention and Treatment During Survivorship: What Lifestyle Changes and How?

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Premature Accumulation of Risk Factors in Young Cancer Survivors

Survivors of Adolescent and Young Adult Cancer Diagnosed at Ages 15 to 29 Years

Respondents Without a History of Cancer

<table>
<thead>
<tr>
<th>Risk behaviors</th>
<th>Smoker</th>
<th>Binge drinker</th>
<th>Obese</th>
<th>No PA</th>
<th>CVD</th>
<th>HTN</th>
<th>Disability</th>
<th>DM</th>
</tr>
</thead>
<tbody>
<tr>
<td>Survivors</td>
<td></td>
<td></td>
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<tr>
<td>Respondents</td>
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</tbody>
</table>
CV Risk Factors and Major CVD Events in Adult Survivors of Childhood Cancer

2+ CV risk factors (RR, 2.4; 95% CI, 1.2 to 4.9)
Causes of Accelerated CVD in Cancer Patients

- Decreased Cardiovascular Reserve
- Surgery
- Radiation
- Systemic Therapy
- Physical inactivity / changes in body composition
- Aging
- Other CVD risk factors (HTN)

Lifestyle and CVD Prevention in Cancer
Exercise and Risk of Major CVD Events in Adult Survivors of Hodgkin Lymphoma

![Cumulative Incidence Graph](image)

- Cumulative Incidence (%)
- Time Since Baseline (years)
- Any Major Cardiovascular Event

Legend:
- < 9 MET-hrs.wk⁻¹
- ≥ 9 MET-hrs.wk⁻¹

Exercise and Survival After Breast Cancer


≥8 MET-hr-wk

≥ 15 MET-hr-wk
### Effects of Exercise Training on Fitness Across the Cancer Continuum (2005-2015)

<table>
<thead>
<tr>
<th>Study</th>
<th>Cancer Type</th>
<th>Studies Reviewed (studies measuring Δ VO2)</th>
<th>Timepoint of Intervention (studies measuring Δ VO2)</th>
<th>Effect of ET on VO2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Singh et al., 2013[66]</td>
<td>Lung (61%), colorectal, prostate, colon, pancreatic, liver, colon, rectum, sarcoma, esophagus</td>
<td>Systematic review of 18 clinical trials. (6)</td>
<td>Pre-surgical.</td>
<td>↑</td>
</tr>
<tr>
<td>Schmitz et al., 2005[68]</td>
<td>Breast (72%), colon, lung, ovarian, leukemia, lymphoma, testicular, sarcoma, stomach, prostate, other</td>
<td>Systematic review of 22 high-quality studies. (9)</td>
<td>During (5) and after (4) cancer treatment.</td>
<td>↑ (weak evidence, during) ↑(strong evidence, after)</td>
</tr>
<tr>
<td>Jones et al., 2011[102]</td>
<td>Breast (67%), lymphoma, prostate, colon</td>
<td>Meta-analysis of 6 clinical trials. (6)</td>
<td>During (2) and after (4) cancer treatment.</td>
<td>↑</td>
</tr>
<tr>
<td>Wolin et al., 2010[103]</td>
<td>Hematologic cancer (100%)</td>
<td>Review of 23 high-quality intervention studies in adults and pediatric population. Adults (1) Children (6)</td>
<td>Receiving and not receiving hematopoietic stem cell transplantation.</td>
<td>↑ (weak evidence, adults) ↑(strong evidence, children)</td>
</tr>
</tbody>
</table>
A Cardiologist’s How To: Exercise and Risk Factor Change in Cancer Patients

• When
  – Prior to treatment
  – During treatment
  – Survivorship

• Where
  – Physical therapy
  – Oncology rehabilitation
  – Cardiac rehabilitation
  – Community centers
  – Home-based

• How
  – Referral
  – Testing
  – Exercise prescriptions
Cardiac Rehabilitation as a Model for Cancer Patients
Expanding Components of CR to Cancer Patients

Dalal, HM. BMJ. 2015; 351:h5000.
Flow to Cardiac Rehabilitation for Cancer Patients

Complete Chemotherapy → Trigger EPIC consults → PT consult → Cardiology consult → Functional evaluation → Cardiac Rehab

Preventative Cardiology Consultation

• Goal of the consultation is to assess fitness and CVD risk factors after cancer treatment.

• Provides patients with a personalized exercise routine.

• Patients also receive information regarding risk of heart disease and ways to improve your heart health over a lifetime.
Suggested Components of Consultation

• The patient’s evaluation will include a heart risk screening exam and a treadmill exercise test.
  • Impact of prior cancer treatment on heart health
  • Fitness level
  • Cholesterol levels
  • Risk of hypertension or high blood pressure
  • Risk of Diabetes
  • Body weight and waist measurements
  • Impact of family history on heart health
  • Smoking cessation information, if needed
1. Measure VO$_2$ - Cardiorespiratory Fitness
2. Determine Cardiopulmonary Safety
3. Determine Exercise Dose
4. Compare Fitness Level to Healthy Age-Sex Matched Individuals
5. Assess Etiology of Shortness of Breath
Contraindications/Special Considerations Prior to Exercise in Cancer Patients

**Cardiac**
- Uncontrolled symptomatic heart failure
- Acute myocarditis
- Recent myocardial infarction
- Severe symptomatic valvular disease
- Uncontrolled heart rhythm
- Acute pulmonary embolism
- Severe hypertension (>200/110 mmHg)

**Lab measures**
- Severe anemia (<8 g/dl)
- Absolute neutrophil count <500
- Platelet count <50 k/cmm

**Symptoms**
- Severe shortness of breath
- Acute nausea during exercise
- Vomiting within 24 hours
- Disorientation
- Blurred vision

**Other**
- Acute Infection
- Acute metabolic disease
- Unmanaged lymphedema
- Mental or physical impairment to exercise

**SPECIAL CONSIDERATIONS**
- Initial wound healing after surgery
- Indwelling catheters
- Bone and brain metastasis
- Recent chemotherapy or radiation (within 24 hours)
# Aerobic Exercise Prescription During Rehabilitation

<table>
<thead>
<tr>
<th>Week Range</th>
<th>Intensity (% Max HR)</th>
<th>Frequency (µ /wk)</th>
<th>Steps per Session</th>
<th>Minutes per Week</th>
</tr>
</thead>
<tbody>
<tr>
<td>Weeks 1–4</td>
<td>70-85% MHR*</td>
<td>Supervised: 2/wk</td>
<td>2000-3000</td>
<td>60–90</td>
</tr>
<tr>
<td></td>
<td>Increase from 20 to 30 minutes</td>
<td>Home: 1/wk</td>
<td>1.25 x baseline</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>60–90</td>
<td></td>
</tr>
<tr>
<td>Weeks 5–8</td>
<td>70-85% MHR</td>
<td>Supervised: 2/wk</td>
<td>3000-4500</td>
<td>120–160</td>
</tr>
<tr>
<td></td>
<td>Increase from 30 to 40 minutes</td>
<td>Home: 1-2/wk</td>
<td>1.5 x baseline</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>120–160</td>
<td></td>
</tr>
<tr>
<td>Week 9–12</td>
<td>70-85% MHR</td>
<td>Supervised: 2/wk</td>
<td>4500-5000</td>
<td>160</td>
</tr>
<tr>
<td></td>
<td>Continue 40 minutes</td>
<td>Home: 2/wk</td>
<td>2 x baseline</td>
<td></td>
</tr>
</tbody>
</table>

* MHR = Maximum heart rate from baseline exercise tolerance test

Resistance Training Prescription During Rehabilitation

<table>
<thead>
<tr>
<th>Upper Extremity</th>
<th>Lower Extremity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chest</td>
<td>Quadriceps</td>
</tr>
<tr>
<td>Back</td>
<td>Hamstrings</td>
</tr>
<tr>
<td>Shoulder</td>
<td>Hip Flexors</td>
</tr>
<tr>
<td>Core</td>
<td>Hip Extensors</td>
</tr>
<tr>
<td></td>
<td>Hip abduction</td>
</tr>
</tbody>
</table>

- The participant resistance training prescription will be based on their experience with resistance training and modified for any identified range of motion deficits.

- Resistance exercise options targeting different muscle groups will be provided and selected based on initial testing results.

- After initial oncology treatment the resistance training prescription is two sets of 8-12 repetitions, performed twice weekly. The initial resistance for chest press and leg press will be set at 60-70% of 1RM for most participants.

Patient Example

- 27 year old survivor of AML (diagnosed 7 years)
- Protocol CCG-2891 (included anthracycline)
- Relapse
- Re-induction chemotherapy
- Stem Cell transplant 1997
- 2018 Echocardiogram: LVEF 53%

- Hypertension on Azor 10-40mg daily
  - BP 120/78
- Insulin resistance on Metformin
  - HbA1c 5.2%
- BMI 36 kg/m2
- Inconsistent exerciser
- Non-smoker
- No premature FH of CHD
- Cholesterol levels: LDL 153, HDL 34, TC 208
Case Example: CPET
(26 year old male s/p treatment for AML)
CVD Prevention Plan

- Blood Pressure
- Insulin resistance
- Cholesterol
- Exercise – Fitness
- Body Weight
- Psychosocial
Conclusion

• CVD risk factor modification is key to preventing CVD in cancer patients.

• Exercise improves fitness and survival among cancer patients.

• Cardiologists can leverage cardiac rehabilitation model to systematically improve preventative and lifestyle modification for cancer patients.
ANYTHING IS POSSIBLE™