Heart Disease After Cancer: 
What You Can Do to Stay Healthy

Eric Chow, MD MPH
June 6, 2015
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Disclosures

• Not a cardiologist
• Not even an internist, but a pediatrician

Many examples will be on transplant survivors & also childhood cancers, but lessons learned are applicable to other groups of survivors
Leading causes of death: 2005-2011

Heart disease & cancer ~ 25% of all deaths

Centers for Disease Control & Prevention
http://www.cdc.gov/nchs/data_access/vitalstatsonline.htm
Behaviors Linked to Heart (and Cancer) Risk

• Obesity
  – Affects ~1 of 3 Americans, still increasing
  – Physical activity levels are low nationally
  – Few meet recommended fruit/vegetable intake; most eat too much salt

• Tobacco
  – Although declining, ~1 of 4 Americans still smoke

• Inadequate treatment of heart-related conditions
  – About half of people with known high blood pressure have it controlled
  – Only 1/3 of people with high LDL cholesterol have it controlled
  – Only 20% of people with diabetes have it well-controlled

CDC – MMWR 10/2014
http://www.cdc.gov/mmwr/preview/mmwrhtml/su6304a2.htm
How about Washington?

- 2009 BRFSS data: among the healthier states, but not the healthiest (OR, ID, WY, MT, UT, CO all doing better!)

Fang J. J Am Heart Assoc 2012
By other metrics, WA is pretty average

adjusted prevalence ratio of “ideal” cardiovascular health, including CHD & stroke, BRFSS 2009

- 37% normal weight (rest of us are overweight or obese)
- 70% met physical activity guidelines!
- 25% eat 5+ fruits/vegetables/day
- 15% still smoke
- 7% have diabetes
- 17% have hypertension
- 32% have high cholesterol

**BRFSS: all based on self-report**
Obesity
Hypertension
Dyslipidemia
Insulin resistance
[Metabolic syndrome]

Lifestyle
Environment
Genetics

Treatment Factors
Chemotherapy
Radiotherapy
Surgery

Cardiomyopathy
Fibrosis

Heart Disease
Anthracycline Chemotherapy
(doxorubicin, daunorubicin, epirubicin, idarubicin, mitoxantrone)

Dutch registry (830 survivors)
(van Dalen, Eur J Ca 2006)

CCSS cohort (14,348 survivors)
(Mulrooney, BMJ 2009)
Serious Cardiovascular Disease, WA State
Fred Hutch BMT survivors

A. CV Death
HR 3.4 (2.1-5.4)

B. Ischemic Heart Disease
HR 1.6 (1.2-2.3)

C. Cardiomyopathy / Heart Failure
HR 3.4 (2.5-4.7)

D. Stroke
HR 2.2 (1.3-3.6)

E. Vascular Disease
HR 3.0 (2.0-4.4)

F. Rhythm Disorder
HR 3.4 (2.6-4.5)

≥ 2yr BMT survivors
DoL licensees

Ann Intern Med 2011
Fred Hutch BMT Survivors
Effect of modifiable heart disease risk factors

Relative Risk (hazards)

- PreHCT*
  - Coronary artery disease: 100%
  - Heart failure: 50%

- 2yr
  - Hypertension: Almost 300%
  - Almost 200%

* Hazards associated with presence of each additional risk factor: current smoking, obesity, hypertension, dyslipidemia, or diabetes
Other Cancer Survivors

(A) Needing blood pressure lowering medications
European testicular cancer patients
(Haugnes, JCO 2010)

(B) Coronary heart disease
European breast cancer patients
(Darby NEJM 2013)
Adult survivors of childhood cancer

- Hypertension
  - Prevalence: 40%
  - Sibling: 26%
  - Survivor: 40%
  - Age Group: <30 years, 30–39 years, 40–49 years, ≥50 years
  - P=0.001

- Dyslipidemia
  - Prevalence: 23%
  - Sibling: 14%
  - Survivor: 23%
  - Age Group: <30 years, 30–39 years, 40–49 years, ≥50 years
  - P=0.002

- Diabetes
  - Prevalence: 9%
  - Sibling: 6%
  - Survivor: 9%
  - Age Group: <30 years, 30–39 years, 40–49 years, ≥50 years
  - P=0.04

- Obesity
  - Prevalence: 31%
  - Sibling: 25%
  - Survivor: 31%
  - Age Group: <30 years, 30–39 years, 40–49 years, ≥50 years
  - P=0.03
Role of Genetics?
Among Hutch BMT survivors free of serious heart disease
Likelihood of developing these conditions [ORs]

<table>
<thead>
<tr>
<th>Family History</th>
<th>Hypertension</th>
<th>Dyslipidemia</th>
<th>Diabetes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Adult survivors</td>
<td>2.1 x</td>
<td>1.7 x</td>
<td>1.5 x</td>
</tr>
<tr>
<td><em>J Clin Oncol 2013</em></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pediatric survivors</td>
<td></td>
<td>2 or more metabolic traits: 3.7 x</td>
<td></td>
</tr>
<tr>
<td><em>Biol BMT 2010</em></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

People with a strong family history of these conditions should be particularly watchful for the development of these conditions.
Compared to a national sample, HCT survivors have healthier lifestyles

JCO, 2013
Role of Lifestyle Factors?

1+yr HCT survivors (all ages), treated 1970-2010 (n=2362) matched against NHANES sample
1+yr HCT survivors (all ages), treated 1970-2010 (n=2362) matched against NHANES sample.

Lifestyle factors (smoking, diet, physical activity) may REDUCE the risk of serious heart conditions even among heavily treated cancer survivors.
Role of Lifestyle Factors?
Among BMT survivors free of heart disease
Likelihood of developing these conditions [ORs]

<table>
<thead>
<tr>
<th></th>
<th>Hypertension</th>
<th>Dyslipidemia</th>
<th>Diabetes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Post-HCT smoking</td>
<td>0.7 x</td>
<td>1.2 x</td>
<td>1.8 x</td>
</tr>
<tr>
<td>Healthy diet</td>
<td>0.9 x</td>
<td>0.7 x</td>
<td>0.5 x</td>
</tr>
<tr>
<td>Physical activity</td>
<td>0.7 x</td>
<td>0.9 x</td>
<td>0.7 x</td>
</tr>
</tbody>
</table>

GREEN = good / protective
RED = worse / not protective

JCO, 2013
Risk of undertreatment?
BMT survivors: lab values at 1 year & subsequent heart disease

<table>
<thead>
<tr>
<th>Condition</th>
<th>Total cholesterol, mg/dL*</th>
<th>Triglyceride, mg/dL†</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>N</td>
<td>Median (IQR)</td>
</tr>
<tr>
<td>Cardiovascular death</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Unaffected &amp; alive</td>
<td>174</td>
<td>195 (164-236)</td>
</tr>
<tr>
<td>Affected</td>
<td>13</td>
<td>223 (208-251)</td>
</tr>
<tr>
<td>Ischemic heart disease</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Unaffected &amp; alive</td>
<td>171</td>
<td>195 (163-236)</td>
</tr>
<tr>
<td>Affected</td>
<td>19</td>
<td>213 (181-276)</td>
</tr>
<tr>
<td>Cardiomyopathy</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Unaffected &amp; alive</td>
<td>169</td>
<td>195 (163-235)</td>
</tr>
<tr>
<td>Affected</td>
<td>30</td>
<td>214 (187-251)</td>
</tr>
<tr>
<td>Stroke</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Unaffected &amp; alive</td>
<td>170</td>
<td>195 (163-236)</td>
</tr>
<tr>
<td>Affected</td>
<td>13</td>
<td>211 (187-251)</td>
</tr>
</tbody>
</table>

BBMT 2014
Develop Better Decision-Making Tools for Clinicians

• 20-year old man, non-smoker, not on medications with total cholesterol 257, HDL cholesterol 41, systolic blood pressure 115
  – Standard population predictor -> 1% risk of heart attack in 10 yrs; 1-5% risk of any heart disease in 30 yrs

• This person also happened to have had relapsed leukemia, and received 2 transplants, and doxorubicin chemotherapy plus total body irradiation
  – Cancer survivor specific predictor: 12% risk of heart attack and/or heart failure based on cancer treatments alone by age 50 (not even factoring in high cholesterol)
Risk Assessment Tool for Estimating Your 10-year Risk of Having a Heart Attack

The risk assessment tool below uses information from the Framingham Heart Study to predict a person’s chance of having a heart attack in the next 10 years. This tool is designed for adults aged 20 and older who do not have heart disease or diabetes. To find your risk score, enter your information in the calculator below.

Age:  
Gender:  
Female  Male
Total Cholesterol:  
mg/dL
HDL Cholesterol:  
mg/dL
Smoker:  
No  Yes
Systolic Blood Pressure:  
mm/Hg
Are you currently on any medication to treat high blood pressure.  
No  Yes

Calculate Your 10-Year Risk

• Can also check out:  
http://www.framinghamheartstudy.org/risk-functions/
Your Resource > CCSS CHF Risk Calculator

This risk assessment tool predicts risk of congestive heart failure (CHF) by age 40 among survivors of childhood cancer. It uses information from the CCSS paper, "Individual prediction of heart failure among childhood cancer survivors" (Chow et al., ...), which created clinically useful models with readily available demographic and cancer treatment information. These models were designed specifically for patients who have recently completed cancer treatment (5 years from cancer diagnosis). These models have been validated in 3 separate groups of childhood cancer survivors: Emma Children's Hospital and Academic Medical Center (Amsterdam, the Netherlands), the National Wilms Tumor Study, and the St. Jude Lifetime Cohort Study.

Depending on what level of treatment information is available, we created three different prediction models:

- Simple (if anthracycline and chest radiation exposures are known, but not the doses)
- Standard (if anthracycline and chest radiation doses are known)
- Standard+heart (if anthracycline dose and heart-specific radiation dosimetry are known)

To determine one's risk of CHF, please enter the information below (All fields are Required):

Gender?
- Male
- Female

Patient's age at diagnosis?
- < 5
- 5 - 9
- 10 - 14
- ≥ 15

Are the patient's anthracycline and/or chest/heart radiation doses known?
- Yes
- No

Online calculator: ccss.stjude.org/chfcalc

Next  Reset
Breast cancer & heart failure after trastuzumab
(based on age 67+, Medicare data)

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Points</th>
</tr>
</thead>
<tbody>
<tr>
<td>Any chemotherapy</td>
<td>2</td>
</tr>
<tr>
<td>Age 67-74</td>
<td>0</td>
</tr>
<tr>
<td>Age 75-79</td>
<td>1</td>
</tr>
<tr>
<td>Age 80+</td>
<td>2</td>
</tr>
<tr>
<td>Coronary artery disease</td>
<td>2</td>
</tr>
<tr>
<td>Atrial fibrillation/flutter</td>
<td>2</td>
</tr>
<tr>
<td>Diabetes</td>
<td>1</td>
</tr>
<tr>
<td>Hypertension</td>
<td>1</td>
</tr>
<tr>
<td>Kidney failure</td>
<td>2</td>
</tr>
</tbody>
</table>

**Risk Score**

<table>
<thead>
<tr>
<th>Risk Score (sum of points)</th>
<th>3-yr heart failure risk</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt;4</td>
<td>15%</td>
</tr>
<tr>
<td>4-5</td>
<td>~25%</td>
</tr>
<tr>
<td>&gt;5</td>
<td>~40%</td>
</tr>
</tbody>
</table>

Ezaz, J Am Heart Assoc 2014
• Discuss with your healthcare provider:
  – Reasonable weight goals
  – Physical activity restrictions, if any
  – Diet/nutrition counseling
  – Help with tobacco cessation
  – Control of high blood pressure, cholesterol, and diabetes if relevant
Other resources

Smoking?

Check your weight status

Search: “CDC BMI calculator”
Check your weight status

Healthy Weight - it's not a diet, it's a lifestyle!

Adult BMI Calculator: English
This calculator provides BMI and the corresponding BMI weight status category. Use this calculator for adults, 20 years old and older. For children and teens, 2 through 19 years old, use the BMI Calculator for Children and Teens.

For the information you entered:
Height: 5 feet, 7 inches
Weight: 160 pounds

Your BMI is 25.1, indicating your weight is in the Overweight category for adults of your height.

For your height, a normal weight range would be from 118 to 159 pounds.

People who are overweight or obese are at higher risk for chronic conditions such as high blood pressure, diabetes, and high cholesterol.
Getting enough exercise??

Physical Activity

How much physical activity do you need?

Regular physical activity helps improve your overall health and fitness, and reduces your risk for many chronic diseases.

Fitting regular exercise into your daily schedule may seem difficult at first, but the 2008 Physical Activity Guidelines for Americans are more flexible than ever, giving you the freedom to reach your physical activity goals through different types and amounts of activities each week. It’s easier than you think!

Physical Activity Guidelines

Children: 6 to 17* years of age

Adults: 18 to 64 years of age

Older Adults: 65 years of age or older

If you are a healthy pregnant or postpartum woman, physical activity is good for your overall health. See our section on Healthy Pregnant or Postpartum Women.

*The 2008 Physical Activity Guidelines for Americans do not include guidelines for children younger than 6 years old. Physical activity in infants and young children is, of course, necessary for healthy growth and development. Children younger than 5 should be physically active in ways appropriate for their age and stage of development. Physical activity guidelines for children younger than 6 that are specific to the early care and education setting are included in Caring for Our Children: National Health and Safety Performance Standards: Guidelines for Early Care and Education Programs (3rd Ed.)
Getting enough exercise??

### Physical Activity

#### How much physical activity do you need?

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Fitting regular exercise into your daily schedule may seem difficult at first, but the **2008 Physical Activity Guidelines for Americans** recommend:

<table>
<thead>
<tr>
<th>Aerobic</th>
<th>Muscle-strengthening</th>
</tr>
</thead>
</table>
| 150+ min/wk moderate  
or  
75+ min/wk vigorous  
or  
Equivalent mix of above | 2+ days/wk involving all major muscle groups |
Analyze your diet
Stay Healthy

Many cancer deaths could be prevented by making healthy choices like not smoking, staying at a healthy weight, eating right, keeping active, and getting recommended screening tests. In this section you can learn how to help lower your chances of getting cancer, plus what screening tests the American Cancer Society recommends, and when.

Stay Healthy Topics

- Stay Away from Tobacco
- Eat Healthy and Get Active
- Be Safe in the Sun
- Other Ways to Protect Yourself
- Find Cancer Early
- ACS Programs to Help You Stay Well
- Information for Health Care Professionals

Tools and Calculators

Watch: Introduction Video
Cancer Survivorship

Cancer Survivorship

There are approximately 14 million cancer survivors in the United States and this population continues to grow. Cancer survivors require long-term surveillance, risk assessment and prevention services, as many face distinct and serious health care issues related to the cancer itself, pre-existing comorbidities, and the exposure to therapy. Delivering high quality survivorship care can enhance patients’ long term health by managing concerns related to cancer treatment and survivorship.

A ASCO Cancer Survivorship Compendium

As an accomplishment to the existing educational opportunities and clinical guidance ASCO offers on survivorship care, the Cancer Survivorship Compendium has been developed to serve as a repository of tools and resources to enable oncology providers to implement or improve survivorship care within their practices. Click here to view the Compendium.

Providing High Quality Survivorship Care in Practice: An ASCO Guide will assist providers with the implementation of a comprehensive survivorship program, regardless of practice setting. The guide includes information on the key components of survivorship care, different models of care delivery, and a needs assessment to help users determine which model of delivery may best serve their patient population. Download Now (24 pages) or purchase print copies through the ASCO Bookstore.

http://www.asco.org/practice-research/cancer-survivorship
Diet & Cancer Prevention

• May reduce recurrence of some cancers
  – Some observational evidence (mixed) after early stage breast cancer; may be primarily driven by weight loss and change to hormonal milieu
  – Some observational evidence after prostate cancer

• Overall limited data for most cancers
Exercise & Cancer Prevention

• Exercise is definitely safe for cancer survivors *(American College Sports Medicine 2010)*
  – Improves quality of life
  – Reduces fatigue

• May reduce recurrence of some cancers
  – Suggestive evidence for breast, colorectal, prostate
  – Mainly from “observational” studies and not from randomized trials
Potential Risk Reduction
Fred Hutch BMT survivors

Attributable risk estimates provide the best-case % improvement if complete elimination of the risk factor occurred.
# Heart Health Screening

<table>
<thead>
<tr>
<th></th>
<th><strong>US Preventative Services Task Force (2013)</strong></th>
<th><strong>International BMT guidelines</strong></th>
<th><strong>Children’s Oncology Group Guidelines</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>General heart health</td>
<td>Annually</td>
<td>Annually</td>
<td>Annually</td>
</tr>
<tr>
<td><strong>Diabetes</strong></td>
<td>Consider if blood pressure &gt;135/80</td>
<td>Every 3 yrs after age 45, or earlier if BP &gt;135/80</td>
<td>Every 2 yrs if certain radiation or other exposures</td>
</tr>
<tr>
<td><strong>Cholesterol</strong></td>
<td>All men age 35+, women age 45+; earlier if other risks present</td>
<td>Same</td>
<td>Every 2 years if certain radiation or other exposures</td>
</tr>
<tr>
<td><strong>Blood pressure</strong></td>
<td>Everyone</td>
<td>Everyone, every 2 yrs</td>
<td>Everyone, every yr if risk factors present</td>
</tr>
<tr>
<td><strong>EKG &amp; echocardiogram</strong></td>
<td>Consider for high risk patients</td>
<td>Consider for high risk patients</td>
<td>Consider for high risk patients</td>
</tr>
</tbody>
</table>
Final Thoughts

• Heart disease is very common, especially among cancer survivors
• Cancer treatments often increase one’s risk of future heart disease
• The good news is that many survivors adopt healthier lifestyles after cancer, which may mitigate some of their heart disease risk
• So, what can YOU do to keep your heart healthy?
To Do’s

- If you’re still smoking, talk to your doctor about trying to quit. Consider enrolling in one of Fred Hutch’s tobacco quit programs.
- Try to exercise and eat better – these things may make a difference; certainly can’t hurt! (except sore muscles)
- If you haven’t had a regular check-up in a while, talk to your primary care provider about whether you should be screened for high blood pressure, cholesterol problems, and diabetes.
- If you already have any of these conditions, please take your medicines or talk to your primary care provider about making sure those conditions are well-controlled.
- If your primary care provider is unsure about the best guidelines for a cancer survivor like you, consider asking for a referral to a SURVIVORSHIP program (we have one here).