Cardiovascular Complications in Survivors after BMT: Risk Factors and Strategies for Keeping your Heart Healthy

K. Scott Baker, MD, MS
Director, Pediatric Blood and Marrow Transplant and Survivorship Programs
Fred Hutchinson Cancer Research Center
Seattle, WA

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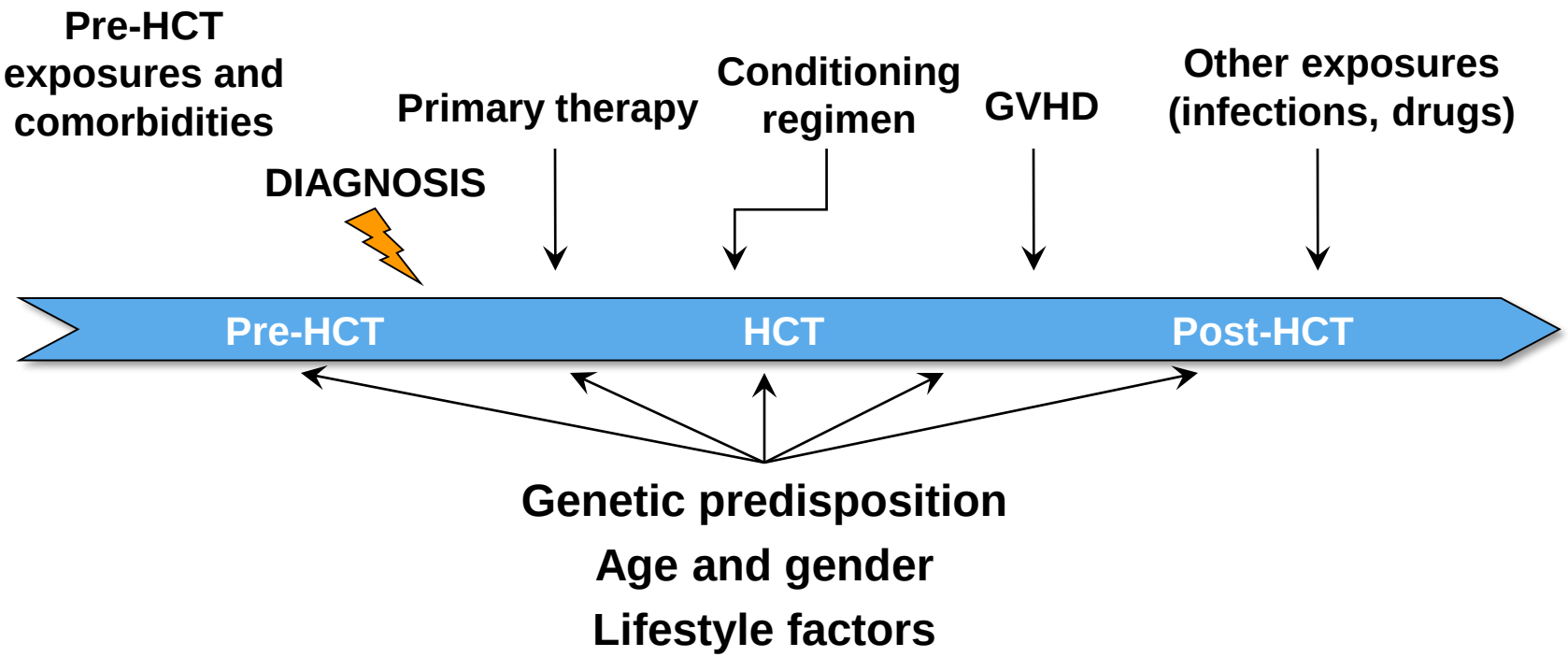
Goals for today's talk…

- To learn about what part of cancer treatment and/or bone marrow transplant affects the heart
- What do you need to know for screening and long-term follow-up
- What can you do to help prevent heart problems

Risk Factors for Late Complications



Majhail NS, Rizzo JD. Late complications: screening and management. Wingard JR, Gastineau DA, Leather HL, Snyder E, Szczepiorkowski ZM, eds. Hematopoietic Stem Cell Transplantation: A Handbook for Clinicians. Bethesda, MD: American Association of Blood Banks (AABB). 2009:473-484. Used with permission from AABB.

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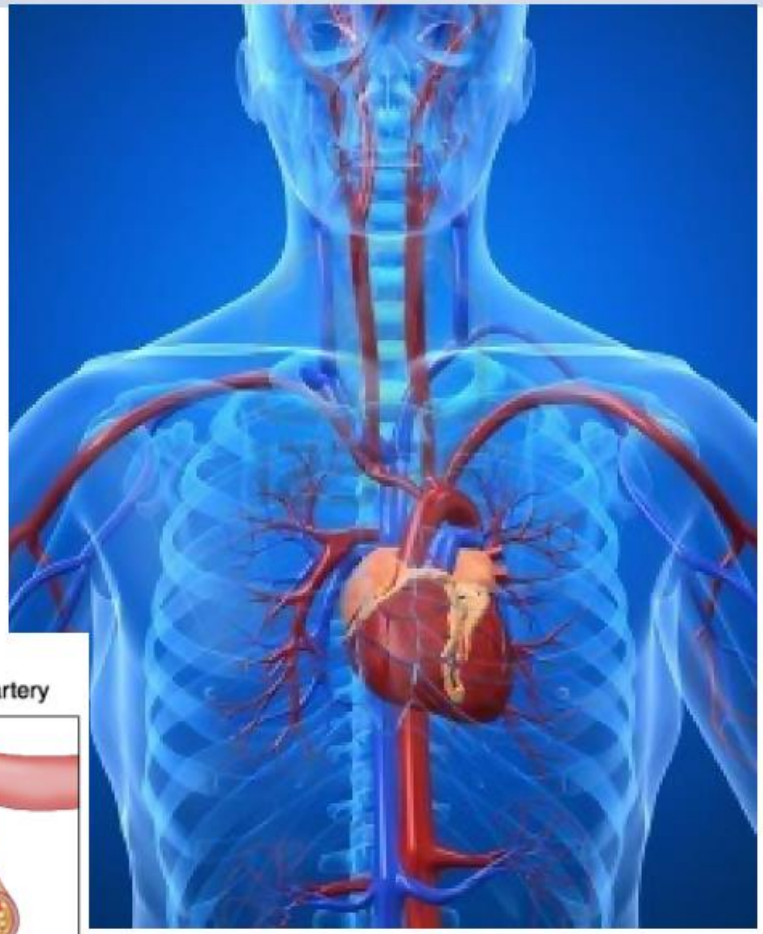
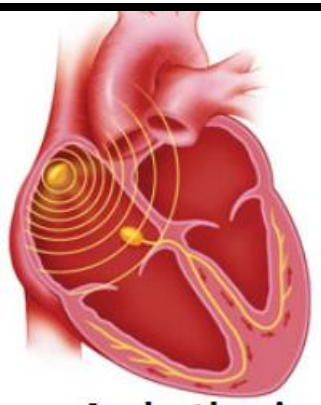
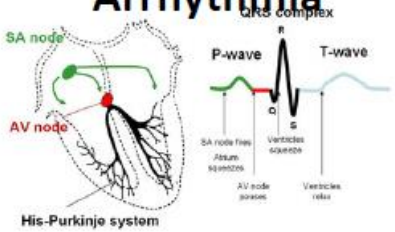
Cardiovascular Complications

Cardiac Dysfunction

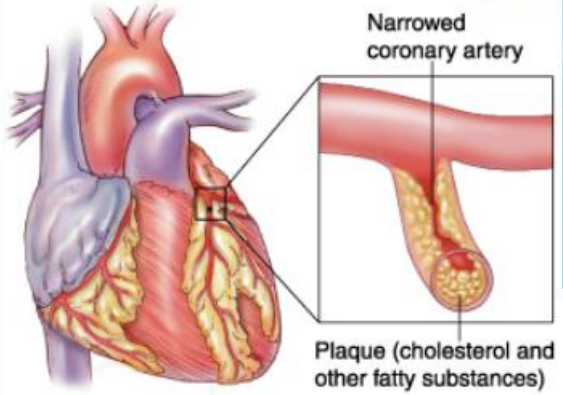




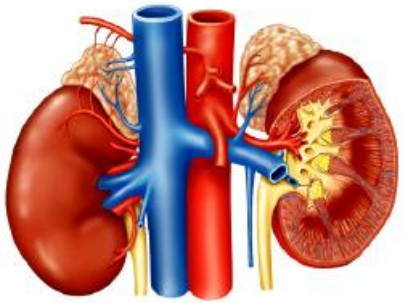
Arrhythmia



Atherosclerosis



Reno-vascular

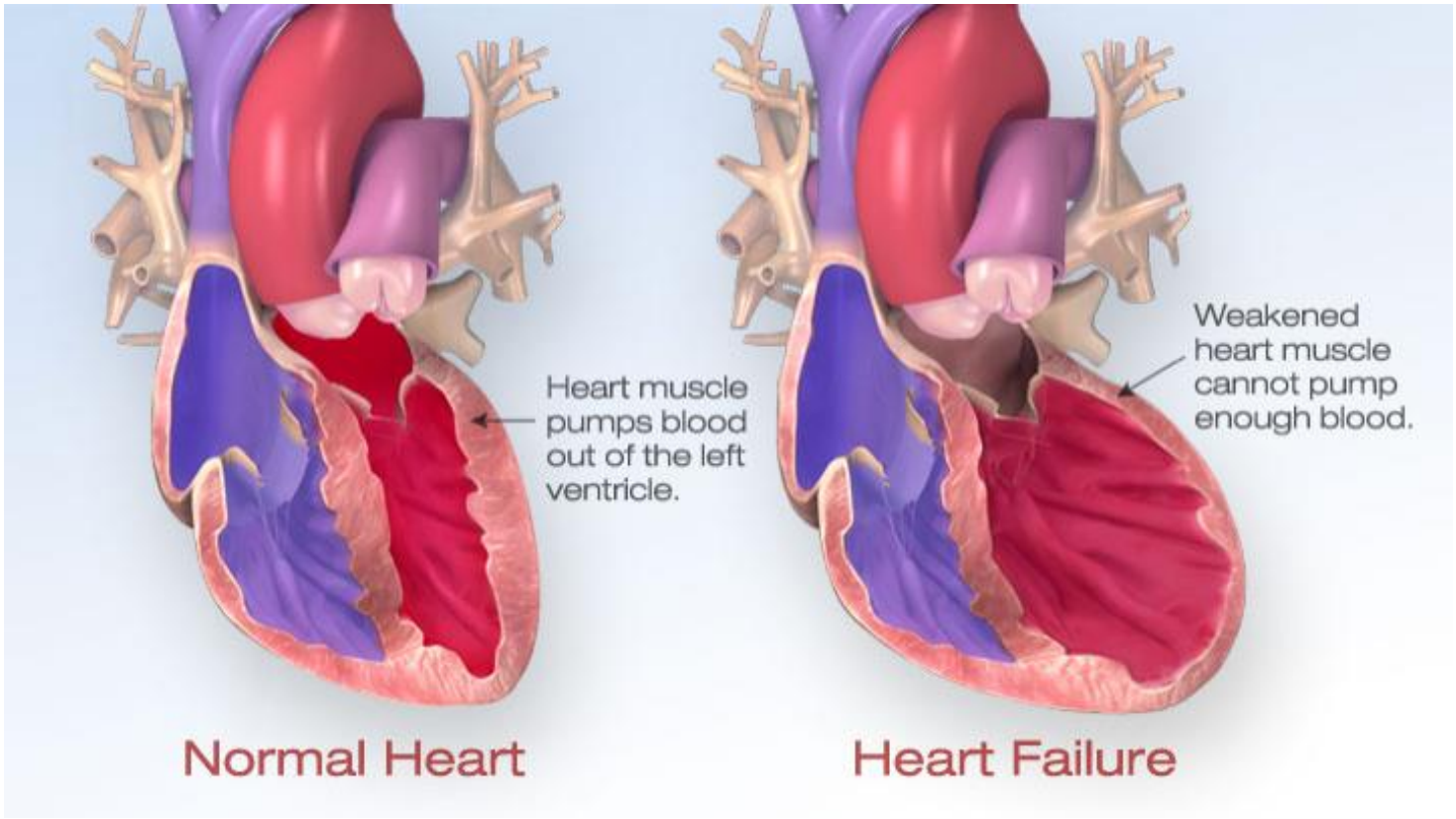


Cardiovascular complication from cancer and cancer therapy

Chemotherapy Induced	Radiation Induced	Multifactorial: Cancer and Tx

• Cardiomyopathy
  • Heart dysfunction
  • Heart Failure
	• Valvular heart disease
	• Pericardium (lining around heart) problems
	• Problem in the cardiac rhythm
	• Blockage of the arteries
		• High Blood Pressure
		• Cholesterol/ Lipid Problems
		• Metabolic Syndrome
		• Body composition abnormalities
		• Cardiovascular Diseases (CVD)
		  • Heart attack, strokes, etc

CHEMOTHERAPY INDUCED CARDIOTOXICITY



Cardiac Problems after chemotherapy

- Congestive Heart failure is a chronic, progressive condition in which the heart muscle is unable to pump enough blood through to meet the body's needs for blood and oxygen
- Basically, the heart can't keep up with its workload.
  - **this can be asymptomatic !**

Drugs that can induced cardiotoxicity

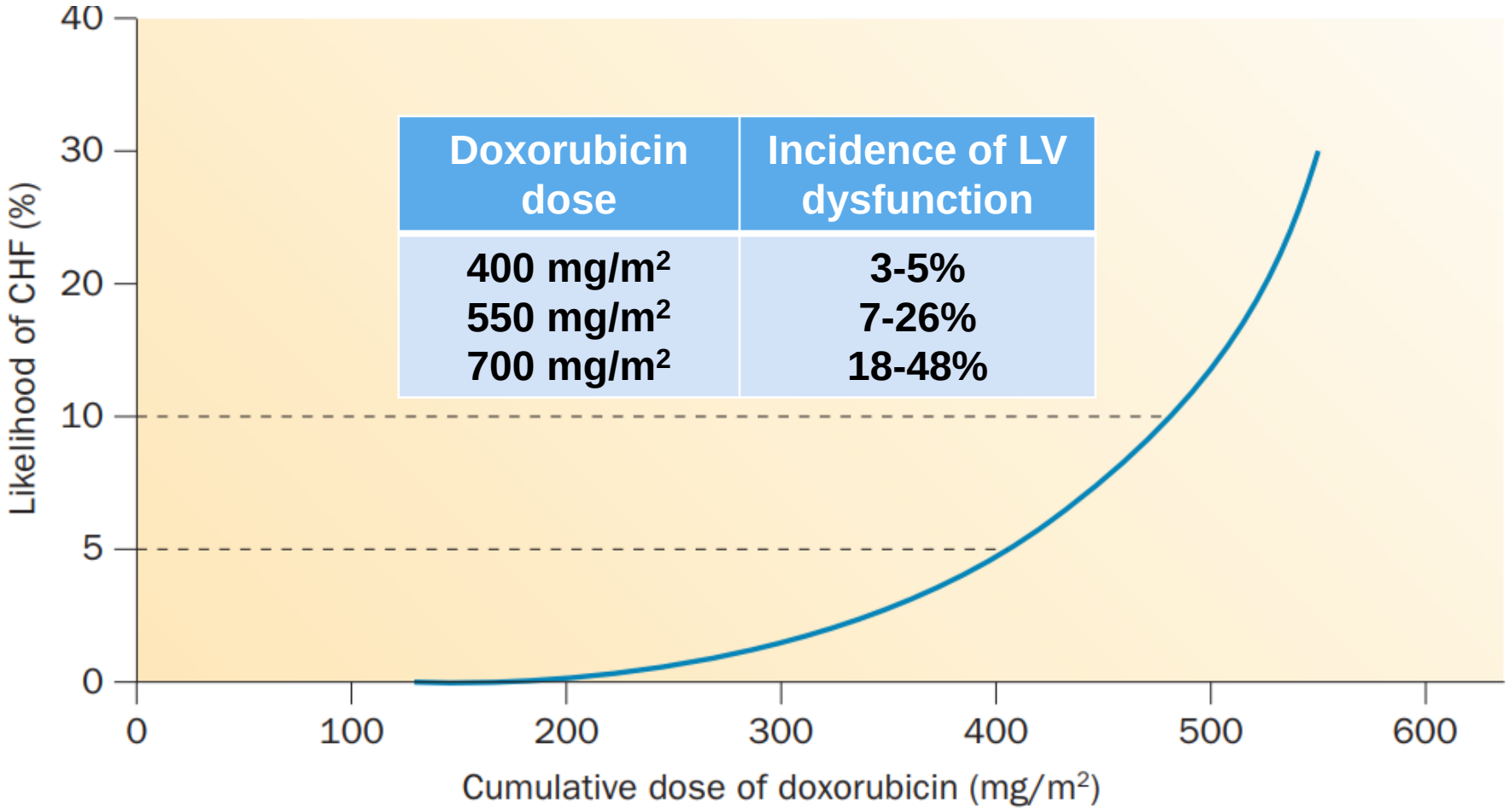
Anthracyclines

- Adriamycin (Doxorubicin, leukemias, lymphomas)
- Daunorubicin (Cerubidine, leukemias)
- Cyclophosphamide (Genoxal, Mitoxan)

Targeted Therapies

- Epirubicin (Ellence, breast cancer)
- Osemertinib (Tagrisso, lung cancer)
- Trastuzumab (Herceptin, breast cancer)
- Bevacizumab (Avastin)
- Sorafenib (Nexavar)

Anthracycline cardiotoxicity



Doxorubicin dose	Incidence of LV dysfunction
400 mg/m²	3-5%
550 mg/m²	7-26%
700 mg/m²	18-48%

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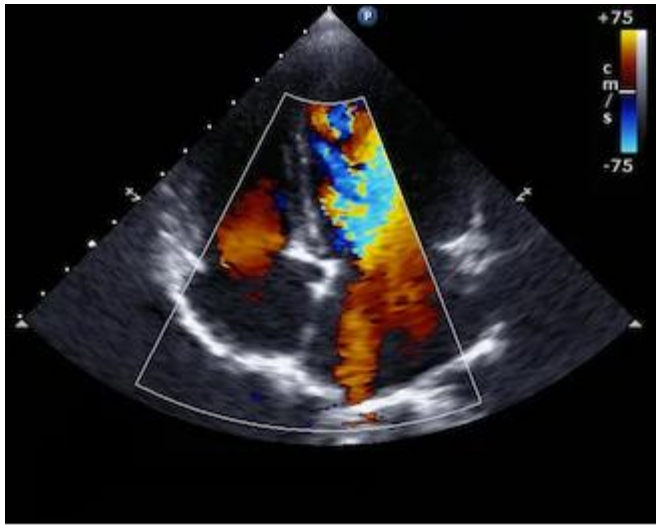
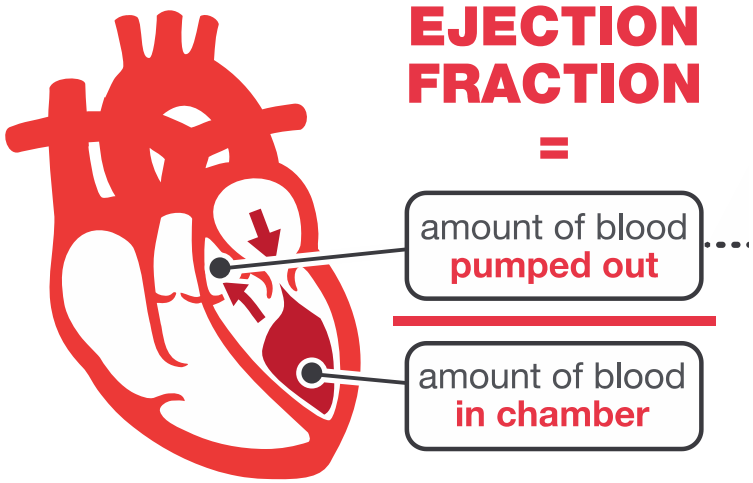
Ewer MS. Nat Rev Cardiol. 12; 547-558 2015

Defining cardiotoxicity: Echocardiogram

- **Decrease of the left ventricular ejection fraction below the baseline after chemotherapy**
- **Normal LVEF ~50-70 %**





The Ejection Fraction compares the **amount of blood in the heart** to the **amount of blood pumped out.** The fraction or percentage helps describe how well the heart is pumping blood to the body.

Bird BR, Swain SM. Clin Cancer Res. 2008; 14: 14-24
Plana et al. European Heart Journal (2014) 15, 1063

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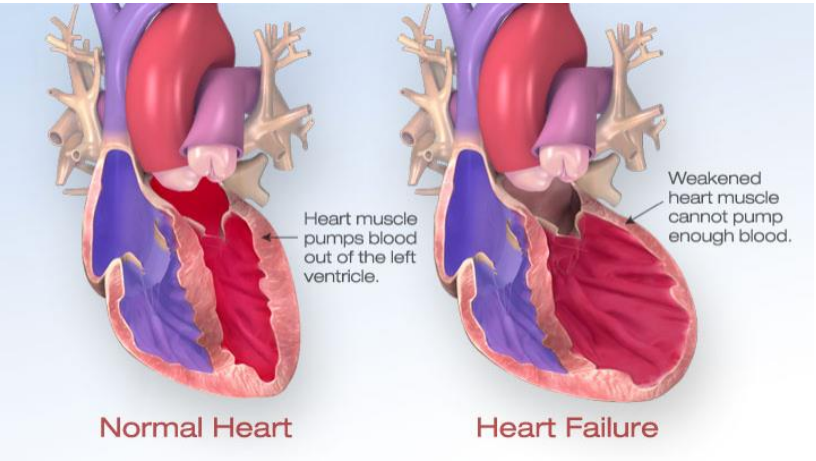
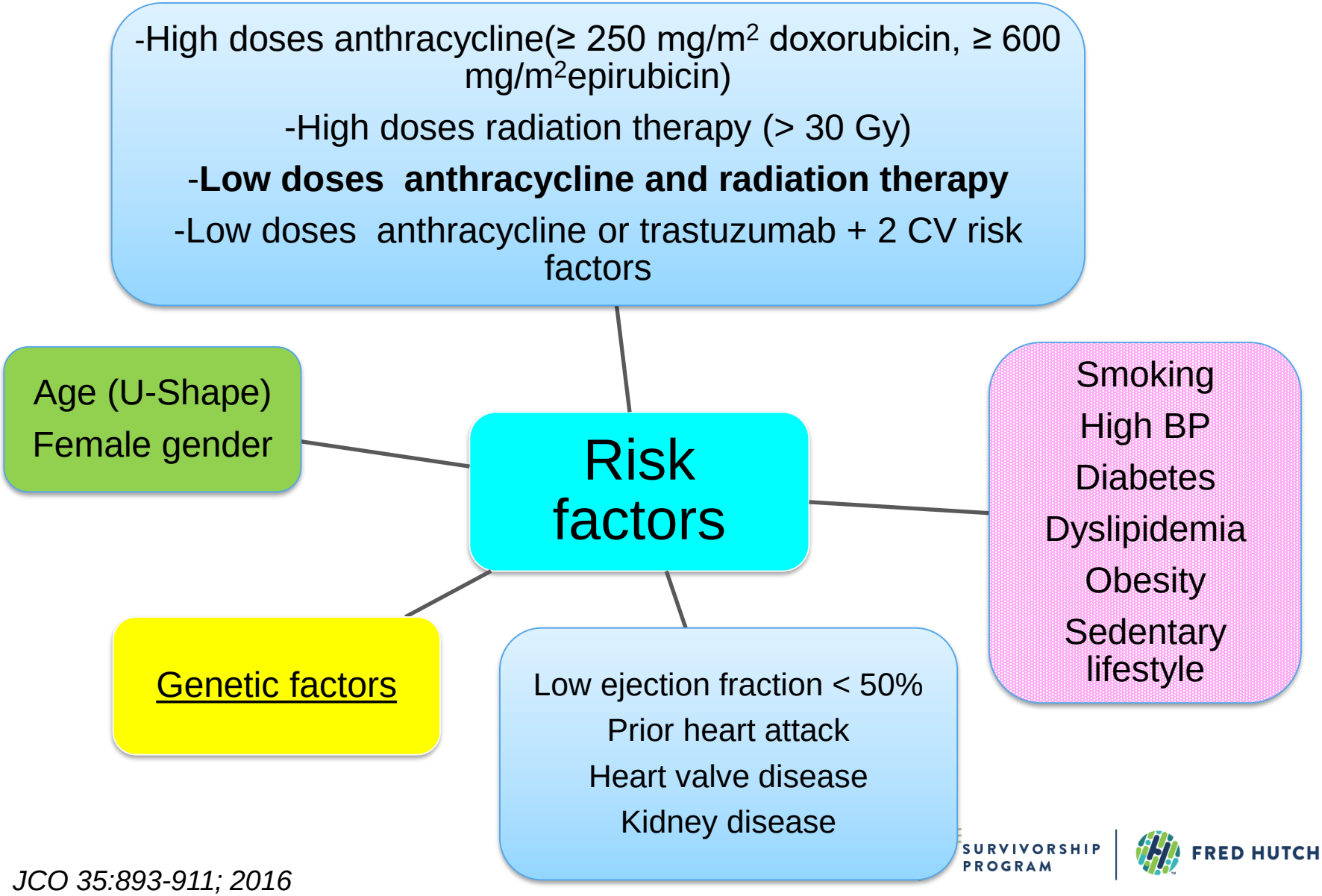
Symptoms of Congestive Heart Failure



- Shortness of breath
- Increased heart rate
- Severe fatigue preventing exercise
- Very swollen feet or ankles (so swollen that if a finger is pressed firmly on the area for few seconds it leaves an indentation)
- Cough and wheezing that doesn't go away
- Lack of appetite, nausea

Which patients after BMT are at increased risk for developing cardiovascular disease?



JCO 35:893-911; 2016

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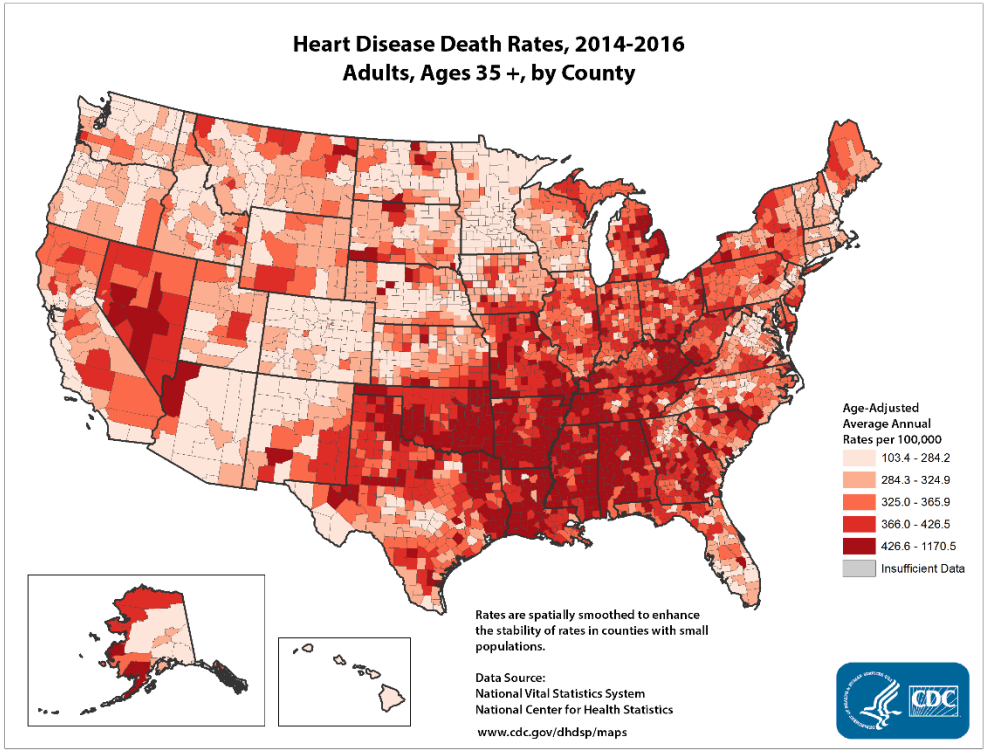
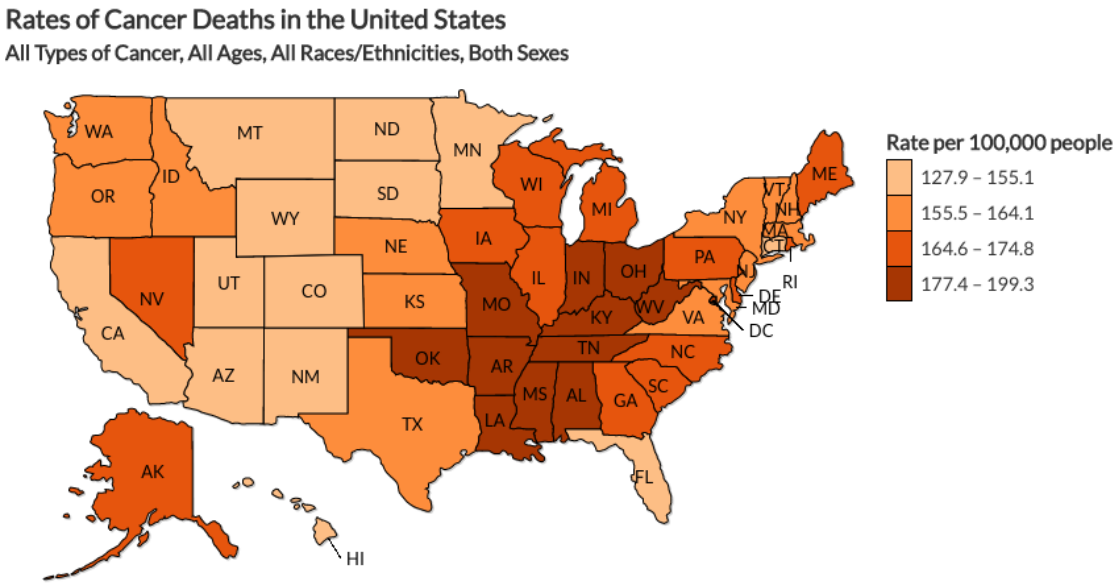
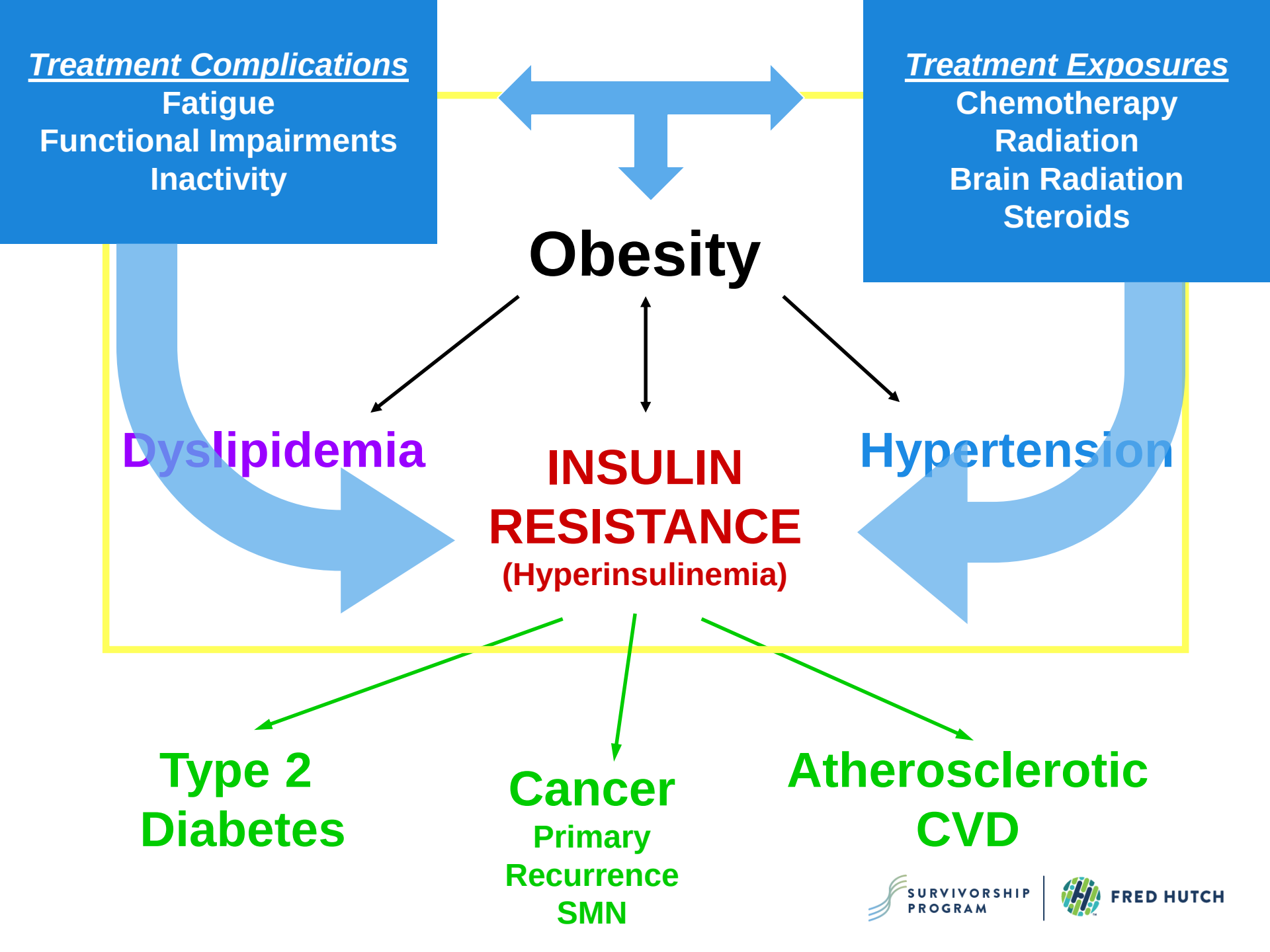
Clustering of CVD and Cancer Rates






Treatment Complications
Fatigue
Functional Impairments
Inactivity
Treatment Exposures
Chemotherapy
Radiation
Brain Radiation
Steroids
Obesity
Dyslipidemia
INSULIN RESISTANCE
(Hyperinsulinemia)
Hypertension
Type 2 Diabetes
Cancer
Primary
Recurrence
SMN
Atherosclerotic CVD
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The Metabolic Syndrome…

- **A cluster of metabolic disorders related to insulin resistance that predisposes to type 2 diabetes and atherosclerotic disease.**

  Characterized by:

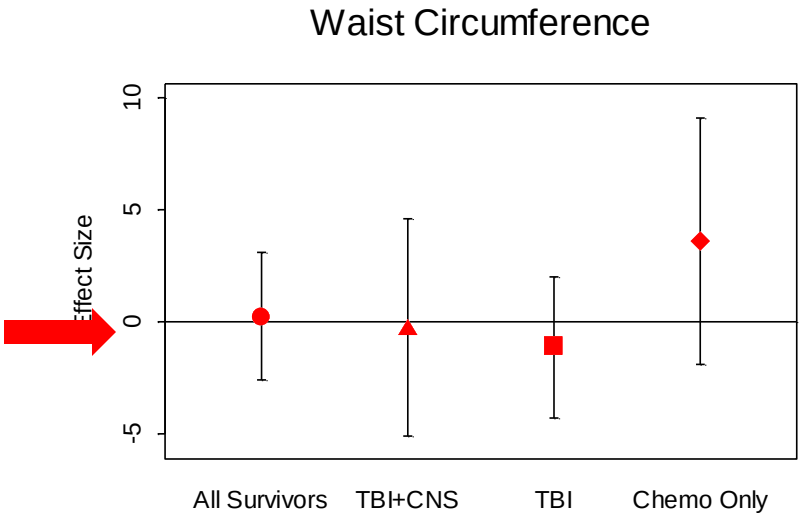
  - **Central obesity**
  - **Glucose intolerance**
  - **Dyslipidemia**
  - **Hypertension**

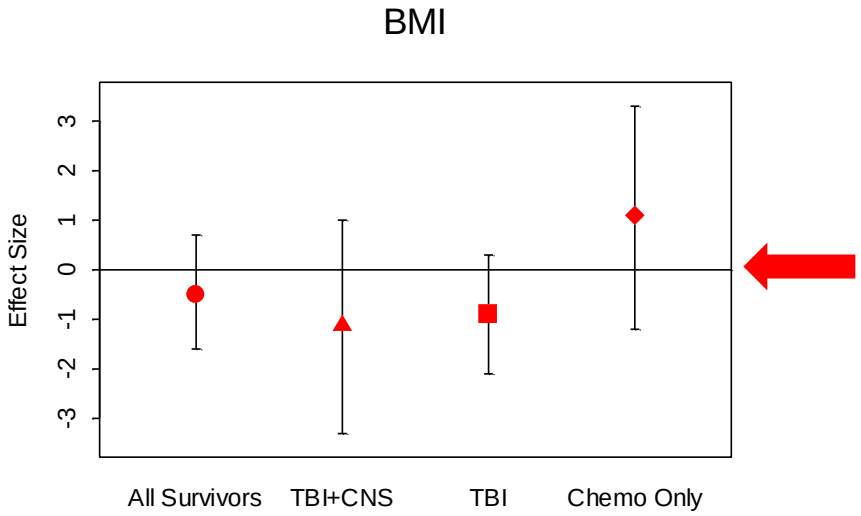
Third National Cholesterol Education Program Adult Treatment Panel III (ATP III) Criteria for Metabolic Syndrome: 3 or more of the following

Criterion	Adults	Adolescents*
High Triglyceride Level, mg/dL	≥150	≥110
Low HDL-C level, mg/dL		
Males	<40	≤40
Females	<50	≤40
Abdominal obesity waist circumference, cm		
Males	>102	≥90th Percentile
Females	>88	≥90th Percentile
High fasting glucose level, mg/dL	≥100	≥100
High blood pressure, mm Hg	≥130/85	≥90th Percentile

ATP III criteria modification for adolescents (age 12-19 years) as described by Cook et al, 2003

Body Composition





Adjusted for age, sex, Tanner stage

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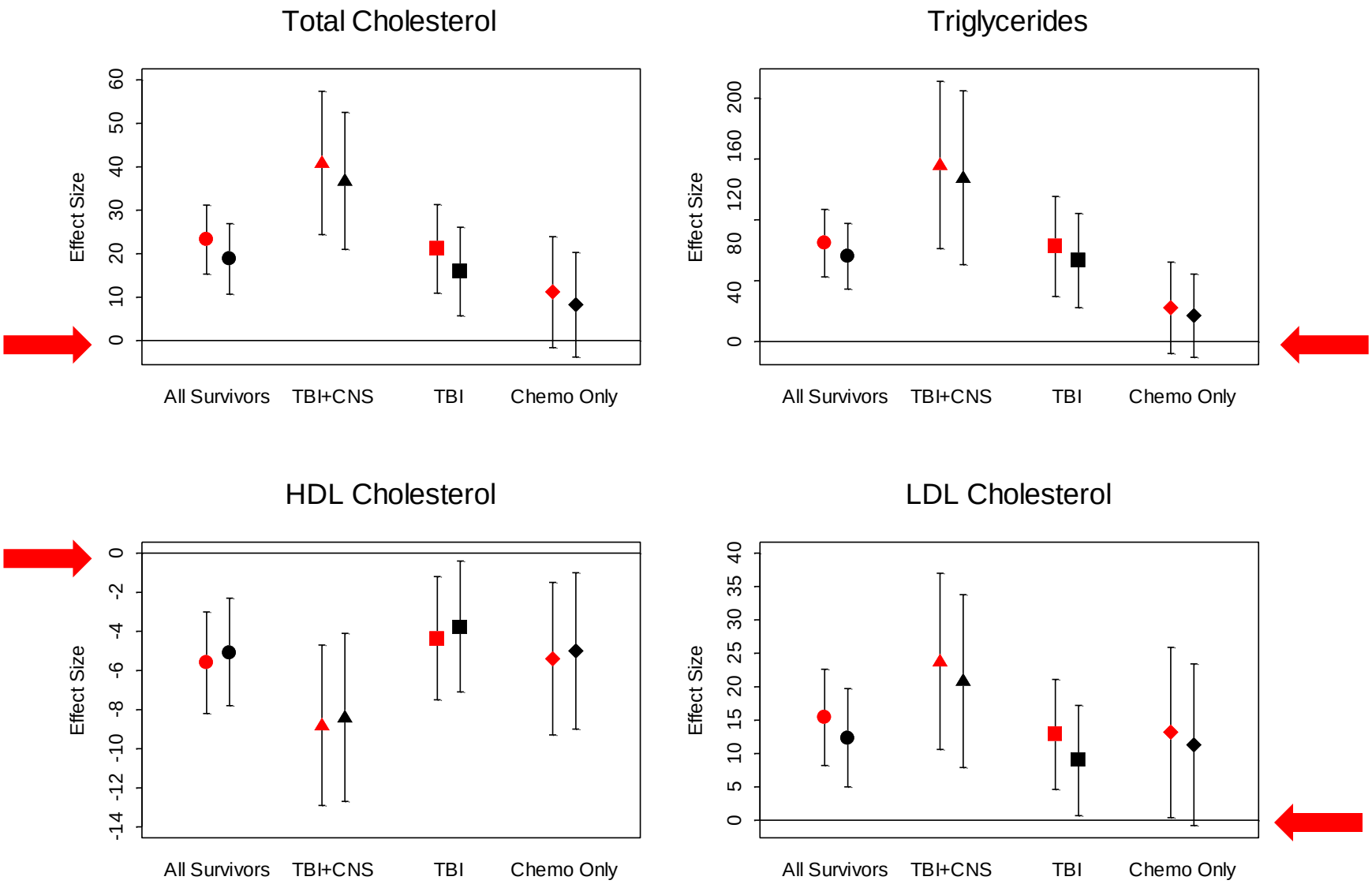
CV Risk Factors-Lipid Levels



No PFM Adjustment

Adjusted PFM

Adjusted for age, sex, Tanner stage

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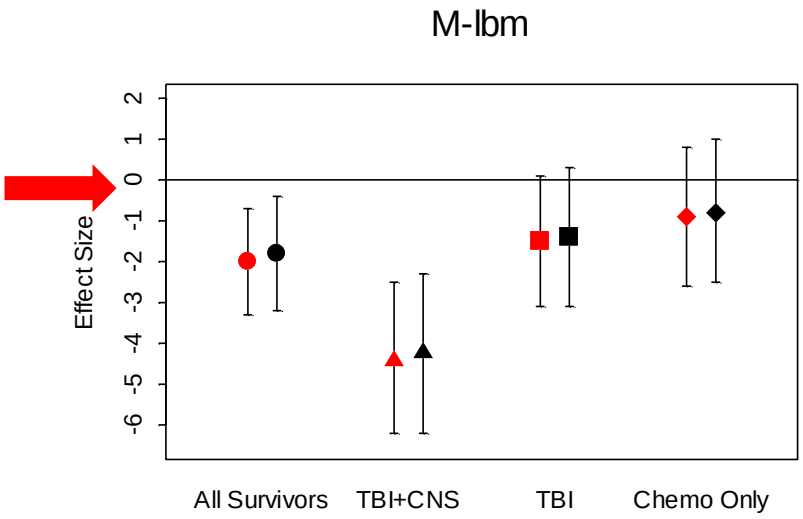
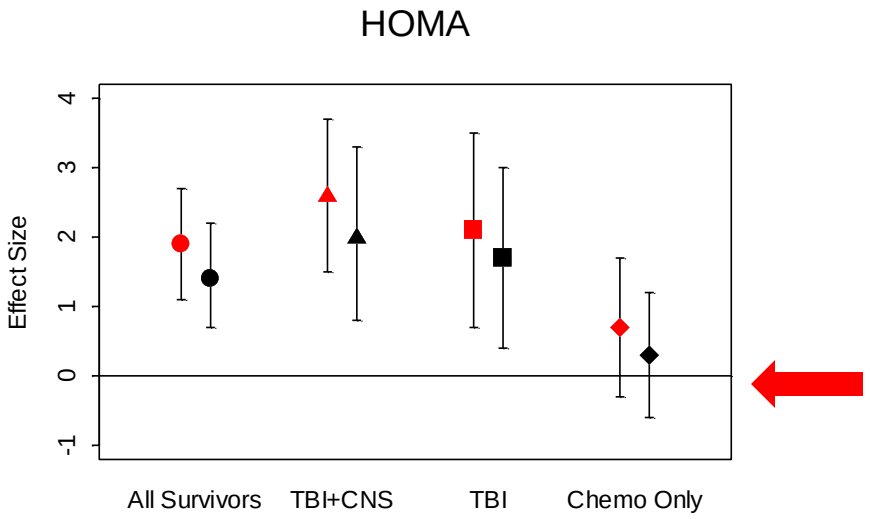
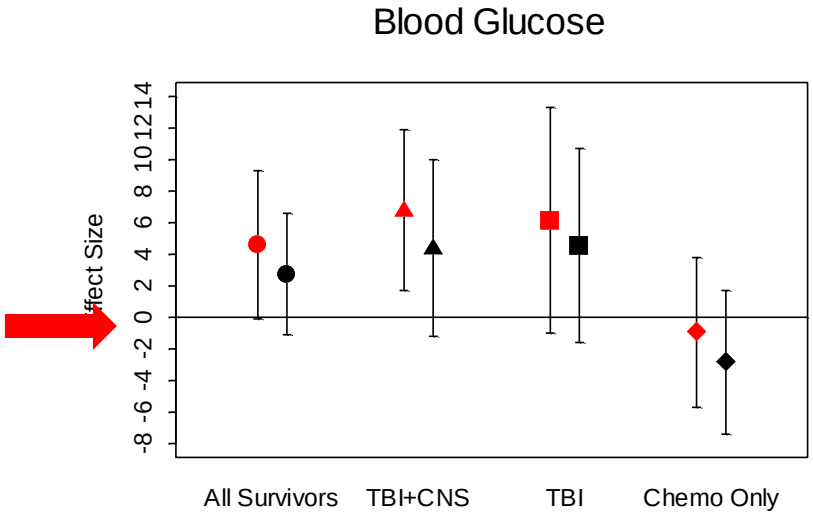
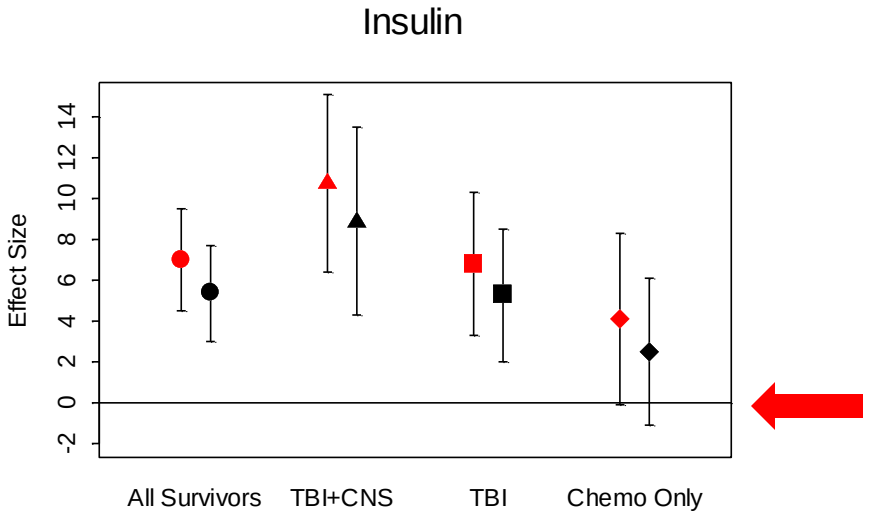
CV Risk Factors-Insulin Metabolism









No PFM Adjustment

Adjusted PFM

Adjusted for age, sex, Tanner stage

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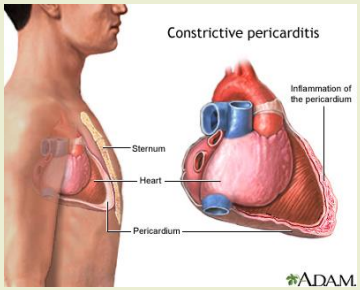
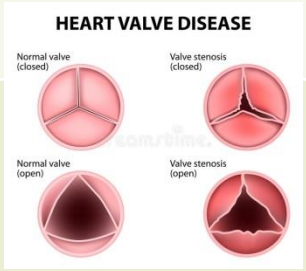
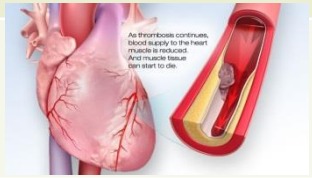
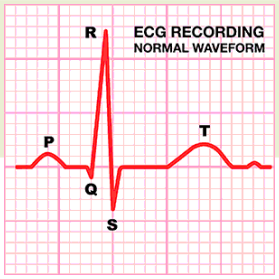
Summary

- **Changes in body composition (loss of muscle mass, increased fat mass) result in normal BMI, but likely contributes to resistance to insulin**
- **Adverse impact of cancer therapies on body composition and development of insulin resistance may increase the risk of CV disease and diabetes in survivors**

Spectrum of Radiation Damage to heart

Structure	Abnormality	Complication
Pericardium		Heart Failure Fatigue Abdominal distention
Heart Muscle		Heart Failure
Cardiac Valves damage		Murmur/ Heart Failure Chest Pain Lightheadedness
Blockage of the arteries		Heart Attack/ Stroke
Electrical complications		Heart Block

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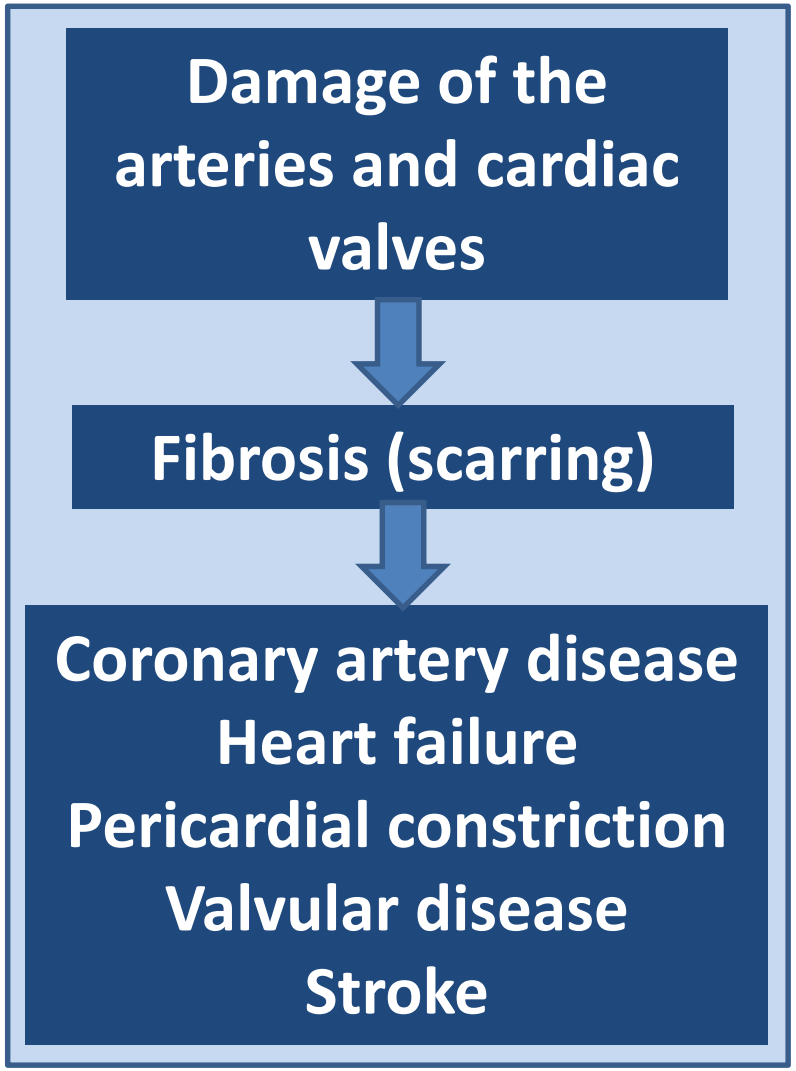
Radiation therapy



Risk factors:

Higher radiation dose
Larger volume exposed
Younger age
Adjuvant chemo
Type of radiation source
CV risk factors

Chen-Scarabelli C et al. JNC 2016 May 25

What about non-treatment Risk Factors?

What You Can Change?

- Physical Activity
- Life Stress
- High Blood Pressure
- Obesity
- Diabetes
- High Cholesterol & Triglycerides
- Smoking
- Unhealthy Diet (HIGH in saturated fat & calories; LOW in fresh fruit, veggies, whole grains & fish)

What You Can't Change?

- Age
- Gender
- Family History

Always Know Your Numbers!

Total Cholesterol	<200 mg/dl
"Bad Cholesterol" LDL (Low Density Lipoprotein Cholesterol)	<100 mg/dl (best) <130 mg/dl (OK)
"Good Cholesterol" HDL (High Density Lipoprotein Cholesterol)	>50 mg/dL women >40 mg/dL men
Triglycerides	<150 mg/dl
Fasting Glucose	<100 mg/dl
Blood Pressure	<120/80 mmHg
Body Mass Index	<25
Waist Circumference	<35 inches women <40 inches men

American Heart Association.

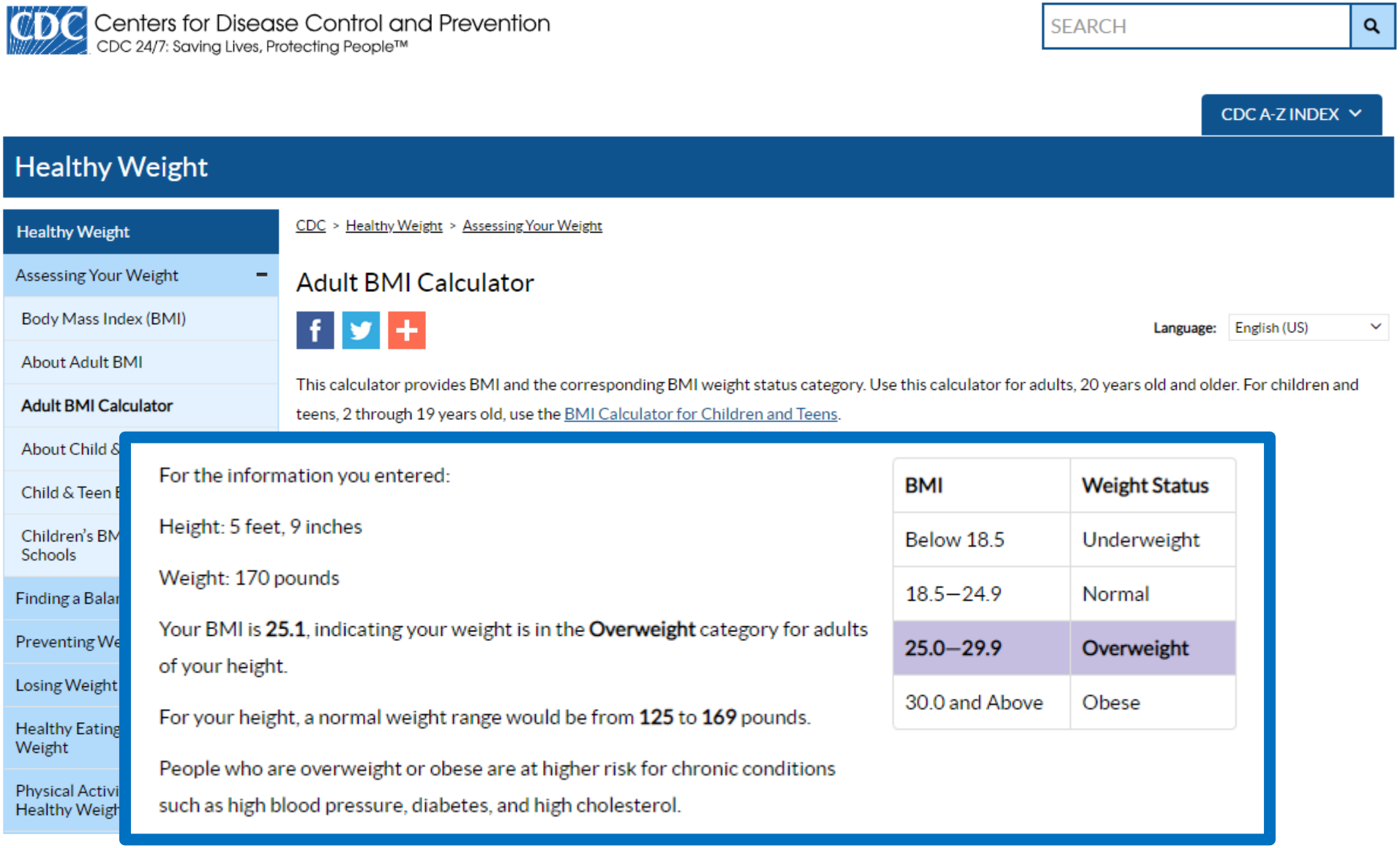
Screening (no evidence-based guidelines in adults)

Screening (condition)	BMT Survivors
Blood pressure	Check at every office visit or at least annually, more frequent if on medications
Fasting lipids (dyslipidemia)	Annually, more frequent if on therapy
EKG / Echo (cardiomyopathy)	Depends upon risk factors and/or symptoms (anthracycline dose, radiation exposure, etc) -Talk to your BMT Team
Fasting glucose	Annually, more frequent if high/borderline high

https://bethematchclinical.org/post-transplant-care/

- ***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*

Check your weight status



Search: "CDC BMI calculator"

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But…. if you have had a BMT remember that a normal BMI may not give you the full picture of your body composition/body fat status and a DXA scan or some other test may be required.

Are you getting enough exercise?

Physical Activity

- Physical Activity
- About Physical Activity +
- **Physical Activity Basics** −
  - Needs for Adults
  - Needs for Children +
  - Needs for Older Adults
  - Needs for Pregnant or Postpartum Women
  - Physical Activity & Health
  - Adding Physical Activity to Your Life +
  - Measuring Physical Activity Intensity +
  - Videos
  - Glossary of Terms
- Personal Stories +
- Initiatives +
- Data & Statistics +

CDC > Physical Activity

Physical Activity Basics

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 old*

Adults
18 to 64 years old

Older Adults
65 years or older

Pregnant or Postpartum Women

https://www.cdc.gov/physicalactivity/basics/index.htm

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Adults (18-64) need at least:

- 2 hours and 30 minutes (150 minutes) of moderate-intensity aerobic activity (i.e., brisk walking) every week

OR

- 1 hour and 15 minutes (75 minutes) of vigorous-intensity aerobic activity (i.e., jogging or running) every week

AND

- Muscle-strengthening activities on 2 or more days a week that work all major muscle groups (legs, hips, back, abdomen, chest, shoulders, and arms).

10 minutes at a time is fine!

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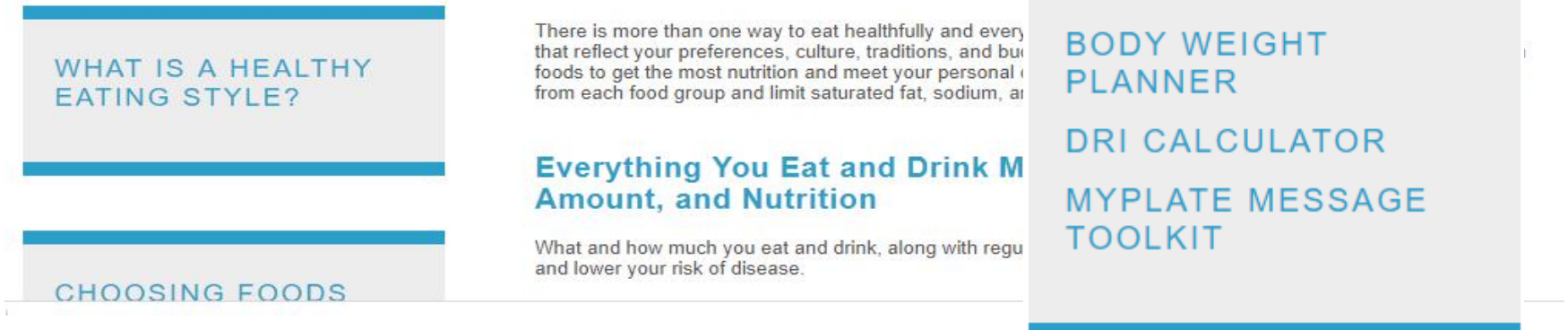
Exercise & Cancer Prevention

- 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

Analyze your diet



How can we help you? search cancer.org SEARCH Live Chat | 800-227-2345

Home | Learn About Cancer | Stay Healthy | Find Support & Treatment | Explore Research | Get Involved | Find Local ACS

Watch: Introduction Video

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

UTCH

cs/account/signin

Tools and Calculators

To Do's

- Find out your treatment history (radiation, anthracycline chemotherapy)
- If you're still smoking, talk to your doctor about trying to quit. Consider enrolling in a tobacco cessation program.
- 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.

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QUESTIONS ?

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Survivorship Program

K. Scott Baker, MD - Director

Karen Syrjala, PhD - Co-Director

Emily Jo Rajotte, MPH, Program Mgr

Elizabeth Kaplan, MD

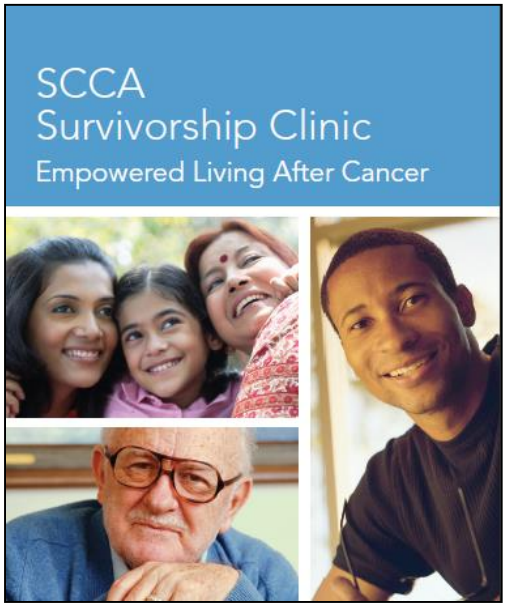
Leslie Heron, ARNP

Deb Loacker, RN

Emy Jensen, Program Assistant

Joli Bartell, Project Coordinator

Gabriela Emond , Program Assistant



Phone: (206) 667-2814
survivor@fhcrc.org

LIVESTRONG SURVIVORSHIP CENTER OF EXCELLENCE NETWORK

SEATTLE CANCER CARE ALLIANCE
Fred Hutchinson Cancer Research Center
University of Washington
Children's Hospital & Regional Medical Center

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What are the Priorities in the Cardiovascular Care of Oncology Patients?

Prior to Cancer Therapy	During Cancer Therapy	After Cancer Therapy
• Identify high cardiovascular risk patients • Mitigate cardiotoxicity risk	• Monitoring to identify cardiotoxicty • Avoid dose interruptions • Prevent CV events	• Decrease risk of late Cardiovascular events • Improve long-term health

Armenian et al. J Clin Oncol 35:893-911

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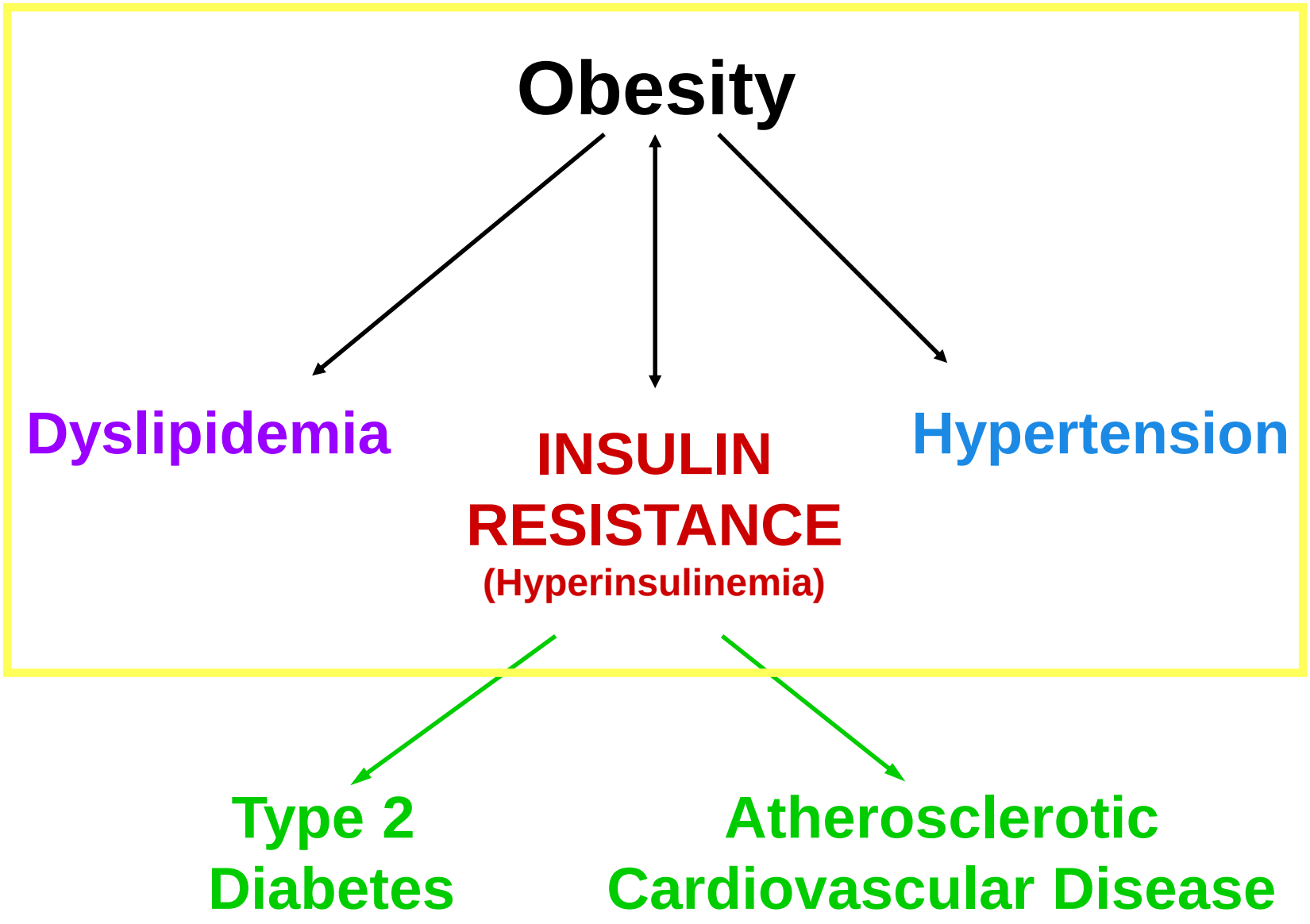
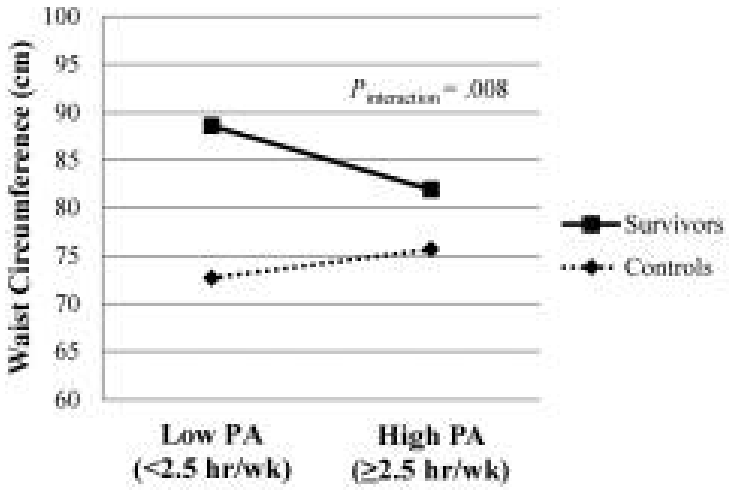
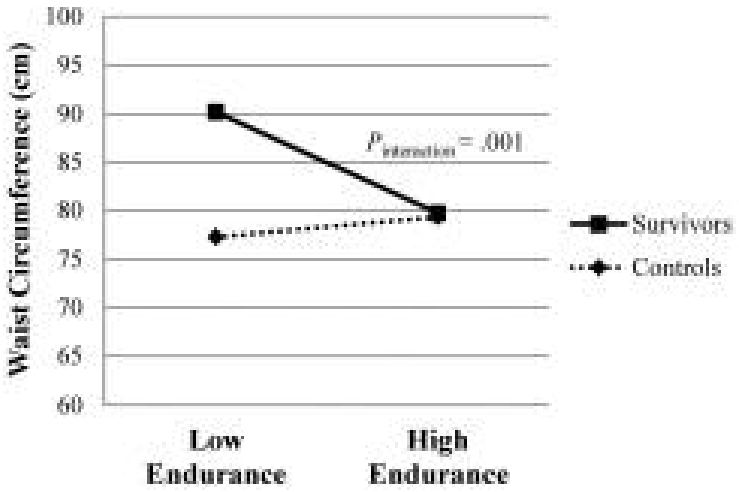
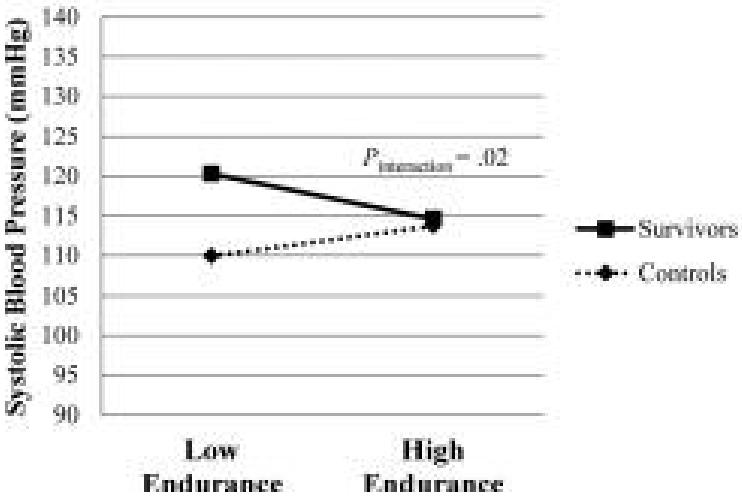
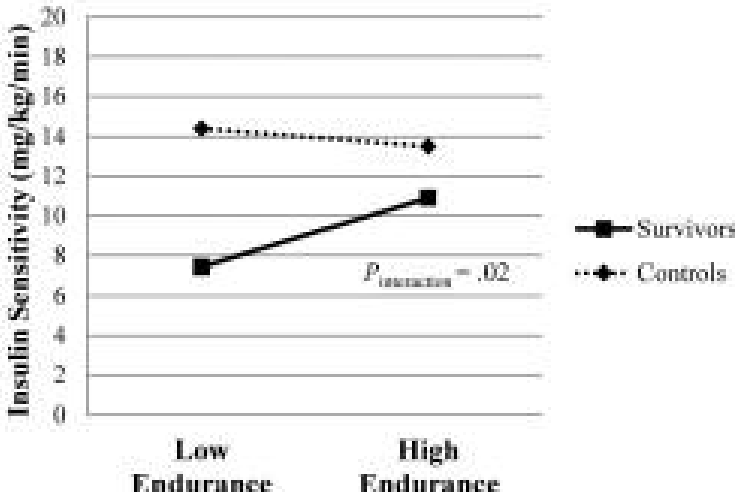


Impact of Sedentary Lifestyle









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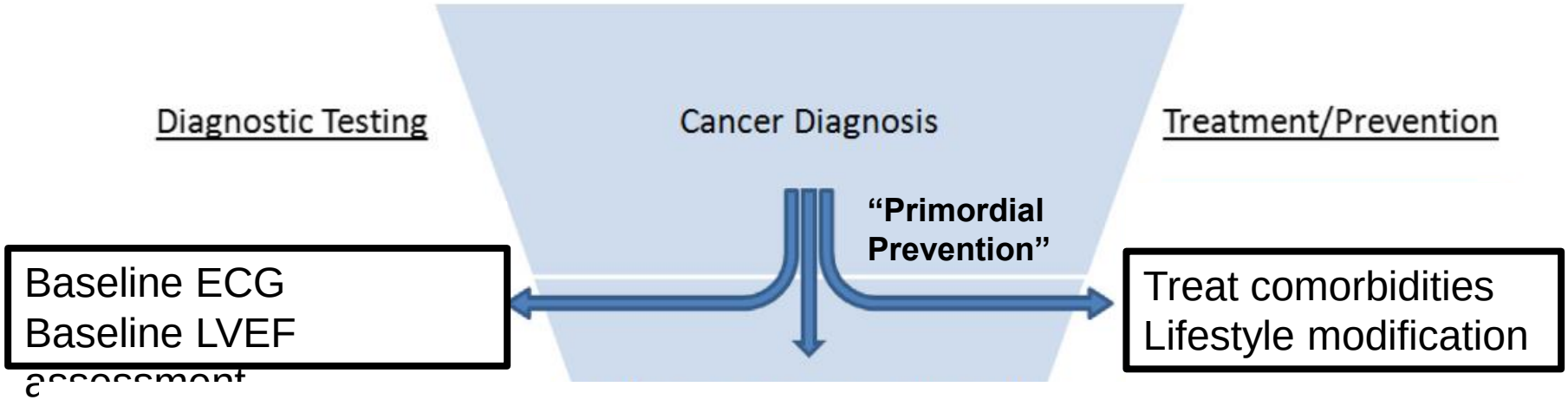
Full range of disease



Modified from: Yu et al. J Card Failure. 2014. 20(11): 841.