



Addressing Accelerated Aging, Functional Limitations, and Comorbidities across the Lifespan from Pediatric to Older Cancer Survivors



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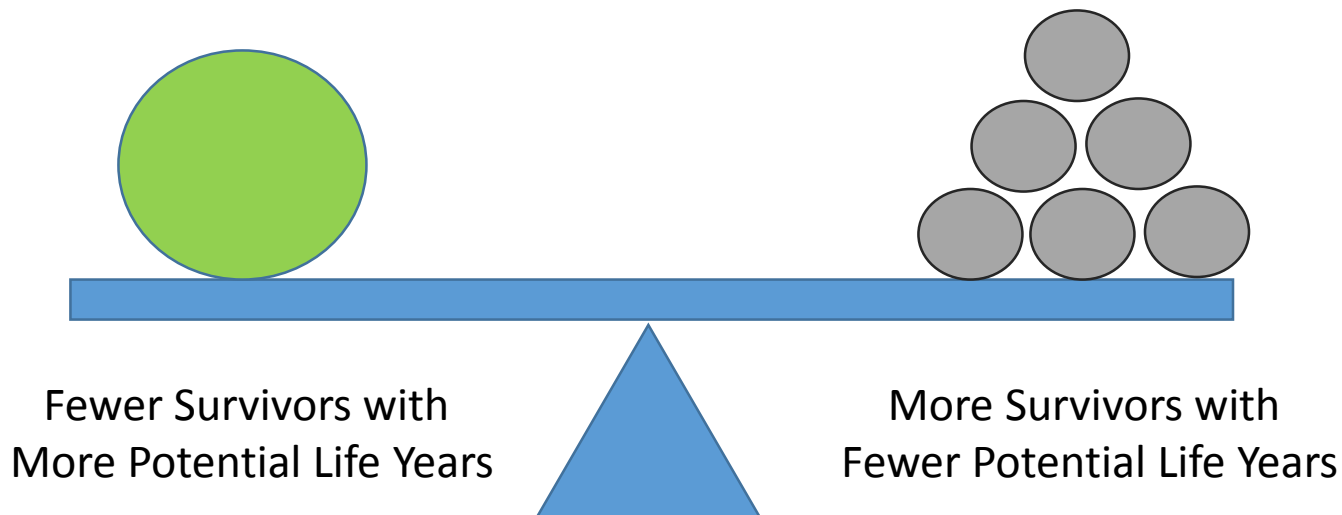
Objectives

- Accelerated Aging
- Significance of Diet/Exercise Interventions
- Considerations in Delivery of Diet and Exercise Interventions

Significance

Young & Old Cancer Survivors

- Overall Relative 5-year Survival Rate >83%
- ~390,000 (2.5% of Survivors)
- Greater Future Life Years
- Overall Relative 5-year Survival Rate >69%
- Over 9.6 M (62% of Survivors)
- Fewer Future Life Years



Late Effects of Cancer

Henderson TO, Ness KK, Cohen HJ ASCO Educ Book 2014

General	• <u>Sarcopenia</u> • <u>Fatigue</u>	• <u>2nd Cancers</u>
Endocrine	• <u>Obesity</u> • <u>Metabolic Syndrome</u> • <u>Osteoporosis</u>	• Hypothyroidism • Premature Menopause
Cardiovascular	• <u>Coronary Artery Disease</u> • <u>Cardiomyopathy</u> • <u>LV Dysfunction</u>	• Arrhythmias • Pericarditis • Valve Dysfunction
Neurologic	• <u>Stroke</u>	• Leukoencephalopathy
	• Cerebellar Dysfunction • <u>Cognitive Dysfunction</u>	• Peripheral Neuropathy
Hepatic	• Decreased Hepatic Function	• Intestinal Obstruction
Immune System	• Increased Infections	• Asplenia
Hematologic	• Myelodysplasia	
Pulmonary	• Interstitial Pneumonitis • Obstructive Lung Disease	• Pulmonary Fibrosis • Restrictive Lung Disease
Renal/ Genitourinary	• Dyspareunia • Erectile Dysfunction	• Glomerular Toxicity • Tubular Dysfunction
Sensory	• <u>Cataracts</u> • Decreased Vision	• Hearing Loss • Tinnitus

Adherence to Guidelines Young & Old Cancer Survivors

Childhood Cancer Survivors

- Overall Prevalence of Overweight and Obesity not higher (exception: Brain Cancer/ALL)
- Higher Risk of Sarcopenia
- 54-84% Insufficiently Active
- 40-70% Suboptimal Diets

Older Cancer Survivors

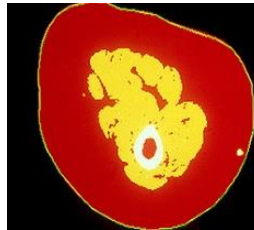
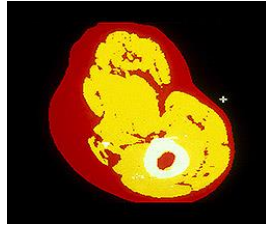
- Up to 71% of Adult Cancer Survivors Overweight & Obese
- Higher Risk of Sarcopenia
- 53-70% Insufficiently Active
- 52-85% Suboptimal Diets



Niu et al. J Oncol Pract 2015; Zhang FF et al Int J Child Health Nutr 2012; Blanchard JCO 2008; Ford JS et al. Children 2004

Sarcopenia: Loss of Muscle Mass and Strength

- Steady loss of muscle mass with age 0.5-1.0% per year after age 50



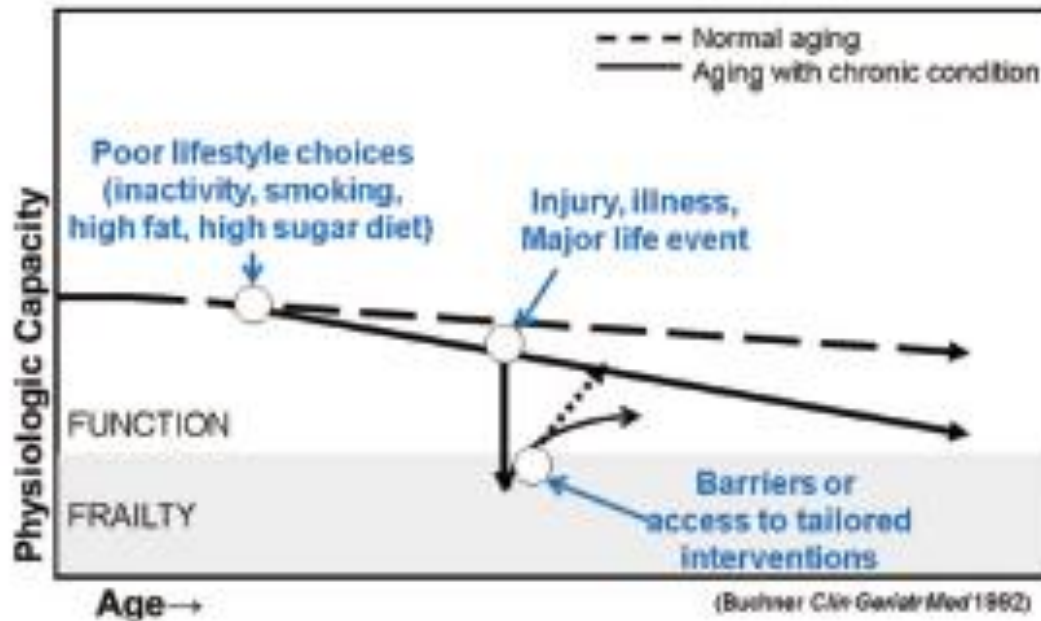
CT x-sections of the thigh
20 year-old vs. 80 yr old men

- Resting Metabolic Rate tracks with lean body mass
- Almost all studies of individuals diagnosed with cancer show adverse body changes over time and as compared to controls.
- Weight loss can exacerbate sarcopenia – exercise can hinder it.

Frailty Prevention

Encourage lifestyles that maintain neuromuscular control, promotes muscle strength, and optimize energy metabolism

Childhood Cancer Survivors (especially females) frailty phenotype is established early



Older Cancer Survivors (especially females) frailty threatens function and ability to live independently

Frailty: Insufficient reserve to recover

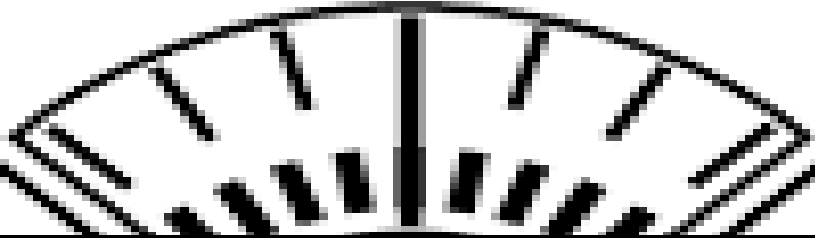


Frailty taking on a
different Phenotype



In study of 261 older Breast Cancer Patients,
odds of frailty increased with higher BMI
1.12 (95% CI: 1.01;1.19) $p=.003$

Bennett et al. Oncol Nurs Forum 40:E126, 2013



Weight Management

Children

Concerns:

Stunting
Sarcopenia

Approach:

1) Behavioral
“Grow into Weight”
2) Minimal Energy
Restriction
½ pound/week

Adults

Up to 2 Pounds/week
500-1000 kcal/day deficit

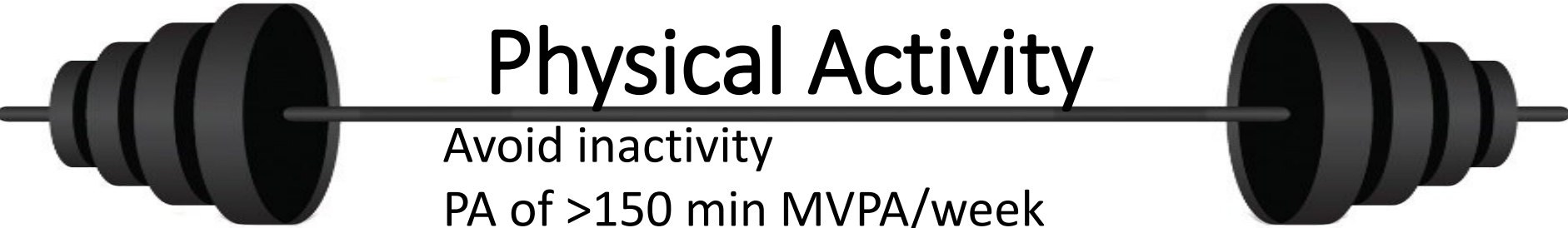
Older Adults

Concerns:

Sarcopenia
Functional Decline

Approach:

1) Energy Restriction
500-750 kcal/day deficit
2) Resistance Training



Physical Activity

Avoid inactivity

PA of ≥ 150 min MVPA/week

Resistance Training 2 x week

Adaptations to Treatment and Common
Comorbidities

Clearance/Training Certification

ACMS Guidelines for Physical Activity for Cancer Survivors

Schmitz KM et al. MSSE 2010

ACS Guidelines 2012

Children

- CDC Guidelines endorse ≥ 300 min MVPA/week
- Strength training within a sports curriculum and supervision
- Review suggests positive effects on composition, fitness

Pediatr2008:121,835

Braam KI et al. Cochrane Database Syst Rev 2016

Older Adults

- ACSM Guidelines for Older Adults
Endorse Strength Training 2-3/week
- Light physical activity increases Physical function
- Review shows PA safe, effective in improving strength and function

Blair et al. MSSE 46:1375, 2014

Klepin HD Interdiscip Gerontol 2013

Considerations in Delivering Diet and Physical Activity Programs to Young and Old Cancer Survivors

Young	Solution	Old
Rare Cancers, Geographically Dispersed	Distance-Medicine Based Approaches	Transportation Issues
Unaware of Increased Risk	Need to Increase Awareness	Unaware of Increased Risk
Lower Health Literacy	Appropriate Reading Level	Lower Health Literacy
Functional/Sensory Deficits	Large font, screen size, buttons, & keyboards; volume control; brief modules, cognitive/computer pre-training and/or provision	Functional/Sensory Deficits
Value Preferences for Immediate Gratification	Incremental Goals with ample reinforcement	Value Preferences for Immediate Gratification
Caregivers	Dyadic Approaches	Caregivers
Game/Play-based	Need for High Engagement	Preference for Holistic Programs that have Meaning & Involve Others
Numerous treatment sequelae	Tailor to extant health conditions	Increased cumulative disease burden

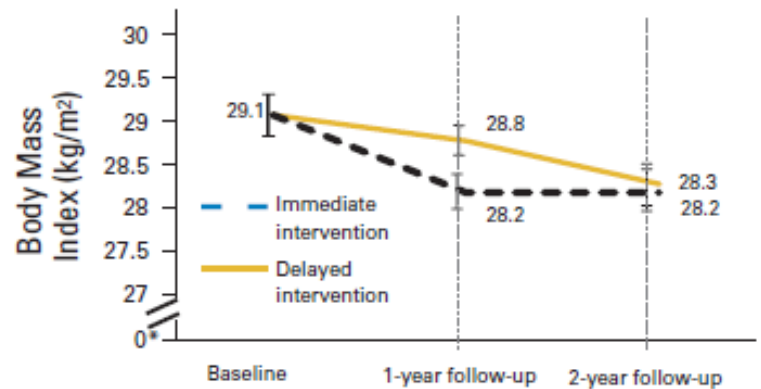
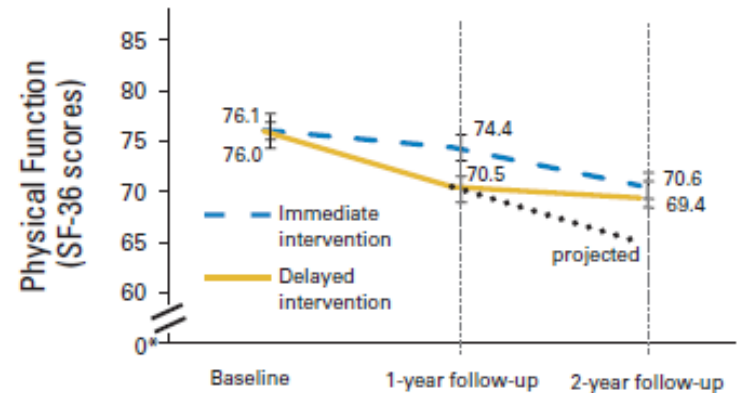
Fit 4 Life: 38 Childhood Cancer Survivors with Acute Lymphoblastic Anemia (ACS-MSRG)

- 4-month, 2 arm, single blinded RCT
- Sample: Children ages 8-18
- Weight loss via caloric restriction (logs), increased physical activity (1 hr/day, 15,000 steps)
- Delivered via the Web, phone and text messaging
- Safe, retention 92%.
- At follow-up: Intervention arm lost 0.1 kg vs gain of 1.4 kg among controls ($p=.06$)

RENEW: 641 Older Breast, Prostate & Colorectal Survivors

(R01 CA106919)

- Mean Age: 73 (65-87)
- 2-year, 2-arm, wait-list, cross-over, single-blinded trial
- Promoted Weight Loss 0.5 kg w⁻¹
Calorie budget (logs), portion control, & volumetrics (Villareal et al. *Obes Res* 2005:31;1849)
- Healthful Diet (ACS 2003 Guidelines)
- Resistance/Aerobic Physical Activity



Morey MC et al. *JAMA* 2009; 301:1883.

Demark-Wahnefried et al. *JCO* 2012; 39:2354

Conclusions



- There are several considerations in delivering programs to younger and older cancer survivors
- Programs must address the health risks in these populations: e.g., frailty, sarcopenia
- Programs also need to overcome well-known barriers: distance, literacy, functional deficits, and address preferences to optimally engage.