2010 Guidance for Exercise and Cancer

- Focused on safety
- Expert opinion, evidence ‘informed’
- Public health oriented
- Reaction to PAGAC
  - Avoid Inactivity
  - 150 min/week aerobic
  - 2x weekly resistance
  - Flexibility on most days
ACSM New Guidelines / Publications

Three peer-reviewed journal articles, Released 16 October 2019

<table>
<thead>
<tr>
<th>Journal</th>
<th>Topic</th>
</tr>
</thead>
<tbody>
<tr>
<td>MSSE</td>
<td>* Exercise &amp; Cancer Prevention and Recurrence</td>
</tr>
<tr>
<td>MSSE</td>
<td>* Exercise During and After Treatment: FITT Prescriptions</td>
</tr>
<tr>
<td>CA</td>
<td>* Exercise Is Medicine in Oncology: A Call to Action</td>
</tr>
</tbody>
</table>

Exercise Prevents Incident & Recurrent Cancer, Improves Survival

<table>
<thead>
<tr>
<th>Level of Evidence</th>
<th>Physical Activity and Lower Risk of Developing Cancer</th>
<th>Sedentary Time and Higher Risk of Developing Cancer</th>
<th>Pre-Diagnosis Physical Activity and Lower Risk of Cancer-Specific Survival</th>
<th>Post-diagnosis Physical Activity and Cancer Risk of Cancer-Specific Survival</th>
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</thead>
<tbody>
<tr>
<td>Strong</td>
<td>Colon, Breast, Endometrial, Kidney, Bladder, Esophagus (adenocarcinoma), Stomach (cardia)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Moderate</td>
<td>Lung, Endometrial, Colon, Breast, Prostate</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Limited</td>
<td>Myeloma &amp; Hematologic, Head &amp; Neck, Pancreas, Prostate, Ovary</td>
<td></td>
<td></td>
<td>Liver</td>
</tr>
</tbody>
</table>
Sharing Slides from Dr. Steve Moore, NCI presented at the recent the Roundtable

Association of Leisure-Time Physical Activity With Risk of 26 Types of Cancer in 1.44 Million Adults

Steven C. Moore, PhD, MPH; Ji Min Lee, MBBS, SGI; Elise B. Winderun, PhD; Peter T. Campbell, PhD; Joshua N. Sampson, PhD; Carl M. Khoury, MD; Todd S. Novak, PhD, MPH; K. Amato, PhD; Amy Barrington de Gonzalez, DPH; Patricia Hartge, MD; Hans-Dou Aitken, MD, PhD; Clore, BL; Kris H. Bero, PhD; Daniel T. Chert, MD; Apple, K. Armitage, PhD; Neal D. Freedman, PhD; Marc Gunter, PhD; Matthias Johanneson, PhD; Yee Ben Ryan, MD, MCC; Martha S. Livid, MD; Nicola O'Nair, PhD; Yi-Ming Park, SGI; Zhi-Rui, MD; Kim Robins, PhD; Catherine S. Slattery, PhD, Howard Swain, SGI, PhD; MichaelC. Squires, BS; Dei Jan Tauber, MS; Alice Work, DMD; Charles E. Matthews, PhD; Alison P. Fark, PhD.

The Physical Activity Collaboration of the NCI Cohort Consortium

8 US Cohorts 4 European Cohorts

1.44 million participants
55% women
Age 50-65 years
187,000 incident cancers

Types of physical activity included:

Leisure-time
Moderate intensity and/or
Vigorous intensity
e.g. walking or
e.g. hiking, jogging

Main results
(Not adjusted for BMI)

<table>
<thead>
<tr>
<th>Cancer</th>
<th>Cases</th>
<th>Hazard ratio (90th vs. 10th percentile)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gallbladder</td>
<td>362</td>
<td>-</td>
</tr>
<tr>
<td>Liver</td>
<td>1,234</td>
<td>0.6</td>
</tr>
<tr>
<td>Lung</td>
<td>19,153</td>
<td>1.0</td>
</tr>
<tr>
<td>Kidney</td>
<td>4,546</td>
<td>1.5</td>
</tr>
<tr>
<td>Small intestine</td>
<td>553</td>
<td>0.6</td>
</tr>
<tr>
<td>Gastric cancer</td>
<td>756</td>
<td>0.3</td>
</tr>
<tr>
<td>Endometrial</td>
<td>5,346</td>
<td>0.6</td>
</tr>
<tr>
<td>Exophytic esophagus cancer</td>
<td>442</td>
<td></td>
</tr>
<tr>
<td>Myeloid leukemia</td>
<td>1,692</td>
<td></td>
</tr>
<tr>
<td>Myeloma</td>
<td>2,161</td>
<td></td>
</tr>
<tr>
<td>Colon</td>
<td>14,160</td>
<td></td>
</tr>
<tr>
<td>Head and neck</td>
<td>3,985</td>
<td></td>
</tr>
<tr>
<td>Rectum</td>
<td>5,231</td>
<td></td>
</tr>
<tr>
<td>Bladder</td>
<td>9,073</td>
<td></td>
</tr>
<tr>
<td>Breast</td>
<td>35,178</td>
<td></td>
</tr>
<tr>
<td>Non-Hodgkin lymphoma</td>
<td>6,535</td>
<td></td>
</tr>
<tr>
<td>Thyroid</td>
<td>1,829</td>
<td></td>
</tr>
<tr>
<td>Gastric non-cardia cancer</td>
<td>1,428</td>
<td></td>
</tr>
<tr>
<td>Soft tissue</td>
<td>401</td>
<td></td>
</tr>
<tr>
<td>Pancreas</td>
<td>4,196</td>
<td></td>
</tr>
<tr>
<td>Lymphocytic leukemia</td>
<td>2,100</td>
<td></td>
</tr>
<tr>
<td>Ovary</td>
<td>2,890</td>
<td></td>
</tr>
<tr>
<td>Brain</td>
<td>2,110</td>
<td></td>
</tr>
<tr>
<td>Prostate</td>
<td>46,992</td>
<td></td>
</tr>
<tr>
<td>Malignant melanoma</td>
<td>12,430</td>
<td></td>
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</tbody>
</table>
Is it obesity?

Associations after BMI adjustment

<table>
<thead>
<tr>
<th>Cancer</th>
<th>Cases</th>
</tr>
</thead>
<tbody>
<tr>
<td>Esophageal adenocarcinoma</td>
<td>899</td>
</tr>
<tr>
<td>Lung</td>
<td>19,133</td>
</tr>
<tr>
<td>Kidney</td>
<td>4,548</td>
</tr>
<tr>
<td>Breast</td>
<td>35,178</td>
</tr>
<tr>
<td>Myeloid leukemia</td>
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<td>3,985</td>
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<tr>
<td>Rectum</td>
<td>5,531</td>
</tr>
<tr>
<td>Bladder</td>
<td>9,073</td>
</tr>
</tbody>
</table>

Hazard ratio (90th vs. 10th percentile)

Summary of State of Evidence on Physical Activity and Cancer Survival: Major Sites

<table>
<thead>
<tr>
<th>Cancer Site</th>
<th>Pre-diagnosis PA</th>
<th>Post-diagnosis PA</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Cancer-Specific</td>
<td>All Cause Mortality</td>
</tr>
<tr>
<td>Breast</td>
<td>↓↓</td>
<td>↓↓</td>
</tr>
<tr>
<td>Colorectal</td>
<td>↓↓</td>
<td>↓↓</td>
</tr>
<tr>
<td>Prostate</td>
<td>Null</td>
<td>↓↓</td>
</tr>
<tr>
<td>Lung</td>
<td>↓</td>
<td>NA</td>
</tr>
<tr>
<td>Kidney</td>
<td>↓</td>
<td>NA</td>
</tr>
<tr>
<td>Endometrium</td>
<td>Null</td>
<td>Null</td>
</tr>
<tr>
<td>Ovarian</td>
<td>Null</td>
<td>Null</td>
</tr>
</tbody>
</table>
But what about other cancer health related outcomes?

(Symptoms, Treatment Tolerance, Adverse Effects of Treatment)
Exercise and Cancer-related Fatigue

- ~ 200 RCTs currently available
- Largest evidence area in the field of Exercise Oncology

**Exercise and Fatigue**

- Results available for various:
  - cancer entities
  - Treatments
  - Timing
  - exercise approaches

Effect Sizes

- Aerobic Ex: 0.27
- Resistance Ex: 0.19
- Combination: 0.41
- Overall: 0.32
Effects not influenced by:
- Cancer Type
- Presence of Metastasis
- Treatment Status (during/after)
- Delivery mode (supervised/not)
- Delivery setting (group-based/not)
- Type of Exercise
- Duration
- Other methodological parameters

Efficacy of various Approaches against Fatigue

Mustian et al. 2017, JAMA Oncology

Overall:
AT and/or RT positively impacts Fatigue
Stable against modifying factors
Effects are seen for General/Overall Fatigue
QOL survey Physical Fatigue

Range of FITT applied in studies:

<table>
<thead>
<tr>
<th>Type</th>
<th>Frequency</th>
<th>Intensity</th>
<th>Time</th>
<th>Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>Resistance</td>
<td>2-3x/week</td>
<td>8-15 RM</td>
<td>8-15 sets</td>
<td>Machine based, Bands</td>
</tr>
<tr>
<td>Aerobic</td>
<td>2-6x/week</td>
<td>50-95% HR Max</td>
<td>15-90 min</td>
<td>Treadmill, Cycle, Walking</td>
</tr>
</tbody>
</table>

Lymphedema

*Specific to Breast Cancer Related Lymphedema
Trials included

- Ahmed et al. 2006
- Courneya et al. 2007
- Schmitz et al. 2009
- Schmitz et al. 2010
- Kilbreath et al. 2012

The Physical Activity and Lymphedema (PAL) Trial

- 1 year randomized controlled intervention
  - Twice weekly progressive strength training
  - Non-exercising control
- Primary aim: To determine whether there are any changes in lymphedema outcomes
  - 2 separate trials
    - WITH lymphedema
    - AT RISK FOR lymphedema
    - Powered independently
Summary

- Twice weekly slowly progressive strength training is SAFE for breast cancer survivors who have had lymph node removal including
  - Those WITH lymphedema
  - Those AT RISK FOR lymphedema
- Risk of lymphedema flare-ups decreased by HALF
  - Cost effectiveness?
- Among at-risk women with 5+ nodes removed, risk of ↑ arm swelling is reduced by 70%
- Substantive strength improvements
- Body image, appendicular skeletal muscle mass improved
- Reduction in physical function prevented

Sum Up - Lymphedema

- Finding of SAFETY for RESISTANCE TRAINING
- All trials
  - started with SUPERVISION
  - Started with ‘start low, progress slow’
- Preliminary data for lower limb lymphedema does not support assuming that the results translate
- No evidence available for aerobic training
  - Presumed safe based on lack of reports of adverse events
Overview of new Ex Rx for People Living With and Beyond Cancer

- Avoid Inactivity
- General public health related guidelines for
  - Primary prevention
  - Secondary prevention
- For specific outcomes, if there is no FITT prescription, default to general public health guidelines
  - 150 min aerobic, 2 sessions resistance exercise per week
- For 8 cancer health related outcomes with sufficient evidence:
  - Aerobic Exercise 3x weekly, up to 30 minutes
  - Resistance training 2 sets, 8-12 reps, 2x weekly
  - No comment on flexibility activities

Current State

- < 25% of cancer patients are adequately active
- Multifactorial causes include:
  - Lack of referral from clinicians
    - 9% of nurses refer patients to exercise
    - 20% of physicians refer patients to exercise

Why don’t clinicians talk to patients about exercise?

- Lack of awareness of the potential value of exercise in cancer populations
- Uncertainty regarding safety or suitability of exercise for a particular patient,
- Lack of awareness regarding available programs to help facilitate exercise in cancer populations
- Need for education and skills development for making referrals
- Belief that referrals to exercise programming is not within the scope of practice for oncology clinicians
Recommendation

• Apply the Exercise Is Medicine approach
  – Assess
  – Advise
  – Refer
• Similar approach to that used for DISTRESS screening

The Triage Step: Catch-22

• Clinicians are asked to clear patients for exercise for MANY programs
• We ask that clinicians clear for programs
• Are they qualified to do so?
• Who is?
• Who is in the system who can do this work?
• Lack of valid triage schema

Refer WHERE???

We have developed a registry of exercise programs for people living with and beyond cancer @
www.exerciseismedicine.org/movingthroughcancer

Release Date: 16 October 2019
Moving Through Cancer

Rx Pad

- Intended to ease referrals
  - Assess, advise, refer
- Need to train clinicians
  - Raise awareness
  - Clarify how easy it can be
  - Document benefits in clinic

MANY other challenges

- Transitions from PT to community and back
- Behavioral issues
- Workforce development
- Policy issues
  - Triage methods
  - Payment model for services

What is Possible?

Jollie’s story

Exercise Oncology in Action
5/11 Friend invited to train for Sprint TRI (Oct. 2011)
6/11 32 min 5k. Exhausted after 5 laps in pool...
7/11 Developed what felt like chest congestion. Nothing significant on chest scan.
PCP prescribed albuterol for, “Adult Onset Asthma”
8/11 Swim/Run - 1 mi into run friend says, “Stumm Jolie, I didn’t know you had asthma!”
9/11 PCP orders 2nd chest scan, “…looks like you have an enlarged heart. Probably nothing, just an athlete’s heart. I’ll have my friend who’s a radiologist review”
10/11 Radiologist recommends CT - Stage 3 lymphoma
12/11 Biopsy reveals Small Lymphocytic Lymphoma
01/12 6 cycles bendumustine + rituximab
01/12 LLS training started

Today (Fall 2019)...

“We’re working together…” Training Plan

<table>
<thead>
<tr>
<th>M</th>
<th>Rest</th>
</tr>
</thead>
<tbody>
<tr>
<td>T</td>
<td>Run 3 mi. HIIT + Swim 20 laps</td>
</tr>
<tr>
<td>W</td>
<td>Bike 20 mi.</td>
</tr>
<tr>
<td>R</td>
<td>Run 6 mi. Tempo</td>
</tr>
<tr>
<td>F</td>
<td>Run 3 mi HIIT + Swim 20 laps</td>
</tr>
<tr>
<td>S</td>
<td>Swim 30 laps + Bike 36 mi.</td>
</tr>
<tr>
<td>S</td>
<td>Run 10 mi.</td>
</tr>
</tbody>
</table>

*With 21 yr. & 22 mo. girls and with another 5 mo. old foster child and a busy career, I almost always get Sat. & Sun workouts in, but only 2-3 workouts during the week
Jollie’s Takeaways

• Teach your patients to listen to their body. They will know something’s wrong before a lab test. If something feels off, don’t ignore it!
• Be quick to refer patients to allied health professionals (exercise, nutrition, psychological). Medicine & surgery are not your only tools!
• Exercise can reduce &/or eliminate medication symptoms & reduce reoccurrence of some cancers
• Exercise gives patients control of their lives’ back!

Case Study
NORMA

• Age: 61
• Diagnosis:
• Other chronic conditions:
  – Asthma
  – Type 2 diabetes
  – Controlled hypertension
  – Obesity
• At Enrollment
  – Ambulated with a walker
  – Had to take frequent breaks to sit down due to weakness in her legs
  – Prior spinal surgery
    + told she would be mostly bedridden

Nurse AMIE

• Tablet based supportive care intervention
  – Daily symptom questions
  – Daily interventions
    • Walking (FitBit, progressive goals)
    • Resistance, balance, and flexibility exercise
    • Mindfulness Meditation
    • CBT
    • Music
    • Discussion Board (social support)
  – Weekly navigator call
Norma!

• At end of study
  – Averaging 10,000 steps/day
  – Able to ambulate on her own with no assistance but carried a cane for long distances.
  – When she met with the patient navigator she strutted in swinging her cane in circles to show how well she could walk on her own.

  "when I came over here, I was on the walker but now I’m using the cane because I’ve been doing the exercise and my bones have been getting stronger. I love nurse AMIE. It helped me a lot, when I do exercise it helps with the pain in my legs, I suffer a lot from a lot of pain”

And the list goes on...

• Syndy Hooper – pancreatic cancer survivor
  Ironman competitor

And on...

• Susan Helmrich –
  – 3 time survivor
  • DES Daughter
  • Lung
  • Pancreatic
  – masters swimmer

And on...

• Gabrielle Grunewald –
  – Adenoid cystic carcinoma diagnosed 2011
  – Sponsored, Ranked USATF runner
  • Placed 4th in 1500 in London Olympic Trials
  • National Champion 3000m in 2014

‘There are two ways to live your life:
The first is as if nothing is a miracle.
The other is as if everything is a miracle.’
And on....

- Mike Levine
  - Stage 4 Pancreatic Cancer
  - Ironman competitor

"When I was diagnosed with aggressive breast cancer, it was incredible how quickly my athlete frame of mind took over. I made a public commitment to stay active. I rode my bike to and from treatments and stopped at the gym on my way. Days I felt totally unlike myself and miserable, I would get out and do something for at least 10 minutes. Moving helped me feel better physically, and more importantly, it gave me a mental victory. I credit staying physically active for helping my body process the treatment.

I continue to raise awareness of how important physical activity is for preventing cancer, getting through cancer and recovering through cancer. I am the biggest advocate now that I’ve been through it myself. I hope to continue using my platform to help move this forward until physical activity is a prescriptive part of treatment for all."

Kikkan Randall
2019 ACSM Annual Meeting

General Conclusion

- Exercise may not make a cancer go away, but it will
  - Put the patient back in control
    - EMPOWERMENT
  - Manage symptoms
  - Slow the trajectory for loss of function and lean mass

It’s time for these examples to stop being exceptional.

It’s time for a paradigm shift:

Exercise Is Medicine for People Living With and Beyond Cancer
Exercise is Medicine

DrKatieSchmitz@gmail.com