Home-based Diet-Exercise Interventions to Improve Health Behaviors, Body Weight, & Functional Status in Cancer Survivors: Results of the RENEW trial

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Objectives

• Brief overview of issues in survivorship and potential role of nutritional status, diet and exercise.

• What factors need to be considered in delivering dietary interventions that promote dietary change and healthier eating patterns over the long-term?

• Discuss lessons learned and findings of the RENEW trial
Cancer Survivorship: The Good News!

About 25 million survivors worldwide

(Parkin et al. CA- Cancer J Clin. 2005)
Cancer Survivorship: The Bad News!

Cancer Survivors at greater risk
- Progressive disease
- Second primaries
- Cardiovascular Disease
- Diabetes
- Osteoporosis
- Sarcopenia
- Functional decline
- Subsets prone to depression & fatigue
- $219 Billion annually on cancer in the US: 2/3’s of these costs due to downstream effects
## Possible Solutions

<table>
<thead>
<tr>
<th></th>
<th>Diet</th>
<th>Exercise</th>
</tr>
</thead>
<tbody>
<tr>
<td>Depression</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Fatigue</td>
<td>✓</td>
<td>✓✓</td>
</tr>
<tr>
<td>Adverse Body Composition Change</td>
<td>✓</td>
<td>✓✓✓✓</td>
</tr>
<tr>
<td>Functional Decline</td>
<td>✓</td>
<td>✓✓✓✓</td>
</tr>
<tr>
<td>Comorbidity</td>
<td>✓✓✓✓</td>
<td>✓✓✓✓</td>
</tr>
<tr>
<td>Recurrent/Progressive Disease</td>
<td>✓✓</td>
<td>✓✓</td>
</tr>
</tbody>
</table>

- ✓ Possible benefit
- ✓✓ Probable benefit
- ✓✓✓✓ Convincing benefit
Change in BMI after Diagnosis of Breast Cancer & Association with Recurrence & Mortality

Data from Cohort of 5204 Breast Cancer Survivors in Nurse’s Health Study

Kroenke et al. JCO 23: 1370-8, 2005
Exercise & Association with Recurrence & Survival - CALGB 89803 (Stage III CRC) N=832

Meyerhardt et al. JCO 24:3535, 2006
Results of the Women’s Intervention Nutrition Study (WINS) Show Reduced Rates of Recurrence in Patients Assigned to a Low Fat Diet (n=2,437)

Recurrence Rates (% of population)

- **All Patients**
  - Low Fat Diet
  - Regular Diet
  - Probability: \( P = .034 \)

- **ER positive**
  - Low Fat Diet
  - Regular Diet
  - Probability: \( P = .277 \)

- **ER negative**
  - Low Fat Diet
  - Regular Diet
  - Probability: \( P = .018 \)

*Chlebowski et al. JNCI 98:1767, 2006*
## Diet & Physical Activity Guidelines for Cancer Survivors

<table>
<thead>
<tr>
<th>Weight</th>
<th>Be as lean as possible without becoming underweight</th>
</tr>
</thead>
<tbody>
<tr>
<td>Physical Activity</td>
<td>Be physically active 30+ min/day – aim for 60+ min/day</td>
</tr>
<tr>
<td></td>
<td>Limit sedentary habits such as watching television</td>
</tr>
<tr>
<td>Dietary Pattern</td>
<td>Avoid sugary drinks. Limit energy-dense foods (foods high in sugar &amp; fat, and low in fiber)</td>
</tr>
<tr>
<td></td>
<td>Eat more of a variety of vegetables, fruits, whole grains and legumes</td>
</tr>
<tr>
<td></td>
<td>Limit consumption of processed &amp; red meat</td>
</tr>
<tr>
<td>Other</td>
<td>Limit consumption of salty foods</td>
</tr>
<tr>
<td>Alcohol</td>
<td>If drink limit to 1-2 drinks/day</td>
</tr>
<tr>
<td>Supplements</td>
<td>Don’t use supplements to protect against cancer</td>
</tr>
</tbody>
</table>
What are the Lifestyle Practices of Cancer Survivors?

<table>
<thead>
<tr>
<th>Behavior</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Overweight or Obese</td>
<td>59-71%</td>
</tr>
<tr>
<td>Eat &lt; 5 Daily Servings of Fruits &amp; Vegetables</td>
<td>52-58%</td>
</tr>
<tr>
<td>Moderate to Heavy Alcohol Intake</td>
<td>16%</td>
</tr>
<tr>
<td>Takes Supplements</td>
<td>70-80%</td>
</tr>
<tr>
<td>Sedentary</td>
<td>~70%</td>
</tr>
</tbody>
</table>

Much Work Needs to be Done!
Levels of Interest in Diet & Exercise Interventions (978 Breast and Prostate Cancer Survivors)

Levels of Interest in Various Intervention Modes of Delivery
(% of sample indicating “extremely or very interested”)

Reach Out to ENhance Wellness in Older Survivors (R01 CA106919)

- Test the impact of a diet-exercise mailed material/telephone counseling program on **weight loss** & physical functioning in 640 prostate, colorectal & breast cancer survivors
- 65+ years of age & overweight
- 5+ years out from diagnosis
% with Limitations: Survivors vs. General Population

## Estimated associations between health behaviors & physical function (n=688)

<table>
<thead>
<tr>
<th>Health Behavior</th>
<th>Point increase in SF36 Physical Function Subscale</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Affirmative response to vigorous exercise 20 min at least 3 x weekly</td>
<td>15.4</td>
<td>P&lt;.0001</td>
</tr>
<tr>
<td>One daily serving increase in F&amp;V</td>
<td>0.9</td>
<td>P=.0049</td>
</tr>
<tr>
<td>1% decrease in total energy from fat</td>
<td>0.2</td>
<td>P&lt;.0001</td>
</tr>
</tbody>
</table>

Demark-Wahnefried et al. [Intl J Behav Nutr Phys Act](1:16, 2004) (www.ijbnpa.org/content/1/1/16).
Effect of Weight Change on Physical Function in Women Age 65+

Modest weight loss improves function in those who are overweight/obese

Fine et al. JAMA. 282:2136, 1999
Overview: Accrual & Screening

Self-Referrals
N=107
Confirm case status w/MD

N = 107
Mailed letter of invitation
and a screening survey

n = 86
80% response

North Carolina Cancer Registry
N = 67,054
Omit decedents, duplicates, 2nd primaries, contact info

Potential N = 37,054

Approached N = 26,031

Undeliverable n = 6,030

n = 1147
6% response

Returned survey/consents
White, males, younger & more proximal to dx more likely to respond

n = 1233

Ineligible n = 567

641 Enrolled

Randomization: cancer site, gender, age (65-74 years vs 75+ years), and race

Immediate Intervention (319)

Immediate Intervention (319)

1-yr Follow-up (269)

1-yr Follow-up (269)

76 Drop-outs

77 Drop-Outs

2-yr Follow-up

2-yr Follow-up
Geographic Distribution of Participants
Accrued for the RENEW Trial (n=641)
# of Letters of Invitation Mailed to Ascertain 1 Analyzable Participant
Project LEAD vs. RENEW Telephone Counseling/Mailed Material
Diet & Exercise Interventions aimed at Elderly Cancer Survivors

- Recruited within 18M of diagnosis: Project LEAD - 11, RENEW - 39
- Recruited at least 5-yrs after diagnosis: Project LEAD - , RENEW - 39
<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age</td>
<td>73.1 (5.1) (range 65-87)</td>
</tr>
<tr>
<td>% Male</td>
<td>45%</td>
</tr>
<tr>
<td>% Caucasian</td>
<td>89%</td>
</tr>
<tr>
<td>Education</td>
<td>33% ≤ HS</td>
</tr>
<tr>
<td></td>
<td>30% Some College</td>
</tr>
<tr>
<td></td>
<td>37% ≥ College Grad</td>
</tr>
<tr>
<td>Type of Cancer</td>
<td>45% Breast</td>
</tr>
<tr>
<td></td>
<td>41% Prostate</td>
</tr>
<tr>
<td></td>
<td>14% Colorectal</td>
</tr>
<tr>
<td>% Cancer Registry</td>
<td>92%</td>
</tr>
<tr>
<td>Years since Dx</td>
<td>8.6 (2.7) (range 5-26)</td>
</tr>
<tr>
<td># of Comorbidities</td>
<td>2 (1.2)</td>
</tr>
<tr>
<td>Current Smoker</td>
<td>6%</td>
</tr>
<tr>
<td>Physical Function (SF 36)</td>
<td>75.7 (18.9) (range 10-100)</td>
</tr>
</tbody>
</table>
## Results

<table>
<thead>
<tr>
<th></th>
<th>Δ Intervention Mean (SE)</th>
<th>Δ Wait List Control Mean (SE)</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>SF-36 Physical Function</td>
<td>-2.55 (1.07)</td>
<td>-5.39 (1.01)</td>
<td>.034</td>
</tr>
<tr>
<td>Basic Lower Extremity – LLF</td>
<td>+0.41 (0.71)</td>
<td>-2.11 (0.67)</td>
<td>.005</td>
</tr>
<tr>
<td>Adv. Lower Extremity – LLF</td>
<td>+0.44 (0.60)</td>
<td>-2.55 (0.61)</td>
<td>.015</td>
</tr>
<tr>
<td>Strength Exercise (min/d)</td>
<td>+22.2 (2.8)</td>
<td>+0.5 (3.0)</td>
<td>&lt;.0001</td>
</tr>
<tr>
<td>Strength Exercise (session/w)</td>
<td>+1.4 (2.6)</td>
<td>+0.2 (2.5)</td>
<td>&lt;.0001</td>
</tr>
<tr>
<td>Endurance Exercise (min/d)</td>
<td>+43.1 (5.7)</td>
<td>+26.1 (6.3)</td>
<td>&lt;.0001</td>
</tr>
<tr>
<td>Endur. Exercise (session/w)</td>
<td>+1.6 (3.9)</td>
<td>+0.5 (4.1)</td>
<td>.005</td>
</tr>
<tr>
<td>F&amp;V Intake (servings/d)</td>
<td>+1.48 (0.16)</td>
<td>+0.15 (0.12)</td>
<td>&lt;.0001</td>
</tr>
<tr>
<td>Saturated Fat Intake (g/d)</td>
<td>-3.64 (0.61)</td>
<td>-1.19 (0.55)</td>
<td>.002</td>
</tr>
<tr>
<td>Healthy Eating Index</td>
<td>+7.1 (0.9)</td>
<td>+1.4 (0.8)</td>
<td>&lt;.0001</td>
</tr>
<tr>
<td>Weight (kg)</td>
<td>-2.45 (0.22)</td>
<td>-1.03 (0.2)</td>
<td>&lt;.0001</td>
</tr>
<tr>
<td>BMI</td>
<td>-0.82 (0.07)</td>
<td>-0.035 (0.08)</td>
<td>.0002</td>
</tr>
<tr>
<td>Quality-of-Life (Total SF-36)</td>
<td>+0.91 (0.86)</td>
<td>-2.17 (0.90)</td>
<td>.025</td>
</tr>
</tbody>
</table>

Changes in Lifestyle Behaviors

**Weekly Minutes of Exercise**
- Immediate RENEW Intervention (Green)
- Delayed Intervention (Orange)

**Healthy Eating Index**
- Immediate RENEW Intervention (Green)
- Delayed Intervention (Orange)
Change in BMI

Body Mass Index (kg/m\(^2\))

- Immediate RENEW Intervention
- Delayed Intervention

Baseline 1-yr 2-yr
28.3 28.2 29.1
28.2 28.8 28.8
28.2 28.6 28.6
28.2 28.4 28.4
28.2 28.2 28.2
28.2 28.2 28.2

Immediate RENEW Intervention
Delayed Intervention
Change in Physical Function (SF-36)

Immediate RENEW Intervention

Delayed Intervention

Baseline
1-yr
2-yr

76.1
74.4
70.6

70.5
69.4

65
The RENEW exercise-diet intervention that was delivered via mailed materials & telephone counseling was successful in:

- improving diet and physical activity
- improving weight status
- reorienting physical functioning
- improving overall quality of life
- DURABLE and REPLICABLE
Areas for Future Research

- To determine optimal timing of interventions
- To determine optimal channels and modes of delivery for interventions
- To determine the optimal target (survivors alone or survivors and family/friends)
- To determine optimal means of addressing content in multi-component interventions
- To determine means by which effective interventions are sustainable
Collaborators

Miriam Morey, PhD
Elizabeth Clipp, PhD
Bercedis Peterson, PhD
Carl Pieper, PhD
Harvey Cohen, MD
Denise Snyder, MS, RD
Richard Sloane, MS, MPH

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