

THE RELATIONSHIP BETWEEN EXERCISE AND SLEEP AND HEALTH
RELATED QUALITY OF LIFE IN BREAST CANCER PATIENTS

by

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ABSTRACT

Not much is known about the role of exercise in sleep and health related quality of life (HRQOL) in breast cancer survivors. Information on sleep and physical activity was collected from 10 female breast cancer survivors. Physical activity was assessed by the 7 Day Physical Activity Recall (PAR) and the Short Questionnaire to Assess Health Enhancing Physical Activity (SQUASH). Sleep (quality and duration) was assessed using a cell phone app, the Sleep Cycle Alarm Clock. HRQOL was assessed by the Functional Assessment of Cancer Therapy questionnaire. Pearson's Correlation Coefficients showed a significant negative relationship between physical activity expenditure, assessed by PAR, and sleep quality ($r=0.76$; $p<0.01$) and sleep duration ($r=0.68$; $p<0.03$), but there was no relationship between time spent in light, moderate, and intense physical activity, assessed by SQUASH, and sleep quality and duration. There was also no relationship between physical activity and HRQOL or between HRQOL and sleep quality and duration. In conclusion, physical activity was not associated with improved sleep quality and duration or HRQOL in breast cancer survivors. Future studies with a larger sample and using a more objective measurement of physical activity are needed.

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INTRODUCTION

The Dietary Guidelines for Americans state that adults should perform at least 150 minutes of moderate-intensity aerobic exercise or 75 minutes of vigorous-intensity aerobic exercise per week (1). In addition, the dietary guidelines recommend muscle strengthening activity at least two days per week (1). The objective of these recommendations is to reduce the risk for a number of chronic health conditions including cardiovascular disease, hypertension, type-2 diabetes, obesity, dyslipidemia, and certain types of cancer (1).

Regular exercise may also be associated with improved sleep duration and sleep quality. The National Sleep Foundation recommends seven to nine hours of sleep per night for adults (2). Scheduled exercise is effective in improving the quality of sleep in the elderly. In a study on elderly Iranian males conducted by Karimi et al. (3), the majority of participants undergoing an exercise intervention program showed improved quality of sleep compared to those without exercise intervention. Physical activity may also increase sleep quality among those dealing with adversity. In a study by Li et al. (4), physical activity was linked to increased sleep quality and sleep duration in widows.

In addition to improved sleep, regular exercise may be related to improved health related quality of life. In this same study conducted by Li et al, regular physical activity was associated with increased overall health related quality of life among widows experiencing hardship and adversity (4). In this study, exercise energized the widows' mental status, reduced depression and the need for psychoactive drugs, and increased socialization circles (4). Physical activity interventions also proved successful in aiding

participants with major depressive disorders to better cope with depressive tendencies and experience psychological wellbeing. Blumenthal et al. conducted two studies comparing the effectiveness of a 4-month aerobic exercise program with pharmacotherapy in adults diagnosed with major depressive disorders (5, 6). Both studies illustrated that exercise is equally effective in reducing depressive symptoms as is antidepressant medication.

The benefits of regular exercise are also currently being examined in cancer patients. Cancer patients may experience a decreased quality of sleep and health related quality of life following their diagnosis and during treatment. There is no data, however, on how regular exercise in cancer patients affects their sleep quality and duration. Nevertheless, there is some evidence that regular exercise in cancer patients may help improve their health related quality of life. In a brief review of studies examining the role of physical activity in patients with leukemia, lymphoma, or myeloma by Eckert et al. (7), the researchers found that physical activity may be an effective approach to improve health related quality of life in patients with hematological cancers. In another study conducted by Huether et al. (8), the researchers found that cancer survivors placed in a three month physical activity intervention program group referred to as “Energy Through Motion” reported decreased cancer related fatigue compared to a group of cancer survivors without any physical activity intervention. The cancer survivors partaking in regular physical activity also experienced greater improvement in their health related quality of life than their peers. They reported improvements in fatigue, general activity, work, relationships, and enjoyment of life (8). A meta-analysis conducted by Speck et al

(9) showed that physical activity has a moderate to positive effect on functional quality of life, anxiety, and self-esteem in cancer survivors.

OBJECTIVES

The objective of this study is to understand the relationship between exercise and quality and duration of sleep and health related quality of life in breast cancer patients. This study will also examine the relationship between duration and quality of sleep and health related quality of life in these patients.

HYPOTHESIS

It is hypothesized that regular exercise will be linked to improved sleep quality and duration and improved health related quality of life. It is also hypothesized that increased sleep quality and duration will correlate with improved health related quality of life.

SIGNIFICANCE OF THE STUDY

Not much is known about the relationship between exercise and sleep and health related quality of life in cancer patients. This area is important to study since cancer diagnosis and treatment affect health related quality of life and sleep. Finding strategies that may improve these outcomes is warranted.

METHODS

Participants and Recruitment

190 females diagnosed with breast cancer were contacted to participate in this study. Of those 190 women, 30 responded, 27 were eligible, 17 voluntarily withdrew, and 10 subjects completed the study. Participants must have had diagnosed breast cancer of stages 1-3 and be at least 45 days removed from their final chemotherapy treatment. Having undergone radiotherapy or currently undergoing radiotherapy was not an exclusion criteria. Subjects were recruited via email and by phone from the patients' database (Sales Force) at FitSTEPS Cancer Foundation For Life.

Measurements

Demographic, anthropometric, behavioral, and health information

Data on demographics, anthropometric, behavioral, and health information was accessed through a questionnaire.

Physical Activity

Physical activity was assessed by an interviewer administered 7-d physical activity recall (7-d PAR), a validated tool (11) that collects information on the time spent in sleep, moderate, hard, and very hard activities. Physical activity was also assessed using a validated questionnaire (12) the Short QUestionnaire to ASsess Health-enhancing physical activity (SQUASH). The questionnaire captures information on commuting activities, leisure time activities, household activities, and activities at work and school over the past 7 days.

Sleep Duration and Quality

To track sleep duration, subjects used the Sleep Cycle Alarm application on a smart phone for one week. This application uses sound analysis and an accelerometer within the phone to identify different phases of sleep by tracking movements in bed. The Sleep Cycle application monitors body signals to assess an individual's sleep quality and sleep duration. A description on how to use the application is given in the procedures section.

Health Related Quality of Life

To assess health related quality of life (HRQOL), subjects filled out the Functional Assessment of Cancer Therapy (FACT-G), a validated questionnaire (13). The questionnaire assessed physical well-being, social/family well-being, emotional well-being, functional well-being, and fatigue.

PROCEDURES

Subjects were instructed to complete a demographics, anthropometric, behavioral, and health information questionnaire.

The subjects were instructed to track their sleep duration and quality for 7 days by using the Sleep Cycle Alarm Clock Application on their smart phone. The subjects were instructed download the application and create an account. Before bed, the application prompted them to select a window of preferred wake up time for the following morning. When the subjects were ready to go to sleep, they selected “start” within the application. They were then prompted to place their smart phone face down on their bedside table, with the base of the phone oriented toward them. The application then began tracking

their sleep quality and sleep duration. When the subjects woke up, they selected “stop” on the application. The application showed the subjects their sleep quality and sleep duration. The subjects were instructed to send this information, via e-mail, to the investigators.

Physical activity was assessed by the interviewer administered 7-d PAR. With this questionnaire, data on time spent in sleep, moderate, hard, and very hard activities was collected over 7 days. Data from the 7-d PAR was used to calculate the energy expended (kcal/kg/d) in sleep, light, moderate, hard, and very hard activities by multiplying the reported average number of hours per day spent at each activity level by the metabolic equivalent (ratio of work metabolic rate and resting metabolic rate) for that activity (1, 1.5, 4, 6 and 10, respectively).

Physical activity was also assessed using a validated questionnaire (12) the Short Questionnaire to ASsess Health-enhancing physical activity (SQUASH). It took about five minutes to complete the questionnaire. The questionnaire captured information on commuting activities, leisure time activities, household activities, and activities at work and school over the past 7 days. To assist the participants, examples of activities were given under sports, household, and activities at work and school. Participants indicated the number of days per week they performed the activities, how much time on average they engaged in the activity, and if applicable how strenuous the activity was. Total minutes for each activity were calculated by multiplying frequency (days/week) by duration (hours/minutes).

Subjects then completed a questionnaire on HRQOL, the Functional Assessment of Cancer Therapy (13). It assessed HRQOL across four dimensions: physical well being,

emotional well being, functional well being, and social/family well being. Answers to each question were assigned values ranging from 0 and 4. Composite scores were calculated by adding up scores from each of the four items. The maximum possible score is 104, which correlated to the highest possible HRQOL.

DATA ANALYSIS

Descriptive statistics were generated for demographic, anthropometric, behavioral, and health information. The data was presented as means and standard deviations or medians and 25th & 75th percentiles for continuous variables and as frequencies for categorical variables. Pearson's coefficient correlations were used to examine the relationship between energy expenditure and sleep duration and quality. Also examined, using Pearson's coefficient correlations, were the relationships between the exercise variables and HRQOL, and between sleep variables and HRQOL.

RESULTS

Demographics and Behavioral Characteristics

The demographics and behavioral characteristics of the subjects are presented in **Table 1**. All subjects were females. Mean age was 57.00 ± 9.08 y. Mean BMI was 25.20 ± 4.30 kg/m². Median (25th and 75th percentiles) duration of cancer diagnosis was 36 (16.75, 122.00) months. Ninety percent of the subjects had breast cancer diagnoses of stages 1 or 2. All subjects were white and most were non-Hispanic (80%). Most subjects earned either a Bachelor's degree (50%) or a Graduate's degree (40%). All subjects were non-smokers and 30% consumed alcohol on a regular basis.

Descriptive Data on Sleep, Physical Activity, and Health Related Quality of Life

Descriptive data for sleep, physical activity, and HRQOL are presented in **Table 2**. Mean energy expenditure was 237.30 ± 10.27 kcal/kg/wk. Median (25th and 75th percentiles) light activity was 118.90 (74.13, 367.50) min/wk, moderate activity was 8.60 (0.00, 67.48) min/wk, and intense activity was 12.85 (0.00, 18.18) min/wk. Mean sleep quality (max quality is 100%) was 80.01 ± 7.06 %. Mean sleep duration was 7.55 ± 0.65 hr/day. Mean HRQOL (max score=104) was 90.30 ± 7.63 .

Pearson's Correlation Coefficients

Pearson's correlations between physical activity, sleep, and HRQOL are presented in **Table 3**. Pearson's Correlation Coefficients showed a significant negative relationship between physical activity expenditure, assessed by 7-d PAR, and sleep quality ($r=0.76$; $p<0.01$) and sleep duration ($r=0.68$; $p<0.03$), but there was no relationship between time spent in light, moderate, and intense physical activity, assessed by SQUASH, and sleep quality and duration. There was also no relationship between physical activity and HRQOL or between HRQOL and sleep quality and duration.

DISCUSSION AND CONCLUSION

Pearson's correlations between physical activity, sleep, and HRQOL revealed that physical activity expenditure, assessed by 7-d PAR, significantly reduced sleep quality and sleep duration. These results did not corroborate with the findings by Speck et al (9), who found physical activity to improve HRQOL outcomes in cancer patients. It is

possible that the lack of a positive relationship between physical activity and sleep in the present study is because this subject population was overall not very physically active. These participants spent only a median of 8.60 min/wk in moderate physical activity and 12.85 min/wk in intense physical activity, even though the national guidelines recommend 150 minutes of moderate physical activity or 75 minutes of intense physical activity each week (14). This population may not participate in enough physical activity to experience the benefits of exercise on sleep and HRQOL.

This finding is significant for the community of breast cancer survivors. Though this sample size was small, there are numerous prior studies that indicate decreased health risks and increased HRQOL outcomes in physically active cancer patients. This group of breast cancer survivors did not meet the minimum physical activity requirements for adults. This may have affected their sleep duration and sleep quality, which may in turn affect their HRQOL. It is important to educate breast cancer survivors on the potential benefits of exercise as a part of various treatment methods, as the tendency may be to deviate from exercise after cancer diagnosis.

This study had several limitations. It was limited by a small sample size of only ten subjects. In addition, all of the subjects were white and most were non-Hispanic (80%). All subjects were non-smokers and 30% consumed alcohol on a regular basis. Almost all subjects earned a degree beyond a high school diploma, including Bachelor's (50%) and Graduate degrees (40%). The homogeneity of subjects makes it difficult to generalize the findings. In addition, physical activity assessment was subjective. Both the 7-d PAR and the SQUASH questionnaire are limited by memory and the tendency for subjects to over-report levels of physical activity.

One strength of this study was that multiple variables were studied and relationships between these variables were assessed beyond the findings presented by prior studies. This study assessed relationships between sleep quality and duration, time spent in physical activity and physical activity METS, and HRQOL across four dimensions of well being. In addition, a strength of this study was observing the long term effects of these variables. Participants were included if they did not receive chemotherapy or were a minimum of 45 days removed from their final chemotherapy treatment. This inclusion criteria enabled assessment of the relationships among a breast cancer diagnosis and sleep, physical activity, and HRQOL in survivors who were removed from harsh treatment methods for a significant period of time in order to see the effects of breast cancer on lifestyle long term.

Future studies are needed to assess the relationships between exercise and sleep and HRQOL. Future studies should include a larger and more diverse population. They should assess patients of several different ethnicities, educational backgrounds, and cancer diagnoses. In addition, objective methods should be used to assess physical activity, such as accelerometers or the doubly labeled water method.

In conclusion, physical activity was not related to sleep or HRQOL in this small group of cancer survivors. Sleep quality and sleep duration were also not related to HRQOL.

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Table 1. Demographics and Behavioral Characteristics of the Subjects

Variables	n=10
Age (years) (mean \pm SD)	57.00 \pm 9.08
BMI (kg/m ²) (mean \pm SD)	25.20 \pm 4.30
Duration of cancer diagnosis (months) (median (25 th and 75 th percentiles))	36 (16.75, 122.00)
Stage of Cancer (%)	
Stage 1	40
Stage 2	50
Stage 3	10
Race (% white)	100
Ethnicity (% non-Hispanic)	80
Education (%)	
High School Diploma	10
Bachelor's Degree	50
Graduate Degree	40
Smoking (% non-smokers)	100
Alcohol intake (% drinking regularly)	30

Table 2. Descriptive Data on Sleep, Physical Activity, and HRQOL

Table 1: Descriptive Data on Sleep, Physical Activity, and HRQOL	
Daily METS (kcal/kg/wk)	237.30 ± 10.27
Light Activity (min/wk)	118.90 (74.13, 367.50)
Moderate Activity (min/wk)	8.60 (0.00, 67.48)
Intense Activity (min/wk)	12.85 (0.00, 18.18)
Sleep Quality (max quality is 100%) (%)	80.01 ± 7.06
Sleep Duration (hr/day)	7.55 ± 0.65
HRQOL (max score=104)	90.30 ± 7.63

Daily METS, sleep quality and duration, and HRQOL are presented as means and standard deviations whereas the amount of time spent in light, moderate, and intense physical activities are presented as medians and 25th and 75th percentiles.

Table 3. Pearson's Correlations Between Physical Activity, Sleep, & HRQOL.

Sleep and Physical Activity METS	r	p^a
Daily METS and Sleep Quality	-0.76	0.01
Daily METS and Sleep Duration	-0.68	0.03
Sleep and Time Spent in Physical Activity	r	p^a
Sleep Duration and Light Activity	-0.36	0.31
Sleep Duration and Mod Activity	-0.33	0.36
Sleep Duration and Intense Activity	-0.46	0.18
Sleep Quality and Light Activity	-0.47	0.17
Sleep Quality and Moderate Activity	-0.32	0.36
Sleep Quality and Intense Activity	-0.45	0.19
Sleep and HRQOL	r	p^a
Sleep Duration and HRQOL	-0.25	0.49
Sleep Quality and HRQOL	-0.41	0.23
Physical Activity METS and HRQOL	r	p^a
Daily METS and HRQOL	0.19	0.60
HRQOL and Time Spent in Physical Activity	r	p^a
HRQOL and Light Activity	0.37	0.30
HRQOL and Mod Activity	0.36	0.31
HRQOL and Intense Activity	0.01	0.97

^a P values derived from Pearson's correlation coefficient test.

APPENDIX**Letter from the Board Chairman of FitSTEPS Cancer Foundation for Life****Recruitment Letter****Questionnaires**

Demographics, anthropometric, behavioral, and health information

SQUASH Questionnaire

7-day Physical Activity Recall

Functional Assessment of Cancer Therapy (FACT-G)

NIH Certificates

Kylie von Richter

Dr. Meena Shah

Abstract

Letter from the Board Chairman of FitSTEPS for Life



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Letter from the Board Chairman of Cancer Foundation For Life

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FitSTEPS For Life
 P.O. Box 8257
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Date: 10/28/2016

Dear IRB Committee:

My name is Dr. Gary Kimmel and I am the Board Chairman Emeritus of FitSTEPS for Life, Cancer Foundation For Life. This letter is to certify that I allow Kylie von Richter access to the FitSTEPS for Life Salesforce database to recruit subjects for her study entitled: "The Relationship Between Exercise and Sleep and Health Related Quality of Life in Breast Cancer Patients."

Kylie von Richter will be given access to phone numbers and email addresses of breast cancer patients at the FitSTEPS for Life. She will be able to use this information to recruit the cancer patients for her study. Once the patients sign the TCU IRB consent, she will collect data on demographic, anthropometric, lifestyle, health, sleep, exercise, and quality of life from the subjects. The data on the subjects will only be published as averages.

Please feel free to email or call me if you have any questions.

Sincerely,



Garry T. Kimmel, MD
 Board Chairman Emeritus
 Cancer Foundation For Life
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 903-520-0368

Recruitment Letter

TCU Study on Exercise, Sleep, and Quality of Life in Breast Cancer Patients

Volunteers are needed for a TCU study examining the relationship between exercise, sleep, and quality of life in breast cancer patients.

Study Details

- Breast cancer patients are needed for the study.

- The participation will require monitoring of exercise and sleep for 7 days using a monitor and phone app.

- You will also be asked to completed questionnaires on your demographics, anthropometry, health, exercise, and quality of life.

Contact

To participate or for further information, please call or email Kylie von Richter by phone at (408) 832-5700 or e-mail at k.vonrichter@tcu.edu

Thank you!!!!

Demographics, Anthropometric, Lifestyle, and Health History Questionnaire

1. Name (Last, Middle, First): _____
2. Phone Number: _____
3. E-mail Address: _____
4. Birthdate (m/d/y): _____
5. Height: _____ Weight: _____
Gender: _____
6. Racial Categories:
 1. *Black or African American* (any black African racial origins including Haitians)
 2. *Asian* (Far East, Southeast Asia or Indian Subcontinent including Cambodia, China, India, Japan, Korea, Malaysia, Pakistan, Philippine Islands, Thailand, and Vietnam)
 3. *Native Hawaiian or other Pacific Islander* (any origins from Hawaii, Guam, Somoa or other Pacific Islands, specifically not the Philippine Islands)
 4. *American Indian or Alaskan Native* (any origins from the *original peoples* of *North, Central, and South America*)
 5. *White* (any origins from original peoples of Europe, Near/Middle East, or North Africa including Hispanics and Latino of these races)
 6. *Multiracial*
7. Ethnic Categories:
 1. *Hispanic or Latino* (A person of Cuban, Mexican, Puerto Rican, South/Central American or other Spanish-speaking culture regardless of race)
 2. *Not Hispanic or Latino*

8. What is your current occupation?
1. Official/ Management
 2. Professional (doctor, teacher, lawyer)
 3. Technician
 4. Civil Service (police officer, fireman)
 5. Sales
 6. Administrative Support
 7. Craftsman/Trade/Laborer
 8. Student
 9. Other _____
9. What is your highest level of education
1. Some High School
 2. High School Diploma (9-12 years)
 3. Vocational Training (after high school)
 4. Some College (less than 4 years)
 5. Bachelor's Degree
 6. Graduate Degree
10. Do you currently smoke?
1. Yes
 2. No
11. If you smoke, how many cigarettes per day do you smoke? _____ per day.
12. Do you drink any alcoholic beverages?
1. Yes
 2. No
13. If you drink alcohol, how many drinks (1 drink = 12 ounce beer, 4 ounce wine, or one ounce hard liquor) on average do you drink per week? _____ per week.

14. Do you have any of the following health conditions? Please circle or check the ones that you have:

High blood cholesterol

High blood triglycerides

Heart disease

Type 1 diabetes

Type 2 diabetes

Liver disease

Documented malabsorption

Other types of cancer

High blood cholesterol

High blood triglycerides

High blood pressure

Overactive thyroid (hyperthyroidism) disease

Underactive thyroid (hypothyroidism) disease

Kidney Problems (protein in urine)

Adrenal Disease such as Addison's Disease or Cushing's Syndrome

Psychiatric Problems (including severe depression)

Reflux Disease

Sleep Apnea

Gall Stones

Polycystic ovarian syndrome

15. Do you have any other health problem? If yes, please specify:

16. Have you ever undergone any treatment for breast cancer? If yes, please describe the type of treatment and the data of treatment.

7-Day Physical Activity Recall

ID: _____

Slim Study

Week 16

Days of the Week	Yesterday								One Week Ago	
	HRS	MIN	HRS	MIN	HRS	MIN	HRS	MIN	HRS	MIN
Sleep	:	:	:	:	:	:	:	:	:	:
Moderate	:	:	:	:	:	:	:	:	:	:
Hard	:	:	:	:	:	:	:	:	:	:
Very Hard	:	:	:	:	:	:	:	:	:	:
Moderate	:	:	:	:	:	:	:	:	:	:
Hard	:	:	:	:	:	:	:	:	:	:
Very Hard	:	:	:	:	:	:	:	:	:	:
Moderate	:	:	:	:	:	:	:	:	:	:
Hard	:	:	:	:	:	:	:	:	:	:
Very Hard	:	:	:	:	:	:	:	:	:	:
Moderate	:	:	:	:	:	:	:	:	:	:
Hard	:	:	:	:	:	:	:	:	:	:
Very Hard	:	:	:	:	:	:	:	:	:	:

Calculated Energy Expenditure: Kcal/kg/day

SQUASH questionnaire to assess physical activity

Think about an average week in the past months. Please indicate **how many days per week** you performed the following activities, how much time **on average** you were engaged in this, and (if applicable) how strenuous this activity was for you?

COMMUTING ACTIVITIES (round trip) days per *week* average time per *day* Effort (circle please)

Walking to/from work or school days hour minutes slow/moderate/fast

Bicycling to/from work or school days hour minutes slow/moderate/fast

Not applicable

LEISURE TIME ACTIVITIES days per week average time per day Effort (circle please)

Walking days hour minutes slow/moderate/fast

Bicycling days hour minutes slow/moderate/fast

Gardening days hour minutes light/moderate/intense

Odd jobs days hour minutes light/moderate/intense

Sports (please write down yourself)

e.g., tennis, fitness, skating, swimming, dancing

1. days hour minutes light/moderate/intense

2. days hour minutes light/moderate/intense

3. days hour minutes light/moderate/intense

4. days hour minutes light/moderate/intense

HOUSEHOLD ACTIVITIES days per *week* average time per day

Light household work days hour minutes

(cooking, washing dishes, ironing, child care) days hour minutes

Intense household work

(scrubbing floor, walking with heavy shopping bags)

ACTIVITY AT WORK AND SCHOOL average time per *week*

Light work hour minutes

(sitting/standing with some walking, e.g., a desk job) hour minutes

Intense work

(regularly lifting heavy objects at work)

Not applicable

Functional Assessment of Cancer Therapy (FACT-G)

BASELINE – CYCLE 1

Effect of Exercise during Adjuvant Chemotherapy for Breast Cancer

Qualifying Information – Employee enters information

Survey Date *

Survey location *

Participant Case Number *

Cycle Number *

How often are you scheduled for chemotherapy treatments? *

Are you... *

- Single?
 Married/Living with another adult?

Do you have children under the age of 18 living in your household? *

- Yes
 No

Which of the following best describes your level of education completed? *

- Less than high school
 High school
 Some college
 College graduate

Which of the following best describes your financial status? *

- Quite secure
 Comfortable
 Ok
 Marginal
 Poor

BASELINE – CYCLE 1**Have you received, or plan to receive radiation therapy? ***

- Yes, I am currently receiving radiation
 Yes, I have received radiation, but not currently
 Yes, I plan to receive radiation
 No

Have you had previous cancers? *

- Yes
 No

What previous cancers have you had? (Mark all that apply) ***if yes--**

- Bladder
 Brain
 Breast
 Cervical
 Colorectal/Colon/Anal
 Endometrial
 Esophageal
 Gastric (Stomach cancer)
 Head and Neck/Throat
 Kidney
 Leukemia
 Liver
 Lung
 Lymphoma (Lymph Node cancer)
 Melanoma/Sarcoma
 Myeloma (Bone cancer)
 Ovarian
 Pancreatic
 Skin (non-Melanoma)
 Thyroid
 Uterine
 Other

Please specify type of cancer not listed ***With your previous cancer(s), did you receive any of the following therapies? ***

- Chemotherapy
 Radiation therapy
 Chemo- and radiation therapy
 None of these

Did you have chemotherapy *

- Less than 1 year ago?
 1 – 5 years ago?
 More than 5 years ago?

BASELINE – CYCLE 1

Did you have radiation? *

- Less than 1 year ago?
- 1 – 5 years ago?
- More than 5 years ago?

Have you exercised in the past 3 months on a regular basis (at least 3 times per week)? * comp

- Yes
- No

What best describes your employment status? *

- Retired
- Working part-time
- Working full-time
- Unemployed, seeking work
- Unemployed/homemaker
- On sick leave from work

Do you use any type of assistive devices for mobility (such as a cane, walker or wheelchair)? *

- Yes
- No

Do you use a cane? * if yes...

- Yes
- No

Do you use a walker? * comp

- Yes
- No

Do you use a wheelchair? * conditional

- Yes
- No

Do you currently use oxygen? *

- Yes
- No

Have you and your physician discussed this study and/or exercising during your cancer treatment? *

- No
- Yes, exercise was not encouraged
- Yes, only mentioned
- Yes, mildly encouraged
- Yes, modestly encouraged
- Yes, strongly encouraged

BASELINE – CYCLE 1

Which of the following best describes your racial group? *

- American Indian / Alaska Native
- Asian
- Native Hawaiian or Other Pacific Islander
- Black or African American
- White
- More than One Race

Which of the following best describes your ethnicity? *

- Not Hispanic or Latino
- Hispanic or Latino

What is your estimated annual income? *

- Less than \$20,000
- \$20,000 – \$39,999
- \$40,000 – \$59,999
- \$60,000 – \$79,999
- \$80,000 – \$99,999
- \$100,000 – \$149,999
- Greater than \$150,000

Have you ever smoked or used any tobacco products? *

- Yes – I quit
- Yes – I do currently
- No

How long ago did you quit? *

If Yes – I quit...

- Less than 1 year ago
- 1–5 years ago
- More than 5 years ago

How many years have you/did you smoke or use tobacco products? *

If Yes – I quit or
Yes – I do currently

For example, if you smoked for 2 1/2 years, enter the value 2.5

How many packs a day do you/did you smoke or use tobacco products? *

- Less than 1 pack a day
- 1–2 packs a day
- 3–4 packs a day
- More than 4 packs a day

Have you gone through menopause? *

- Yes
- No

BASELINE – CYCLE 1

Below is a list of statements that other people with your illness have said are important. Please mark one number per line to indicate your response as it applies to the past 7 days.

Physical Well-Being

	Not at all	A little bit	Some-what	Quite a bit	Very much
I have a lack of energy *	<input type="radio"/>				
I have nausea *	<input type="radio"/>				
Because of my physical condition, I have trouble meeting the needs of my family *	<input type="radio"/>				
I have pain *	<input type="radio"/>				
I am bothered by side effects of treatment *	<input type="radio"/>				
I feel ill *	<input type="radio"/>				
I am forced to spend time in bed *	<input type="radio"/>				

Social/Family Well-Being

	Not at all	A little bit	Some-what	Quite a bit	Very much
I feel close to my friends *	<input type="radio"/>				
I get emotional support from my family *	<input type="radio"/>				
I get support from my friends *	<input type="radio"/>				
My family has accepted my illness *	<input type="radio"/>				
I am satisfied with family communication about my illness *	<input type="radio"/>				
I feel close to my partner (or the person who is my main support) *	<input type="radio"/>				

No

Regardless of your current level of sexual activity, please answer the following question. If you prefer not to answer it, please mark this box and go to the next section

	Not at all	A little bit	Some-what	Quite a bit	Very much
I am satisfied with my sex life	<input type="radio"/>				

BASELINE – CYCLE 1

Emotional Well-Being

	Not at all	A little bit	Some-what	Quite a bit	Very much
I feel sad *	<input type="radio"/>				
I am satisfied with how I am coping with my illness *	<input type="radio"/>				
I am losing hope in the fight against my illness *	<input type="radio"/>				
I feel nervous *	<input type="radio"/>				
I worry about dying *	<input type="radio"/>				
I worry that my condition will get worse *	<input type="radio"/>				

Functional Well-Being

	Not at all	A little bit	Some-what	Quite a bit	Very much
I am able to work (include work at home) *	<input type="radio"/>				
My work (include work at home) is fulfilling *	<input type="radio"/>				
I am able to enjoy life *	<input type="radio"/>				
I have accepted my illness *	<input type="radio"/>				
I am sleeping well *	<input type="radio"/>				
I am enjoying the things I usually do for fun *	<input type="radio"/>				
I am content with the quality of my life right now *	<input type="radio"/>				

FACIT Fatigue Scale

Below is a list of statements that other people with your illness have said are important. **Please mark one number per line to indicate your response as it applies to the past 7 days.**

	Not at all	A little bit	Some-what	Quite a bit	Very much
I feel fatigued *	<input type="radio"/>				
I feel weak all over *	<input type="radio"/>				
I feel listless ("washed out") *	<input type="radio"/>				
I feel tired *	<input type="radio"/>				
I have trouble <u>starting</u> things because I am tired *	<input type="radio"/>				
I have trouble <u>finishing</u> things because I am tired *	<input type="radio"/>				
I have energy *	<input type="radio"/>				
I am able to do my usual activities *	<input type="radio"/>				
I need to sleep during the day *	<input type="radio"/>				
I am too tired to eat *	<input type="radio"/>				
I need help doing my usual activities *	<input type="radio"/>				
I am frustrated by being too tired to do the things I want to do *	<input type="radio"/>				
I have to limit my social activity because I am tired *	<input type="radio"/>				



Certificate of Completion

The National Institutes of Health (NIH) Office of Extramural Research certifies that **Kylie von Richter** successfully completed the NIH Web-based training course "Protecting Human Research Participants".

Date of completion: 08/03/2015

Certification Number: 1807346



Certificate of Completion

The National Institutes of Health (NIH) Office of Extramural Research certifies that **Meena Shah** successfully completed the NIH Web-based training course "Protecting Human Research Participants".

Date of completion: 11/21/2016.

Certification Number: 2242022.