Breast Cancer and Exercise

이 정 아

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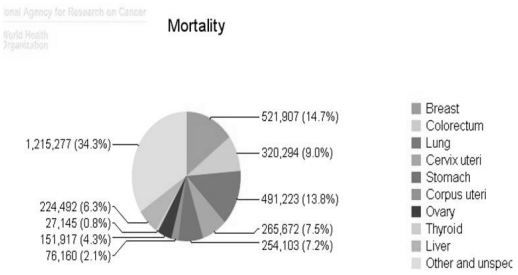
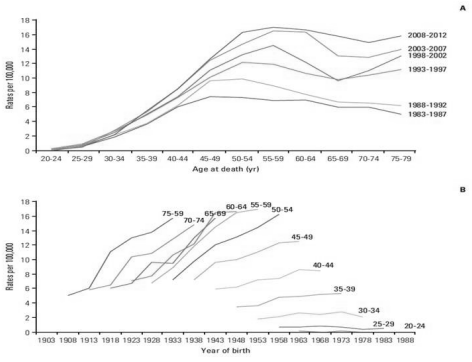
Contents

- Breast cancer & physical activity
  - Pre-diagnosis & Post-diagnosis
  - In Advanced stages
  - Side Effects
- Mechanisms
- Interventions
- Recommendations

Cancer & Mortality



Incidence of Breast Cancer in Korea



Exercise & Breast Cancer

- Exercise plays a major role in recovery of function following treatment, and in reducing the lingering effects of both the disease and its treatment.

ACSM & AHA recommend

30 minutes of moderately intense aerobic exercise 5 days a week

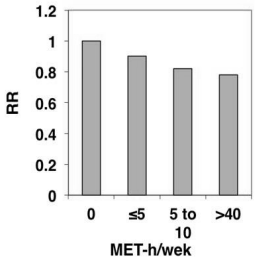
&

Strength- training exercises twice a week

Exercise and risk of breast cancer

McTiernan, JAMA, 2003.

- Overall 25-30% decreased risk
- Greatest in thinner women
- Lifetime exercise matters
- Modest amounts: 1-3 hours brisk walking/week



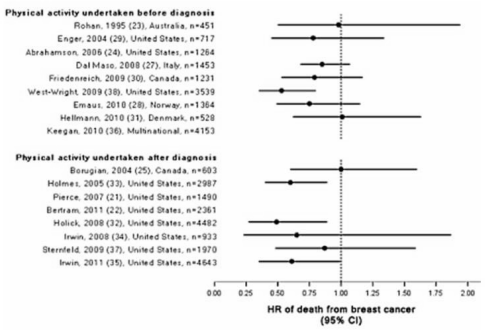
WHI Observational Cohort
(n=74,171; 1780 cancers)

Benefits of Physical activity

- Physical activity can help maintain and/or reduce weight
- Helps us burn excess calories instead of turning into fat
- Increases lean muscle
- Helps retain and strengthen bone
- Strengthens the immune system
- Enhances mental and emotional well being

Physical Activity and Pre & Post Diagnosis Mortality

Exercise & Pre & Post Diagnosis Mortality



Exercise & Pre & Post Diagnosis Mortality

Research Article
See perspective on p. 476
Cancer Prevention Research

Physical Activity and Survival in Postmenopausal Women with Breast Cancer: Results from the Women's Health Initiative

Melinda L. Irwin[1], Anne McTiernan[2], JoAnn E. Manson[3], Cynthia A. Thomson[4], Barbara Stefanick[5], Marcia L. Stefanick[6], Jean Wactawski-Wende[7], Lynette Craft[8], Dorothy Lane[9], Lisa W. Martin[10], and Rowan Chlebowski[11]

Table 4. Associations between breast cancer outcomes and change in physical activity from before to after a breast cancer diagnosis

	Change in moderate- to vigorous-intensity physical activity, MET-h/wk (N = 2,776)		
	No change/inactive (n = 958)	Increase/active (n = 1,121)	Decrease/inactive (n = 697)
Total no. of deaths (n = 168)	46	69	53
Age-adjusted HR (95% CI)	1.00	**0.59 (0.40–0.85)**	1.01 (0.71–1.45)
Multivariable-adjusted HR (95% CI)	1.00	**0.67 (0.46–0.96)**	1.06 (0.73–1.54)
No. of breast cancer deaths (n = 79)	25	32	22
Age-adjusted HR (95% CI)	1.00	0.66 (0.39–1.11)	0.93 (0.54–1.59)
Multivariable-adjusted HR (95% CI)	1.00	0.91 (0.51–1.64)	1.06 (0.59–1.88)

NOTE: Adjusted for age, stage, ER, PR, grade, HER2, ethnicity, WHI study arm, previous hormone therapy use, time from diagnosis to physical activity assessment, BMI, diabetes, alcohol, smoke, total calories, and percentage calories from fat, and servings of fruit and vegetables.

Breast Cancer Survivorship

- Being physically active after a breast cancer diagnosis:
  - 26% reduced risk of breast cancer recurrence
  - 30-40% reduced risk of death from any cause
  - 2-3 hours of brisk walking per week

Exercise & Pre & Post Diagnosis Mortality

Physical Activity and Survival After Breast Cancer Diagnosis

Michelle D. Holmes, MD, DrPH
Wendy Y. Chen, MD
Diane Feskanich, ScD
Candyce H. Kroenke, ScD
Graham A. Colditz, MD, DrPH

Table 2. Age-Adjusted and Multivariable-Adjusted Relative Risks According to Physical Activity Category After Breast Cancer Diagnosis

		Physical Activity After Diagnosis, MET-h/wk				
	Total (N = 2987)	<3 (n = 959)	3-8.9 (n = 862)	9-14.9 (n = 335)	15-23.9 (n = 428)	≥24 (n = 403)	*P* for Trend
Total deaths	463	188	126	38	51	60	
Age-adjusted RR (95% CI)		1.00	0.69 (0.55-0.87)	0.53 (0.37-0.75)	0.56 (0.41-0.77)	0.67 (0.50-0.90)	.004
Multivariable-adjusted RR (95% CI)*		1.00	0.71 (0.56-0.89)	0.59 (0.41-0.84)	0.56 (0.41-0.77)	0.65 (0.48-0.88)	.003
Breast cancer deaths	280	110	84	20	32	34	
Age-adjusted RR (95% CI)		1.00	0.79 (0.60-1.06)	0.47 (0.29-0.76)	0.60 (0.41-0.89)	0.64 (0.44-0.94)	.01
Multivariable-adjusted RR (95% CI)*		1.00	0.80 (0.60-1.06)	0.50 (0.31-0.82)	0.56 (0.38-0.84)	0.60 (0.40-0.89)	.004
Recurrence	370	137	108	29	45	51	
Age-adjusted RR (95% CI)		1.00	0.82 (0.64-1.06)	0.53 (0.35-0.79)	0.66 (0.47-0.93)	0.76 (0.55-1.04)	.05
Multivariable-adjusted RR (95% CI)*		1.00	0.83 (0.64-1.08)	0.57 (0.38-0.85)	0.66 (0.47-0.93)	0.74 (0.53-1.04)	.05

Abbreviations: CI, confidence interval; MET, metabolic equivalent task; RR, relative risk.
*Adjusted for age (months); interval between diagnosis and physical activity assessment (28-33, 34-40, ≥41 mo); smoking status (never, current, past); body mass index (<21, 21-22.9, 23-24.9, 25-28.9, ≥29), which was calculated as weight in kilograms divided by the square of height in meters; menopausal status and hormone therapy use (premenopausal, postmenopausal, and never use; postmenopausal and current use; postmenopausal and past use; uncertain menopausal status, missing); age at first birth and parity (nulliparous, <25 y and 1-2 births, <25 y and ≥3 births, ≥25 y and 1-2 births, ≥25 y and ≥3 births); oral contraceptive use (never, ever, missing); energy intake (quintiles); energy-adjusted protein intake (quintiles); disease stage (I, II, III); radiation treatment (yes or no); chemotherapy (yes or no); and tamoxifen treatment (yes or no).

9 MET hour per week of physical activity participation significantly decreased the recurrence of cancer and increased the survival among breast cancer patients

Table 1. MET-Hours of Activities Surveyed

Leisure-Time Activity	MET-Hours
Normal pace walking (2 to 2.9 mph)	3
Brisk pace walking (3 to 3.9 mph)	4
Very brisk pace walking (4+ mph)	4.5
Jogging (slower than 10 min/mile)	7
Running (faster than 10 min/mile)	12
Bicycling	7
Tennis, squash, racquetball	7
Lap swimming	7
Calisthenics, ski or stair machine, other aerobic exercise	6
Yoga, stretching, toning, lower intensity exercise	4
Other vigorous activities (lawn mowing)	6

Abbreviations: MET, metabolic equivalent task; mph, miles per hour.

9 MET hour per week of physical activity could be
3 hours of walking, 1.25 hours of jogging, about 45 min of running per week

Exercise & Pre & Post Diagnosis Mortality

Physical Activity and Survival After Breast Cancer Diagnosis

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Table 3. Multivariable-Adjusted Relative Risk of Breast Cancer Death According to Activity Category Prior to Breast Cancer Diagnosis and BMI

		Physical Activity Prior to Diagnosis, MET-h/wk (N = 2987)					
	Total	<3	3-8.9	9-14.9	15-23.9	≥24	*P* for Trend
BMI <25*							
No. of deaths/No. of participants	159/1629	59/437	42/459	11/215	23/272	24/246	
Multivariable-adjusted RR (95% CI)†		1.00	0.65 (0.43-0.97)	0.35 (0.18-0.68)	0.63 (0.39-1.04)	0.61 (0.37-0.99)	.10
BMI ≥25*							
No. of deaths/No. of participants	121/1358	51/522	42/403	9/120	9/156	10/157	
Multivariable-adjusted RR (95% CI)†		1.00	1.01 (0.66-1.55)	0.81 (0.38-1.72)	0.44 (0.21-0.93)	0.52 (0.26-1.06)	.01

Abbreviations: BMI, body mass index; CI, confidence interval; MET, metabolic equivalent task; RR, relative risk.
*Calculated as weight in kilograms divided by the square of height in meters.
†See asterisk footnote in Table 2 for list of variables.

It seems like patients whose BMI over 25 kg/m2 need to exercise more (15 MET hour per week) to have the same effects compared with patients whose BMI less than 25 kg/m2.

JAMA®

Online article and related content current as of February 8, 2010.

Physical Activity and Survival After Breast Cancer Diagnosis

Michelle D. Holmes; Wendy Y. Chen; Diane Feskanich; et al.

JAMA. 2005;293(20):2479-2486 (doi:10.1001/jama.293.20.2479)

Table 2. Age-Adjusted and Multivaria

Total deaths	
Age-adjusted RR (95% CI)	
Multivariable-adjusted RR (95% CI)*	
Breast cancer deaths	
Age-adjusted RR (95% CI)	
Multivariable-adjusted RR (95% CI)*	
Recurrence	
Age-adjusted RR (95% CI)	
Multivariable-adjusted RR (95% CI)*	

Abbreviations: CI, confidence interval; MET, met
*Adjusted for age (months); interval between dia
21-22.9, 23-24.9, 25-28.9, ≥29), which was
menopausal, postmenopausal, and never use
parity (nulliparous, <25 y and 1-2 births, <25
energy-adjusted protein intake (quintiles); dise

Table 4. Multivariable-Adjusted Relative Risk of Breast Cancer Death According to 2 Physical Activity Categories After Breast Cancer Diagnosis*

	Physical Activity After Diagnosis, MET-h/wk	
	<9	≥9
Premenopausal†		
No. of deaths/No. of participants	39/289	19/242
Multivariable-adjusted RR (95% CI)‡	1.00	0.58 (0.32-1.04)
Postmenopausal†		
No. of deaths/No. of participants	140/1406	66/836
Multivariable-adjusted RR (95% CI)‡	1.00	0.73 (0.54-0.98)
Negative for estrogen and progesterone receptors§		
No. of deaths/No. of participants	27/272	13/149
Multivariable-adjusted RR (95% CI)‡	1.00	0.91 (0.43-1.96)
Positive for estrogen and progesterone receptors§		
No. of deaths/No. of participants	99/955	38/609
Multivariable-adjusted RR (95% CI)‡	1.00	0.50 (0.34-0.74)
Stage I‖		
No. of deaths/No. of participants	52/1083	26/685
Multivariable-adjusted RR (95% CI)‡	1.00	0.67 (0.41-1.09)
Stage II‖		
No. of deaths/No. of participants	94/609	45/405
Multivariable-adjusted RR (95% CI)‡	1.00	0.62 (0.43-0.90)
Stage III‖		
No. of deaths/No. of participants	48/129	15/76
Multivariable-adjusted RR (95% CI)‡	1.00	0.36 (0.19-0.71)

Abbreviations: CI, confidence interval; MET, metabolic equivalent task; RR, relative risk.
*The cutoff of 9 MET-h/wk was chosen because this was the predetermined category that divided the cohort almost in half.
†P = .34 for interaction between menopausal status.
‡See asterisk footnote in Table 2 for list of variables.
§P = .08 for interaction between estrogen and progesterone receptor status.
‖P = .15 for interaction between disease stage.

Physical activity after a breast cancer diagnosis may reduce the risk of death from this disease

Physical Activity in Advanced-Stage Cancer

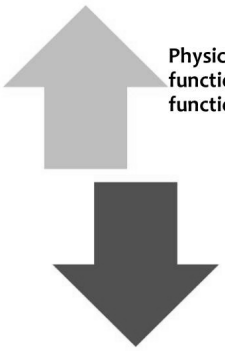
Exercise & Advanced Stage

TABLE 1. Research on PA in Patients With Advanced-Stage Cancer From 1994–2010

Study	Purpose	Design and Sample	Findings	Limitations
Carson et al., 2007	Determine the feasibility of a yoga-based intervention in women with metastatic breast cancer, and examine its effects on pain, fatigue, distress, invigoration, acceptance, and relaxation.	Pilot/feasibility study; N = 13 women with metastatic breast cancer; X age = 59 years (SD = 44–75 years)	Yoga improved daily invigoration and acceptance, with trends for improved pain and relaxation. Yoga practice is predictive of improved levels of next-day pain, fatigue, invigoration, acceptance, and relaxation. Program was appropriate and very useful.	Small sample size limits generalizability of findings; lack of control group
Crevenna, Schmidinger, Keilani, Nuhr, Fialka-Moser, et al., 2003	Determine the feasibility and effects of an aerobic exercise program for patients with bone metastases.	Prospective case study; 48-year-old woman with breast cancer and advanced metastasis to the lung, liver, and bone	Exercise was safe, practical, and feasible. Compliance was excellent. Improvements were seen in endurance, physical and social functioning, mental health, pain, vitality, and general health perception. Immense benefit was reported from	Case study, making generalizing to other populations difficult
Jones & Peppercorn, 2010	Determine the safety and feasibility of cardiopulmonary exercise testing with advanced-stage cancer.	Cross-sectional pilot study enrolling consecutive patients with inoperable NSCLC or metastatic breast cancer (N = 85)	A symptom-limited, individualized cardiopulmonary exercise testing appears to be a relatively safe and feasible assessment tool to evaluate physical functioning in patients with advanced cancer.	Potential selection bias; exclusion of patients with low performance status; cross-sectional design; small sample size[a]
Headley et al., 2004	Examine the effects of a seated exercise program on fatigue and QOL in patients with metastatic breast cancer.	Randomized, controlled longitudinal trial (N = 32)	Intervention group had a slower decline in total and physical well-being and QOL and less increase in fatigue scores starting with the third cycle of chemotherapy.	Potential confounders such as spousal support; 16% attrition; small sample size[a]

Tara A. Albrecht, PhD, RN, and Ann Gill Taylor, EdD, RN, FAAN

Exercise & Advanced Stage



Physical performance, physical function, emotional, social function, mental health, QOL

Complications, pain, fatigue

Physical Activity during Cancer Therapy Decreases Treatment Side Effects

Side Effects

Effects of Aerobic interval training on Cancer Patients' Functional Capacity (Macvicar et al 1989)

Exercise	Placebo	Control
3times/week*10weeks	Nonaerobic stretching & flexibility exercises	Normal activities

- **Interval Training exercise→ Improving the functional capacity of stage II breast cancer patients on adjuvant chemotherapy.**

Aerobic exercise not only improved functional capacity and body composition, but also decrease chemotherapy-induced nausea.

Side Effects

Effect of aerobic exercise on body weight and composition in patients with breast cancer on adjuvant chemotherapy (Winningham et al 1989).

Exercise(n=12)	Control(n=12)
Aerobic interval training exercise program Levels set at 60%~85% of max HR (20~30min), 3times/week *10~12weeks	Continue daily activities

- Exercising Ob subjects showed a greater increase in lean body weight than Nob subjects.

Safe and effective weight-control program for breast cancer patients.

Side Effects

Randomized controlled trial of the effects of aerobic exercise on physical functioning and quality of life in lymphoma patients (Courneya et al 2009).

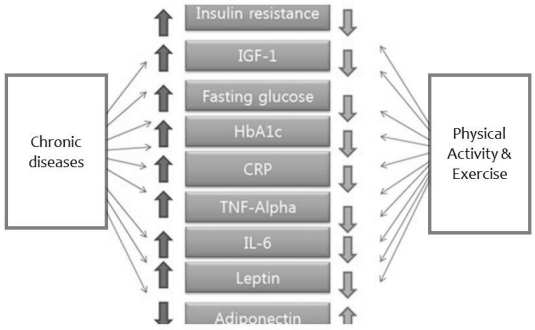
Usual care(n=62)	Aerobic exercise training(n=60)
	12weeks of Supervised exercise

Aerobic exercise training significantly improved physical functioning in lymphoma patients without interfering with medical treatments or response.

Also improve cardiovascular fitness should be considered in the management of lymphoma patients.

Mechanisms

Mechanisms



Mechanisms

Fasting C-Peptide Levels and Death Resulting From All Causes and Breast Cancer: The Health, Eating, Activity, and Lifestyle Study

Melinda L. Irwin, Catherine Duggan, Ching-Yun Wang, Ashley Wilder Smith, Anne McTiernan, Richard N. Baumgartner, Kathy B. Baumgartner, Leslie Bernstein, and Rachel Ballard-Barbash

VOLUME 29 · NUMBER 1 · JANUARY 1 2011
JOURNAL OF CLINICAL ONCOLOGY
ORIGINAL REPORT

Table 3. Fasting C-Peptide and Risk of Death Resulting from Breast Cancer in Women Diagnosed With Breast Cancer

ıtide Level	No. of Events	Total No. of Patients	Age-Adjusted Model HR	95% CI	Age and BMI-Adjusted Model HR	95% CI	Multivar HR
ıL†							
	7	184	1.00		1.00		1.00
	11	187	1.70	0.65 to 4.44	1.96	0.74 to 5.22	2.19
				.28		.072	
ıl							
	7	184	1.00		1.00		1.00
	11	187	1.69	0.65 to 4.41	1.92	0.72 to 5.07	2.19
	10	175	1.70	0.64 to 4.54	2.67	0.98 to 7.68	2.55
ɒe 2 diabetes	5	58	2.81	0.86 to 9.23	4.69	1.30 to 16.91	2.83
ıl (continuous)‡	28	546	1.21	0.92 to 1.58	1.37	1.04 to 1.82	1.36
				.18		.027	

ɜMI, body mass index; HR, hazard ratio.
riables included age, race/site, and initial treatment; stratification variables included BMI, disease stage, and estrogen receptor st
ıgories based on tertiles, excluding women with type 2 diabetes.
ıtinuous) excludes women with type 2 diabetes. Range of C-peptide is 0.25 to 9.70 ng/mL.

Exercise Interventions

Exercise Interventions

[Intervention Review]

Exercise interventions on health-related quality of life for people with cancer during active treatment

Shiraz I Mishra[1], Roberta W Scherer[2], Claire Snyder[3], Paula M Geigle[4], Debra R Berlanstein[5], Ozlem Topaloglu[6]

- Exercise have beneficial effects on HRQoL and certain HRQoL domain including physical functioning, role function, social functioning, and fatigue.
- Positive effects of exercise interventions are more pronounced with moderate- or vigorous-intensity vs. mild-intensity exercise program.

Exercise Interventions

Effects of exercise on breast cancer patients and survivorship: a systematic review and meta-analysis

Margaret L. McNeely, Kristin L. Campbell, Brain H. Row, Terry P. Klassen, John R. Mackey, Kerry, Courneya

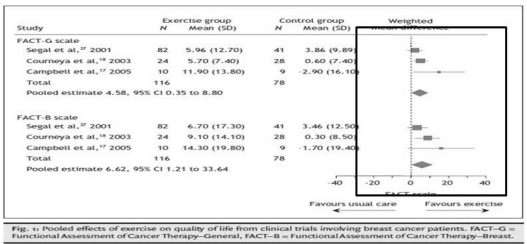


Fig. 1. Pooled effects of exercise on quality of life from clinical trials involving breast cancer patients. FACT-G = Functional Assessment of Cancer Therapy–General, FACT-B = Functional Assessment of Cancer Therapy–Breast.

Exercise Interventions

Effects of exercise on breast cancer patients and survivorship: a systematic review and meta-analysis

Margaret L. McNeely, Kristin L. Campbell, Brain H. Row, Terry P. Klassen, John R. Mackey, Kerry, Courneya

Table 3: Effects of exercise on cardiorespiratory fitness, body composition and physical functioning

Outcome	No. of studies	N	Weighted mean difference (95% CI)	p value	Standardized mean difference (effect size) (95% CI)	p value
Cardiorespiratory fitness						
VO_{2peak} absolute, L/min	2	95	0.30 (0.2 to 0.41)	0.00001*	Not estimated	-
VO_{2peak} relative, mL/kg per min	3	95	3.39 (1.67 to 5.1)	0.0001*	1.14 (0.47 to 1.81)	0.0009*
Predicted VO_2, mL/kg per min	2	150	0.99 (-0.21 to 2.18)	0.07	Not estimated	-
6-min walk test, m	2	39	35 (12.6 to 58.1)	0.002*	Not estimated	-
12-min walk test, m	1	19	101 (62.5 to 140.4)	0.00001*	Not estimated	-
1-mile walk test, min	1	89	-1.31 (-0.42 to -0.20)	0.004*	Not estimated	-
Body composition						
Weight, kg	4	277	-0.03 (-0.44 to 0.38)	0.88	-0.07 (-0.36 to 0.21)	0.61
Body mass index, kg/m^2	4	240	-0.02 (-0.09 to 0.05)	0.58	-0.12 (-0.38 to 0.13)	0.35
Percent body fat	1	81	-1.38 (-1.57 to -1.19)	0.03	Not estimated	-
Lean body mass, kg	1	81	0.86 (0.76 to 0.96)	0.008	Not estimated	-
Bone density, %	1	66	3.79 (2.55 to 4.17)	0.02	Not estimated	-
Physical functioning	4	208	Not estimated	-	0.84 (0.36 to 1.32)	0.0006

Note: CI – confidence interval.
*Indicates significant value.

Exercise Interventions

A randomized trial of exercise on well-being and function following breast cancer surgery: the RESTORE trial

Roger T. Anderson · Gretchen G. Kimmick · Thomas P. McCoy · Judith Hopkins · Edward Levine · Gary Miller · Paul Ribisl · Shannon L. Mihalko

Table 3 Longitudinal regression modeling results for total meters walked and FACT-B total score (N=104)

	Six-min walk			FACT-B		
Characteristic	Beta (SE)	95% CI	p value	Beta (SE)	95% CI	p value
Intercept	165.6 (114.3)	(−63.23, 394.45)	–	49.8 (23.6)	(2.67, 96.95)	–
Time (linear)*	0.76 (0.63)	(−0.50, 2.02)	0.231	0.54 (0.14)	(0.26, 0.83)	<0.001
Time (quadratic)*	−0.61 (0.16)	(−0.93, −0.29)	<0.001	−0.15 (0.03)	(−0.21, −0.08)	<0.001
Baseline outcome	0.71 (0.09)	(0.53, 0.90)	<0.001	0.58 (0.10)	(0.37, 0.78)	<0.001
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Age group at baseline			3 df, p=0.201			3 df, p=0.896
<50	76.6 (35.2)	(6.05, 147.22)	0.034	0.68 (4.80)	(−9.10, 10.45)	0.889
50 to <65	66.6 (34.0)	(−1.62, 134.81)	0.056	1.56 (4.68)	(−7.98, 11.11)	0.741
65 to <75	61.7 (35.3)	(−9.04, 132.49)	0.086	−1.21 (5.42)	(−12.18, 9.76)	0.825
>75, RC	–			–		
Body mass index			2 df, p=0.678			2 df, p=0.735
Low-normal (<25 kg/m^2), RC	–		–	–		–
Overweight (25–29.9 kg/m^2)	−13.3 (15.2)	(−43.78, 17.10)	0.384	0.92 (2.80)	(−4.69, 6.52)	0.745
Obese (>30 kg/m^2)	−16.9 (27.5)	(−71.94, 38.14)	0.541	−1.78 (4.71)	(−11.22, 7.67)	0.708
# nodes removed	−0.64 (0.97)	(−2.58, 1.29)	0.509	−0.41 (0.16)	(−0.73, −0.09)	0.012
# of self-reported symptoms	−0.39 (1.18)	(−2.75, 1.97)	0.744	0.22 (0.32)	(−0.42, 0.87)	0.492
Baseline SF-12 score						
Mental	0.35 (1.40)	(−2.44, 3.14)	0.803	0.23 (0.24)	(−0.26, 0.72)	0.345
Physical	0.07 (1.24)	(−2.42, 2.55)	0.958	0.38 (0.22)	(−0.07, 0.82)	0.097
Intervention group (intervention versus control)	34.3 (12.8)	(8.61, 60.08)	0.010	1.38 (2.44)	(−3.50, 6.26)	0.573

Although a significant improvement in the six-minute walk test was reported in the exercise group, no benefit was seen in other parameters, such as quality of life.

Exercise Interventions

VOLUME 30 · NUMBER 30 · OCTOBER 20 2012

Lifestyle Factors in Cancer Survivorship

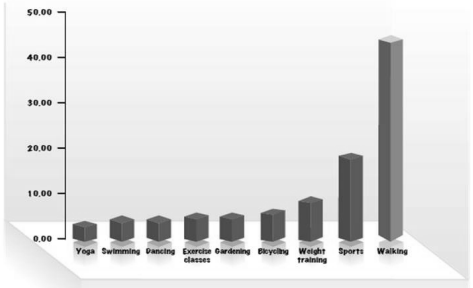
Jennifer Ligibel

Adiposity		
Breast	More than 50 observational studies; obesity at diagnosis consistently linked to poor prognosis[5-7]	No data that weight-loss interventions improve prognosis
	Meta-analysis: HR of 1.33 (95% CI, 1.21 to 1.47) for cancer-specific and overall death for BMI ≥ 30 v < 30 kg/m^2	Indirect data from WINS[8] and WHEL[9] study that weight loss and/or a low-fat diet decrease disease recurrence
Prostate	Obesity consistently linked to poor outcomes[10,11]	
	Obese men more likely to develop biologically aggressive tumors[12] and to have advanced disease at diagnosis[13]	
	Some evidence that obesity may influence the response to androgen deprivation therapy[14]	
Colon	Three reports suggest BMI ≥ 35 kg/m^2 associated with poor prognosis[15]	
Diet		
Breast	Dozens of studies focused on intakes of fat, alcohol, and other nutrients; few or no consistent relationships across studies[16,16]	WINS: 24% decrease in recurrence with a low-fat diet that led to 6 lb of weight loss[8]
		WHEL study: No change in survival with a high-fruit/vegetable, low-fat diet that did not lead to weight loss[9]
Prostate	Results not consistent across studies; some evidence that low-saturated fat, high-tomato products and high soy may be associated with better outcomes[2,11,17]	Nine small studies PSA and points[2]
		Increased soy, low-fat/vegan diet and lycopene supplements all shown to produce favorable changes in PSA
Colon	One study showed increased risk of recurrence with a Western-pattern diet[18]	
Physical activity		
Breast	Five prospective cohort studies showed physical activity after diagnosis was associated with better outcomes[19-23]	
	Completion of 9 y ≥ 3 MET-h/wk physical activity: HR, 0.50; 95% CI, 0.31 to 0.82[19]	
Colon	Three prospective cohort studies showed a 50% decrease in cancer-specific and overall mortality in individuals who completed 18 MET-h/wk physical activity[11,24,25]	CHALLENGE trial was designed to test the impact of exercise on DFS; currently enrolling
Prostate	Two prospective cohort studies showed men who walk regularly at a moderate to brisk pace had 50% lower risk of overall mortality[26,27]	

Recommendations

Most Enjoyable Exercise

Figure 1. Physical Activities Breast-cancer Survivors Typically Find Most Enjoyable



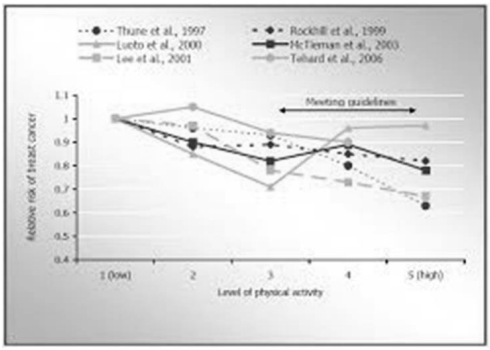
Note: The sports category included minimal reporting of sailing, kayaking, tennis and snowshoeing, and higher reporting of golf and skiing (both downhill and cross-country). Exercise classes included both water-based and organized instructor–led workouts.

Exercise Intensity

High Intensity Activity Provides More Benefits Than Light Activity

- A recent Cochrane database systematic review of 56 trials encompassing 4,800 subjects found that compared to light exercise, moderate-intensity or vigorous exertion during cancer treatment provided greater improvements in health-related quality of life, physical functioning, anxiety, fatigue, and sleep disturbances.
- This suggests that for patients on chemotherapy or radiation, and without contraindications to vigorous exercise, even more benefits will accrue with high-intensity activity.

Exercise Intensity



Summary

- **Improved physical fitness and function, and increased feelings of vitality.**
- **Exercise and physical activity reduced cancer-specific mortality, total mortality.**
- **Patients with different cancer diagnoses may require different amounts and intensities of exercise to obtain the maximum benefit.**