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Analysis of the Relationship Between Diet and Exercise Beliefs and Actual Behaviors Among Breast Cancer Survivors in Northwest Ohio

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Abstract

Introduction: Studies have shown that a diet high in fruit and vegetable intake, as well as a routine including daily exercise or physical activity, can independently affect relapse rates and survivorship in breast cancer patients. Fruits and vegetables contain powerful anti-oxidant molecules, capable of preventing tumor formation and proliferation. Exercise can lower circulating levels of estrogen, the female hormone responsible for tumor proliferation in the estrogen-sensitive form of the disease. The most beneficial results have been shown in women who exercise and consume a diet rich in fruits and vegetables. We studied the attitudes towards and behaviors related to fruit and vegetable intake and exercise in a cohort of breast cancer survivors in northwest Ohio.

Materials and Methods: Data were gathered from a survey sent out by the Northwest Ohio Branch of the Susan G. Komen For the Cure Foundation. We assessed and evaluated survivors' self-reported beliefs, attitudes, and behaviors regarding exercise and fruit and vegetable intake.

Results: Nearly half of the survivors (46.5%) reported being unsure or in disagreement with the statement "Eating at least 5 servings of fruits and/or vegetables per day will reduce the risk of breast cancer recurrence." Only 46.8% of those in agreement with the previous statement actually report eating at least 5 fruits and/or vegetables per day. With respect to exercise, 32.9% reported being unsure or in disagreement with the statement "Engaging in regular physical activity will reduce the risk of breast cancer recurrence." Only 68.5% of those in agreement with the previous statement report any physical activity in the past 30 days.

Conclusions: Many breast cancer survivors do not appear to be aware of the benefits of diet and exercise. Further, a large proportion of those who are aware of the benefits do not adapt a healthy diet and exercise as part of their lifestyle. A majority of these survivors see a primary care physician, which we believe is the best venue to bridge this education gap. It is apparent by the pattern our data shows that more needs to be done to educate breast cancer survivors about the benefits of exercise and fruit and vegetable intake. Steps need to be taken to ensure that those who are educated also remain motivated to engage in a healthy lifestyle with the hopes of avoiding breast cancer recurrence.

Keywords: breast cancer, relapse rate, exercise, diet

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Introduction

Breast cancer is the most common cancer among women in the United States, expected to account for 192,370 invasive cases and 27% of all new female cancer diagnoses; and 40,170 deaths or 15% of all female cancer mortality in 2009.¹ Encouragingly, breast cancer mortality rates have decreased 37% since 1991.¹ Although breast cancer is still one of the deadliest cancers, decreasing mortality rates mean that more women than ever will survive their first bout with the illness.

As survivorship has increased, the research pertaining to survivorship maintenance and lowering recurrence rates has grown. Thus, a well-established list of non-modifiable factors affecting breast cancer prognosis (age, ethnicity, tumor stage, and hormone-receptor status), and a list of modifiable risk factors (alcohol intake, smoking, obesity, sedentary lifestyle, and high-fat diet) have resulted.² Many researchers are beginning to explore whether ameliorating modifiable risk factors for cancer can play a role in increasing survivorship and lowering female breast cancer recurrence.

Diet and Breast Cancer

There is a wealth of *in vitro*, animal, and human studies supporting the role of diet in cancer survivorship and recurrence prevention. Flavonoids and carotenoids are classes of compounds often identified as having possible therapeutic effects through their abilities to counteract oxidative stress, reduce tumor proliferation, and decrease free estrogen circulation.³⁻⁶ Flavonoids are found in foods of plant origin and therefore abundant in many fruits and vegetables.^{4,5} Isoflavones from soy products have demonstrated phytoestrogenic properties that allow them to mimic estrogen and inhibit aromatase activity.⁴ Aromatase, a cytochrome p450 enzyme involved in converting androgens to estrogen⁷ has been implicated with high circulating estrogen levels in obese, post-menopausal women.⁸ Therefore, dietary flavonoid consumption may have a direct anti-tumor effect by inhibiting estrogen production and decreasing the amount of free estrogen that can reach and bind to estrogen receptors on the breast tissue.⁹

Carotenoids, which are found in darkly colored fruits and vegetables including carrots, spinach, and apricots, account for 34% of dietary vitamin A

in women.¹⁰ Carotenoids also have demonstrated antioxidant properties¹⁰ by donating electrons to free radicals, which acts to stabilize them and protect DNA from oxidative damage.¹⁰ Plasma carotenoids have been used as a biomarker for high fruit and vegetable intake among breast cancer study subjects.⁶

Vitamin A was the first dietary factor shown to influence breast cancer risk.¹¹ Diets high in fruits and vegetables have been shown to decrease all-cause and breast cancer-specific mortality.³ A “prudent” diet (high in fruits, vegetables, and fiber, and low in fat), when compared to a “western” diet (high protein and fat) has been shown to reduce all-cause mortality among breast cancer survivors.¹² High plasma carotenoids have been shown to significantly lower risk of a new breast cancer event.⁶ While studies remain that have null results, there have been a number of large clinical epidemiological studies that have shown inverse relationships between fruit and vegetable intake and breast cancer recurrence or all-cause mortality.^{3,6,12}

Physical Activity and Breast Cancer

Studies have shown that breast cancer treatments, including mastectomy, regional lumpectomy, and chemotherapy can suppress immune responses in patients.^{13,14} Significant evidence is available that suggests a role for exercise in bolstering immune function,¹⁵ lowering circulating estrogen,¹⁶ and lowering C-reactive protein¹⁷ in breast cancer survivors. Inverse correlations have been shown between increased physical activity and decreased all-cause mortality¹⁸ as well as lower breast cancer recurrence.^{18,19} The best survivorship trends have been observed in patients who engage in exercise and have high serum carotenoid levels, regardless of tumor-receptor status.²⁰

The primary goals of this research were to 1) determine the association between diet and exercise beliefs and actual behaviors among breast cancer survivors, 2) determine their knowledge of breast cancer-related diet and exercise on survival recurrence, and 3) identify potential sources and modes of education between health care providers and breast cancer survivors.

Materials and methods

Researchers from the University of Toledo collaborated with The Northwest Ohio Affiliate of the



Susan G. Komen For the Cure Foundation (Komen Foundation) to conduct a regional needs assessment of the 24 counties covered by the Northwest Ohio Affiliate. Six of these counties were in the transitional process of being added to the Northwest Ohio Affiliate's region. The Komen Foundation is a non-profit organization and the world's largest grassroots network of cancer survivors and activists. Through fundraising and sponsored research, they strive to ensure quality care, provide breast cancer education, and empower women to improve their quality of life. A breast cancer survivor survey was developed to identify priority counties in need of survivorship funding and programming.

A three-wave mailing procedure was used to maximize the response rate. Based on an a priori power analysis, the survey was sent to a random sample of 700 breast cancer survivors obtained from the Komen Foundation mailing list in what was the present 18-county northwest Ohio and southeast Michigan region. The first mailing included¹ a personalized, hand-signed cover letter that introduced the study, requested the confidential participation of the recipient, and provided directions for returning the survey;² a copy of the survey printed on colored paper;³ a \$2.00 bill as an incentive for participation; and⁴ a return envelope addressed to the principal investigator with a first-class postage stamp. The second and third mailings included all of the above except for the incentive. Return of the completed survey served as consent for use of the answers supplied.

Survey content

Survivors were asked to provide demographic information, including age, race, gender, marital status, employment status, income, and zip code. Survivors were also asked to provide data regarding the breast cancer treatments they had received, tumor stage at diagnosis, and current health status. Additionally, they were asked to provide their beliefs regarding a wide scope of topics including mental health, sexual life, spirituality, relationship with friends and family, relationship with oncologist and primary care physician, and most pertinent to this project—diet and exercise. Finally, they were asked a series of questions to determine how likely they were to alter their behaviors and adopt a more healthy lifestyle. The questions analyzed for this project were intended to determine the beliefs

and current behaviors of breast cancer survivors regarding diet and exercise, as well the likelihood that survivors would adopt new healthy behaviors.

Statistical analysis

All data were analyzed with Statistical Analysis Software (SAS) Version 9.1. Univariate analyses were performed to obtain descriptive data (frequencies, proportions, means, medians, modes, and standard deviations) regarding the distribution of variables throughout the survey. To obtain correlations between belief of breast cancer recurrence risk and survivor health behavior as well as inter-individual beliefs and behaviors, cross-tabulations of these two types of variables were calculated. Formal correlation procedures (Pearson and Spearman) were then calculated to determine statistical significance ($p < 0.05$) of these associations.

Results

Demographic data

The respondents can be described as follows: the majority (67%) surveyed reported living in Lucas, Wood, and Monroe counties (Data not shown); were white (94.7%), and at least 60 years of age (Table 1). Most of these breast cancer survivors (71.5%) had a normal Body Mass Index (BMI) (BMI between 18 and 24.9), 24.7% were overweight (BMI between 25 and 29.9), 2.5% were underweight (BMI < 18), and 1.3% were obese (BMI > 30).

Survivor beliefs

To determine survivors' beliefs on diet and exercise, level of agreement with three statements was assessed. Survivors were deemed to be "in agreement" with a statement if they answered, "agree" or "strongly agree." An answer of "not sure," "disagree," or "strongly disagree" indicated that the survivor was "in disagreement" with the statement being examined. "Not sure" was considered in disagreement because neither "agree" nor "strongly agree" were marked on the survey.

In response to the statement "Engaging in regular physical activity will reduce the risk of breast cancer recurrence", 67% of survivors were in agreement. Similarly, for body weight, 64.7% of survivors were in agreement with the statement, "Maintaining a healthy

**Table 1.** Breast cancer survivor demographic data.

Category	N	%
Age ^a		
≤40	5	2.8
41–50	24	13.6
51–60	57	32.2
>60	91	51.4
Race/Ethnicity ^b		
White	168	94.9
Non-White	7	5.1
BMI category ^c		
<18.5	4	2.5
18.5–24.9	113	71.5
25.0–29.9	39	24.7
>30	2	1.3

^aN = 177. Average age = 61.6. Age range 36–92.

^bN = 175. “Non-White” is the sum of all other races specified on the survey, specifically Black/African American, Hispanic/Latino, Asian, Bi-racial, or Other.

^cN = 158. Body Mass Index (BMI) calculated from reported height and weight values.

body weight throughout life will reduce the risk of breast cancer recurrence”. However, regarding diet, 50.4% of survivors were in agreement with the statement, “Eating at least 5 servings of fruits/vegetables per day will reduce the risk of breast cancer recurrence” (Data not shown).

The belief that eating at least five fruits and vegetables per day will reduce the risk of breast cancer recurrence was positively correlated with the belief that regular physical activity ($r = 0.60$, $p < 0.0001$) and maintaining a healthy body weight ($r = 0.58$, $p < 0.0001$) will reduce the risk of breast cancer recurrence. In addition, the belief that regular physical activity will reduce the risk of breast cancer recurrence was positively correlated ($r = 0.60$, $p < 0.0001$) with the belief that maintaining a healthy body weight will reduce the risk of breast cancer recurrence (Data not shown).

Survivor behaviors

After determining initial beliefs, behaviors were assessed regarding diet and exercise. The data were cross-tabulated to determine whether a relationship existed between the belief of the breast cancer survivor and their actual behavior.

Responses to the statement “Eating at least 5 fruits/vegetables per day will reduce the risk of breast cancer recurrence” (Statement 1) were cross-tabulated with two questions to determine eating and exercise patterns (Table 2). Slightly less than half (48%) of those who “strongly agree” and 46.4% of those who “agree” with eating at least 5 fruits/vegetables per day will reduce the risk of breast cancer recurrence actually reported eating 5 servings of fruits/vegetables per day. Those who were “not sure” (27%), “disagree” (22.7%), and “strongly disagree” (0%) reported eating 5 servings of fruits/vegetables per day.

Table 2 also shows the cross-tabulation between the statement of “eating at least 5 fruits/vegetables per day will reduce the risk of breast cancer recurrence” and participation in the American Cancer Society (ACS)-recommended amount of exercise. Recommended activity was measured by response to the question “Do you typically engage in moderate exercise of 30 or more minutes per day for 5 or more days per week?” 45.1% of those who “strongly agree” and 36.4% of those who “agree” with the statement reported engaging in the ACS-recommended amount of exercise. Those who were “not sure” (38.0%), “disagree” (13.6%), and “strongly disagree” (0%) reportedly engaged in the ACS-recommended amount of exercise.

Physical activity and breast cancer

Responses to the statement “Engaging in regular physical activity will reduce the risk of breast cancer recurrence” (Statement 2) were cross-tabulated with two questions to determine eating and exercise patterns (Table 3). The cross-tabulation between the statement “engaging in regular physical activity will reduce the risk of breast cancer recurrence” and participation in the ACS-recommended amount of exercise indicated that 50.8% of those who “strongly agree” and 37% of those who “agree” with the statement reported engaging in the ACS-recommended amount of exercise. Those who were not sure (28.9%), “disagree” (33.3%), and “strongly disagree” (33.3%), reported engaging in the ACS-recommended amount of exercise.

Responses to the statement “Engaging in regular physical activity will reduce the risk of breast cancer recurrence” and behavior indicating a diet including at least 5 servings of fruits and vegetables per day indicated 50% of those who “strongly agree”

**Table 2.** Comparison of survivor agreement regarding a healthy diet and actual diet and exercise behavior.

Consume ≥ 5 fruits or vegetables per day	Level of agreement [#]									
	Strongly agree ^a		Agree		Not sure		Disagree		Strongly disagree	
	N	%	N	%	N	%	N	%	N	%
Five servings per day ¹										
Yes	24	48.0	65	46.4	38	27.0	5	22.7	0	0.0
No	18	36.0	44	31.4	64	45.4	10	45.5	2	100.0
Not sure	8	16.0	31	22.2	39	27.6	7	31.2	0	0.0
Total (N = 355)	50		140		141		22		2	
Engaging in regular physical activity	Level of agreement [#]									
	Strongly agree		Agree		Not sure		Disagree		Strongly disagree	
	N	%	N	%	N	%	N	%	N	%
Moderate participation ²										
Yes	23	45.1	51	36.4	54	38.9	3	13.6	0	0.0
No	20	39.2	60	42.9	50	36.0	13	59.1	2	100.0
Not sure	8	15.7	29	20.7	35	25.1	6	27.3	0	0.0
Total (N = 354)	51		140		139		22		2	

[#]Based on agreement with the statement: "Eating at least 5 fruits/vegetables per day will reduce the risk of breast cancer recurrence".

¹Based on survivor response to the question: "Do you typically eat at least 5 servings of fruits/vegetables per day?"

²Based on survivor response to the question: "Do you typically engage in moderate exercise of 30 or more minutes per day for 5 or more days per week?"

and 42.4% of those who "agree" reported that their diet includes 5 servings of fruits and vegetables per day (Table 3). Those who were "not sure" (22.8%), "disagree" (7.7%), and "strongly disagree" (100%) reported that their diet includes 5 servings of fruits and vegetables per day.

Responses to the statement "Maintaining a healthy body weight throughout life will reduce the risk of breast cancer recurrence" (Statement 3) were cross-tabulated with two questions to determine eating and exercise patterns (Table 4). The cross-tabulation between the statement "Maintaining a healthy body weight throughout life will reduce the risk of breast cancer recurrence" and participation in the ACS-recommended amount of exercise indicated that 46.6% of those who "strongly agree" and 36.8% of those who "agree" reported engaging in the ACS-recommended amount of exercise. Those who were "not sure" (35.4%), "disagree" (28.6%), and "strongly disagree" (0%) reported engaging in the ACS-recommended amount of exercise.

The cross-tabulation between "Maintaining a healthy body weight throughout life will reduce

the risk of breast cancer recurrence" and behavior indicating a diet including at least 5 servings of fruits and vegetables per day indicated that 43.9% of those who "strongly agree" and 39.7% of those who "agree" reported that their diet includes 5 servings of fruits and vegetables per day (Table 4). 34% of those who were "not sure," 14.3% of those who "disagree," and 0% of those who "strongly disagree" with statement 3 reported that their diet includes at least 5 servings of fruits and vegetables per day.

Discussion

As expected, the belief that eating at least five fruits and vegetables per day will reduce the risk of breast cancer recurrence was positively correlated with the beliefs that regular physical activity and maintaining a healthy body weight will do the same. These results indicate what we have learned from a wealth of published research that diet, exercise, and body weight, are strongly related to each other and the subsequent health and well-being of individuals. However, though these health-related beliefs and research exist, a number of reasons exist for breast cancer survivors not

**Table 3.** Comparison of survivor agreement regarding regular physical activity and actual exercise and diet behavior.

Engaging in regular physical activity	Level of agreement [#]									
	Strongly agree		Agree		Not sure		Disagree		Strongly disagree	
	N	%	N	%	N	%	N	%	N	%
Moderate participation ¹										
Yes	33	50.8	64	37.0	28	28.9	4	33.3	1	33.3
No	25	38.5	66	38.1	46	46.5	5	41.7	2	66.7
Not sure	7	10.7	43	24.9	35	24.6	3	25.0	0	0.0
Total (N = 352)	65		173		101		12		3	
Consume ≥ 5 fruits or vegetables per day										
5 servings per day ²										
Yes	32	50.0	73	42.4	23	22.8	1	7.7	3	100.0
No	21	32.8	54	31.4	50	49.5	10	76.9	0	0.0
Not sure	11	17.2	45	26.2	28	27.7	2	15.4	0	0.0
Total (N = 353)	64		172		101		13		3	

[#]Based on agreement with the statement: "Engaging in regular physical activity will reduce the risk of breast cancer recurrence".

¹Based on survivor response to the question: "Do you typically engage in moderate exercise of 30 or more minutes per day for 5 or more days per week?"

²Based on survivor response to the question: "Do you typically eat at least 5 servings of fruits/vegetables per day?"

engaging in the diet and exercise-related behaviors that can foster a positive quality of life.

Current and future challenges

In assessing diet and exercise patterns among breast cancer survivors in northwest Ohio and southeast Michigan, several educational and behavioral deficits were identified. In general, a substantial proportion of the survivors in this cohort may be unaware of the preventive effects of diet and exercise on cancer recurrence and have not incorporated the recommended lifestyle changes into their daily routine (Tables 2–4). Roughly one-third of breast cancer survivors surveyed were in disagreement with the statement: "Engaging in physical activity will reduce the risk of breast cancer recurrence". 43% of those surveyed were in disagreement that eating 5 servings of fruits and vegetables per day can reduce the risk of breast cancer recurrence (Data not shown). 35% of those surveyed were in disagreement with the statement: "Maintaining a healthy body weight throughout life will reduce the risk of breast cancer recurrence" (Data not shown).

When cross-tabulating the data for Tables 2–4, behavioral and educational deficits were discovered. Of those who were in agreement with the belief in the preventive effects of both diet and exercise, less

than half exhibited the ACS-recommended exercise behavior and reported that their diets contained 5 servings of fruits and vegetables per day. Thus, in a population of survivors who are aware of the benefits of a healthy lifestyle on breast cancer recurrence, less than half are exhibiting these potentially life-saving behaviors. The challenge to those in position to help breast cancer survivors is two-fold: How can we educate this population? And how can we affect behavior change? A review of the literature and patterns from this survey has suggested that primary care physicians (PCPs) and home interventions may be effective venues for teaching and empowerment.

91% of those who responded to this survey reported that they regularly see a primary care physician, making PCPs a group that has regular contact with this population. Not only do PCPs often see breast cancer survivors, the survivors appear to listen to their messages. A randomized control trial showed that women with breast cancer who received a physician's recommendation to exercise significantly increased their metabolic equivalent (MET)-hours of exercise.²¹ These researchers postulated that a physician's suggestion makes the patients believe they can change their habits.²¹

While PCPs can be an efficient and effective source of education and motivation to survivors, too few

**Table 4.** Comparison of survivor agreement regarding healthy body weight and actual exercise and diet behavior.

Engaging in regular physical activity	Level of agreement [#]									
	Strongly agree		Agree		Not sure		Disagree		Strongly disagree	
	N	%	N	%	N	%	N	%	N	%
Moderate participation ¹										
Yes	27	46.6	64	36.8	35	35.4	6	28.6	0	0.0
No	26	44.8	67	38.5	39	39.4	10	47.6	2	40.0
Not sure	5	8.6	43	24.7	25	24.2	5	23.8	3	60.0
Total (N = 357)	57		174		99		21		5	
Consume ≥ 5 fruits or vegetables per day	Level of agreement [#]									
	Strongly agree		Agree		Not sure		Disagree		Strongly disagree	
	N	%	N	%	N	%	N	%	N	%
5 servings per day ²										
Yes	25	43.9	69	39.7	34	34.0	3	14.3	0	0.0
No	23	40.4	60	34.5	41	41.0	12	47.1	2	40.0
Not sure	9	15.7	45	25.8	25	25.0	6	28.6	3	60.0
Total (N = 357)	57		174		100		21		5	

[#]Based on agreement with the statement: "Maintaining a healthy body weight throughout life will reduce the risk of breast cancer recurrence".

¹Based on survivor response to the question: "Do you typically engage in moderate exercise of 30 or more minutes per day for 5 or more days per week?"

²Based on survivor response to the question: "Do you typically eat at least 5 servings of fruits/vegetables per day?"

physicians are engaging in this behavior. This has been demonstrated in a study by Demark-Wahnefried et al.²² where it was reported that only 20% of oncology care physicians deliver health promotion messages. Improvement in PCP delivery of survivorship care is needed.²³ Only 50% of breast cancer survivors perceived their PCP to be knowledgeable about cancer follow-up. 41% felt that their PCPs were knowledgeable about cancer therapies, and only 28% felt that their PCPs and oncologists communicated well.²³ The fact that there can be demonstrable improvement from physician-based education and motivation, combined with the fact that there are identifiable deficits in physician-patient interactions, make PCP-survivor interaction a clear area of improvement necessary to affect educational and behavioral change in breast cancer survivors.

Encouragingly, there are other routes that have been proven effective to increase breast cancer survivor education and motivation regarding healthy lifestyle. Studies have shown newsletters, internet sources, and telephone interventions to be efficient vectors for these educational methods.²⁴⁻²⁶

Limitations

This study has several identifiable limitations, including: general statistical power, the definition of

"exercise", and interpreting the oft-used response of "not sure." We acknowledge that inclusion of "not sure" as disagreement is not completely perfect, though omission of a respondent marking "agree" or "strongly agree" may be viewed as disagreement. Another limitation of the "not sure" choice is that respondents may gravitate towards the "middle of the road" option. Further, it is unclear if "not sure" reflects a lack of certainty about the individual survey question or lack of certainty regarding survivor beliefs or behaviors. Some questions yielded "not sure" responses from 20 to 30% of our sample. If the survey were to be reissued to a larger population to correct for the low statistical power, questions that produced the most "not sure" responses should be re-examined or omitted.

A large portion of those surveyed neglected to respond to the sections of the survey that covered demographic data; future intentions related to diet, exercise, and breast care; and personal and spiritual beliefs regarding prevention of breast cancer recurrence. The respondents who omitted these sections all stopped at the same question, making it unclear whether it was fatigue, an unwillingness to reveal beliefs regarding the topics in those sections, or a lack of awareness that these sections existed.



Approximately 95% of the respondents were white (Table 1) and 66% were from Lucas County. It should be noted that these values were calculated out of the markedly lower respondents to the demographic questions. While the statistical power is low, the patterns shown by the data still indicate deficits in education and motivation regarding the topics examined. Further studies should be conducted to include a larger and more diverse sample to enhance the generalizability of results.

The existing research is mixed regarding the type of exercise breast cancer survivors should engage in. Recent findings from the Nurses Health Study indicate improvement in breast cancer survival and a reduction in recurrence rates from as little as 3 MET hours per week.¹⁹ The American Cancer Society (ACS) recommends 30 minutes of exercise per day, 5 days per week. However, there is no consensus among researchers regarding which type of exercise, aerobic or weight bearing, is more beneficial to breast cancer survivors. Barriers to action that may affect women in this primarily post-menopausal cohort, such as osteoporosis, were seldom addressed in the literature. Further studies would be warranted to determine 1) optimum exercise for breast cancer survivors; and 2) if tailored exercise programs are appropriate depending on factors including age, health status, and co-morbidities.

Summary

Breast cancer has proven to be a highly prevalent and dangerous disease. While it is true that lifestyle factors are not the only reason one would develop such a disease, the literature is pointing more assuredly to a distinct protective effect of a healthy diet and regular exercise. This study has shown that many breast cancer survivors are either unaware of the effects of their lifestyle, or unwilling or unable to adopt a healthy lifestyle even if they are aware of its benefits. Primary care physician-based education, as well as information sent via numerous modalities such as a newsletter, internet-based, or telephone has been shown to help improve the knowledge and motivation of breast cancer survivors. Breast cancer survivors not only need to know the facts about diet and exercise in relation to breast cancer, they need to be provided the opportunity to use this knowledge to achieve optimal health and well being. Further studies, with more

refined questions and a larger sample size, would be warranted to make this information more precise and universal.

Disclosures

This manuscript has been read and approved by all authors. This paper is unique and is not under consideration by any other publication and has not been published elsewhere. The authors report no conflicts of interest.

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