Lifestyle Factors and Survival in Women with Breast Cancer

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Abstract

With increasing longevity and more effective cancer therapies, the population of cancer survivors is increasing. For example, it is estimated that there are over 2 million breast cancer survivors in the United States. Among cancer survivors and their families, there is substantial interest in whether there is anything that they can do beyond conventional therapy to improve their prognosis. Chief among these is interest in diet and use of complementary and alternative therapies. Despite this interest, there is surprisingly little that is known about the effects of these factors on cancer survival. This is in part because of the usual approach to research on diet and breast cancer in human populations. Studies that have had food and nutrition as a main interest have focused almost exclusively on cancer etiology and prevention; there are literally hundreds of such studies. Meanwhile, studies of populations after a breast cancer diagnosis have rarely considered lifestyle factors. Such studies have focused largely on therapeutics, such as effects of different chemotherapy regimens, or prognostic factors, such as the effects of stage of disease, hormone receptor status, or gene expression signatures on prognosis. To the extent that lifestyle factors have been a focus of cancer prognosis studies, they have often been aimed at the question of whether they impact quality of life, and not on whether they influence cancer survival or recurrence. There have been a handful of studies that have had lifestyle factors such as diet and physical activity as a principal focus. In addition to 2 randomized trials, the Women’s Intervention Nutrition Study (WINS) and the Women’s Healthy Eating and Living Study, there are at least 5 ongoing prospective cohort studies in breast cancer survivors that have diet as a main focus. Although these studies differ in various aspects, they are all aimed at examining whether differences in diet may result in differences in recurrence and mortality rates. One such study, the Pathways Study, is a prospective cohort study that began recruitment of study participants in early 2006. This study is unique in that it is enrolling women as soon after breast cancer diagnosis as is practical, whereas other studies have generally enrolled women after completion of adjuvant therapy or later. This and other studies promise to provide some of the first objective information regarding diet and breast cancer prognosis and serve as models for studies of diet and prognosis of other cancers.

consequence of the focus of investigators interested in these
topics. Epidemiologists who have been interested in the role of
diet in cancer have focused almost exclusively on studies of the
etiology of cancer. Over 2 dozen large prospective cohort studies
are being conducted with a major focus on understanding the
association of dietary factors with the incidence of breast and
other cancers. On the other hand, investigators interested in
studies of breast cancer prognosis have generally ignored the
potential role of dietary or other lifestyle factors and have in-
stead focused on studies that examine modifications in adjuvant
therapy, such as through cooperative oncology groups such as
the National Surgical Adjuvant Breast Program (6,7), or the
identification of molecular or other prognostic indicators, such
as hormone receptor status (8) or, more recently, genetic profiles
(9–11). In the context of known impact on prognosis of such
factors, changes in diet, use of supplements, or other lifestyle fac-
tors may have reasonably been considered an afterthought.

Although the literature related to diet and breast cancer
recurrence or survival has been increasing over the past decade,
the currently available studies suffer from design limitations that
substantially limit their ability to address even the most basic of
questions that confront survivors, their families, and their health
care providers, who wonder whether diet can influence breast
cancer prognosis. These limitations result from the fact that many
such studies have not specifically been designed to address ques-
tions related to prognosis. The paucity of literature and the
difficulties inherent in interpretation result in a situation in
which informed guidance is difficult. This has been noted by the
American Cancer Society in its reports on guidance on cancer
prognosis among individuals (12). It is only recently that investi-
gators have started to conduct studies related to lifestyle factors
and cancer prognosis.

**Design considerations in epidemiologic studies of diet and cancer prognosis**

**Conversion of etiology studies into prognosis studies.** In an attempt to increase knowledge from epidemiologic studies on
factors associated with long-term prognosis, the National Can-
cer Institute issued a Program Announcement in 1998 aimed at
taking advantage of ongoing cohort or case-control studies and
converting them from studies of cancer etiology into studies of
cancer prognosis, conceptually into studies of the etiology of
cancer recurrence and survival after cancer (13). Indeed, with
only a few exceptions, most of the limited epidemiologic knowl-
dge regarding the role of diet or physical activity on breast
cancer prognosis comes from such studies (4). Although such
studies have the advantage of building on ongoing studies,
they may have inherent limitations in their ability to address
questions of interest for cancer prognosis. Some of these limi-
tations are described below and outlined in Table 1.

**Prospective cohort studies.** Cohort studies designed to
investigate the role of dietary factors and risk of cancer typically
have enrolled large numbers of study participants by mailed
questionnaire, with food frequency questionnaires as the prin-
cipal basis for dietary assessment. Study participants can
generally be thought to have been enrolled in a relatively short
calendar time window. They are then followed for data
collection through follow-up questionnaires that may assess
development of cancer and other conditions. Often, linkages
with cancer registries are a basis for determination or validation
of cancer incidence in the cohort. Thus, for example, in the Iowa
Women’s Health Study, in an analysis of a cohort of 34,388
women with dietary information and no prior cancer, 459
women developed breast cancer over an ~4-y follow-up period
(14). By use of statistical methods that account for differential
lengths of follow-up, such as proportional hazards or Poisson
regression, associations between dietary and other lifestyle
factors and risk of cancer can be examined. As the cohort is
followed over time, more cases occur, increasing the statistical
power to examine relationships.

In order to convert such a study into a study examining
prognosis, cohort members who develop cancer would continue
to be followed for subsequent cancers, mortality, or other prog-
nosis endpoints. However, because such studies typically con-
duct data collection according to calendar time, the time between
dietary assessment and the baseline event of interest for cancer
prognosis studies, diagnosis of cancer, will vary substantially,
perhaps by years if there is only 1 assessment of diet. For ex-
ample, in the Iowa Women’s Health Study, an analysis was pub-
lished relating baseline dietary assessments, conducted in early
1986, with survival after incident breast cancer occurrence in
this cohort (15). In this analysis, the time between dietary as-
seessment and breast cancer ranged up to 6 y, and the time from
breast cancer diagnosis to death or end of follow-up varied
similarly. In addition, because dietary assessment occurred before
the cancer diagnosis, no inferences can be made from such analyses
on the role of diet after diagnosis on recurrence or mortality
rates.

In such a cohort study, a proportion of study participants
may actually have had a cancer before diagnosis, if prior cancer
is not an exclusion criterion. Thus, there may be an opportunity
to use baseline dietary assessments to examine the role of diet
on risk of recurrence or death after diagnosis of cancer. Again,
however, time between the initial cancer diagnosis and enroll-
ment will vary, perhaps substantially. In such an approach, there
is also potential for selection bias as a result of selective survival.

**Table 1** Selected design limitations for epidemiologic studies of diet, lifestyle and cancer prognosis when converted from
epidemiologic studies of cancer etiology

<table>
<thead>
<tr>
<th>Original study design</th>
<th>Limitation</th>
<th>Approach to minimize limitation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Prospective cohort study</td>
<td>Time between data collection and cancer diagnosis varies</td>
<td>More frequent, periodic data collection</td>
</tr>
<tr>
<td></td>
<td>Baseline diet reflects prediagnosis diet</td>
<td>Periodic data collection</td>
</tr>
<tr>
<td></td>
<td>Selection bias as a result of selective survival</td>
<td>More frequent, periodic data collection</td>
</tr>
<tr>
<td>Case-control study</td>
<td>Limited ability to examine critical time windows in the cancer experience</td>
<td>Data collection to reflect current diet</td>
</tr>
<tr>
<td></td>
<td>Baseline diet reflects prediagnosis diet</td>
<td>Include follow-up of cases in original or concurrent study design</td>
</tr>
<tr>
<td></td>
<td>Selection bias as a result of selective survival</td>
<td>Rapid case ascertainment, include follow-up of cases on periodic basis</td>
</tr>
<tr>
<td></td>
<td>Limited ability to examine critical time windows in the cancer experience</td>
<td></td>
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</table>

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as individuals who had been diagnosed with cancer and subsequently died before baseline enrollment would not have had the opportunity to enroll in the cohort study.

The problem of differential length of time between dietary assessment and cancer diagnosis may be alleviated somewhat in cohort studies that conduct repeat assessments of diet. A prime example of such a study is the Nurses’ Health Study, in which food frequency questionnaires and other data have been collected every 2–4 y or so (16). Thus, the maximum length of time between dietary assessment and occurrence of cancer would be ~4 y, assuming complete response to each wave of data collection. Even so, because data collection is not conducted in reference to the event of interest, there will continue to be variation in the length of time between dietary assessment and cancer diagnosis. With repeat assessments, the opportunity to also have dietary data from postdisease assessments exists. For example, in an analysis from the Nurses’ Health Study, postdisease protein intake was associated with better survival (17). In this analysis, cases were 1982 women who were diagnosed with incident breast cancer from 1976 to 1990 and who had a food frequency questionnaire assessment after the diagnosis. Other analyses from this study using postdisease data suggested that regular physical activity is associated with better survival (18), and, using both predisease and postdisease assessments, that greater weight gain is associated with poorer survival (19). However, the potential for bias from selective survival in analysis of postdisease dietary assessments remains, although the extent to which this bias exists depends on the frequency of dietary and lifestyle assessments as well as on the proportion of the cohort that is lost to follow-up.

Overall, use of a preexisting cohort study to address questions related to lifestyle factors and cancer prognosis may suffer from 3 main limitations. First, the time between assessment of lifestyle factors and cancer diagnosis will vary, perhaps substantially, because assessment is timed to calendar events and not to occurrence of cancer. Second, in studies in which only predisease dietary data are available, inferences related to postdisease diet may be misleading. Third, if data collection does occur after cancer diagnosis, the potential for bias as a result of selective survival can exist. These problems may be minimized with repeat data collection conducted over relatively short time periods, but only a few such cohort studies exist.

Case-control studies. Conversion of a case-control study into a study of cancer prognosis typically occurs by follow-up of cases for cancer recurrence, death, or other endpoints. In case-control studies of cancer etiology, cases may typically be identified through a cancer registry or other source of cases such as hospital records. Although methods in specific studies vary, data collection among cases can be thought to occur at a uniform time relative to date of cancer diagnosis, rather than at a uniform calendar time as occurs in a cohort study of cancer etiology. Indeed, enrollment typically occurs over the course of several months or years, in contrast to a prospective cohort study, in which the cohort may be established in a matter of months. Thus, the data that are collected do not suffer from variation in length of time between data collection and cancer diagnosis.

Although the timing of data collection among cases in case-control studies is better suited to conversion into a study of cancer prognosis, methods are typically aimed at collection of diet or other lifestyle factors at some reference point before data on diagnosis. Commonly, cases may be asked about their food and beverage intake 1 y before diagnosis. Thus, as in the case of prospective cohort studies that are converted to studies of prognosis, dietary assessment typically refers to predisease dietary habits. A typical example is an analysis from a case-control study in Shanghai, in which a case-control analysis suggested a weak inverse association of soy intake and risk of breast cancer (20), whereas use of the same data to examine survival after cancer suggested that predisease soy intake was not associated with survival (21). This study and analysis were unable to determine whether postdisease soy intake or change in soy intake after diagnosis is associated with survival. Without further data collection on current or postdisease diet, inferences regarding postdisease diet may be misleading.

In the follow-up of cases in a case-control study, it is possible to conduct new data collection, thereby allowing examination of postdisease diet or other lifestyle factors and cancer prognosis. However, unless these follow-up assessments are designed into the study, it may be years after enrollment in the case-control study for subsequent data collection to occur. An example of a case-control study in which follow-up for diet and other lifestyle assessment was planned is the North Carolina Colon Cancer Study, in which data were collected at ~2 y postdisease among the cases, and a similar time period for controls (22). Analyses suggested that cases adopted more healthful behaviors, including changes in vegetable intake and physical activity (22). As in the cohort study context, the longer the time period between subsequent data collection, the greater the likelihood that bias caused by selective survival and loss to follow-up will exist. In addition, such follow-up may be conducted in reference to calendar time rather than to cancer diagnosis or initial enrollment into the case-control study, injecting the ambiguities of differential time differences for data collection relative to the event of interest.

Thus, conversion of a case-control study into a study of cancer prognosis may provide some advantages over conversion of a cohort study, 1 of which is the timing of data collection in a uniform manner relative to the cancer diagnosis. However, because data collection in the case-control study is usually aimed at etiologic questions, such data provide little insight into questions concerning postdisease diet. Although follow-up assessments among cases will provide postdisease information, if these are conducted many years after diagnosis, bias arising from selective survival is a possibility.

Design of de novo epidemiologic studies of lifestyle factors and cancer prognosis. Although use of preexisting epidemiologic studies of cancer etiology to examine questions related to cancer prognosis has the attraction of cost efficiency, such studies are rarely suited to provide direct insight into questions on the relation of diet, especially postdisease diet, to cancer prognosis. Although information from such studies has provided tantalizing clues to the role of diet in prognosis of breast cancer, the design limitations inherent in such studies prevent such data from being definitive.

Given the opportunity to design an epidemiologic study de novo to examine diet or other lifestyle factors as they relate to cancer prognosis, there are several methodological elements that can be considered. Some of these are outlined in Table 2. As noted above, limitations of relying on preexisting studies include the likelihood of selection bias as a result of selective survival, lack of information on postdisease diet, and, especially in cohort studies, the lack of uniformity in timing of data collection relative to cancer diagnosis.

To minimize variation in timing of data collection relative to events of interest, data collection in de novo studies can be conducted as in a case-control study, in relation to the diagnosis of cancer. Identification of cases through a cancer registry would
TABLE 2  Selected design considerations for epidemiologic studies of diet, lifestyle, and cancer prognosis

<table>
<thead>
<tr>
<th>Consideration</th>
<th>Approach</th>
</tr>
</thead>
<tbody>
<tr>
<td>Capture of data during different phases</td>
<td>Rapid case ascertainment to enable enrollment soon after diagnosis</td>
</tr>
<tr>
<td>of the cancer experience</td>
<td>Periodic assessment of lifestyle factors at times associated with important milestones (e.g., completion of therapy)</td>
</tr>
<tr>
<td>Ignore variations in lifestyle caused by treatment</td>
<td>Baseline assessment after completion of adjuvant therapy</td>
</tr>
<tr>
<td>Consider genetic and other biomarkers</td>
<td>Include in-person or other methods for collection of biospecimens</td>
</tr>
<tr>
<td>Ensure collection of known clinical and</td>
<td>Collection of information from medical charts required</td>
</tr>
<tr>
<td>therapeutic prognostic factors</td>
<td></td>
</tr>
</tbody>
</table>

typically result in potential enrollment into the study at least 6 mo after diagnosis, although the possibility of more rapid case ascertainment may exist. For a cancer such as breast cancer, this time since diagnosis may not compromise quality of data collection, whereas for rapidly fatal cancers such as cancers of the pancreas or lung, reliance on a cancer registry for case identification may result in poor quality data. These concerns are similar to those that arise in the context of case-control studies of cancer etiology.

The focus of data collection in studies of cancer prognosis can be aimed at current diet—i.e., postdiagnosis diet—rather than prediagnosis diet. This is a clear distinction from case-control studies. As follow-up of this cohort of cancer cases is conducted, data collection can be conducted relative to the diagnosis of cancer, for example, at time points such as 1, 2, and 5 y postdiagnosis. This differs substantially from the timing of data collection in cohort studies, and perhaps in follow-up studies of cases from a case-control study, in which data may be collected at a uniform calendar time, resulting in varying lengths of time between diagnosis and follow-up data collection.

Because it is likely that dietary patterns change over the course of the cancer experience, repeat dietary assessment to capture patterns at critical points in time may be necessary to investigate focused questions of interest. For example, 1 outstanding question is whether relatively high consumption of antioxidants, from foods or supplements, affects the effectiveness of chemotherapy or radiation therapy (23–25). Assessment of current diet several months or years after therapy may be unable to address such questions.

To minimize the potential impact of bias arising from selective survival, maximizing follow-up of participants is important. In addition, to capture changes in dietary patterns in a manner that minimizes this survival bias, relatively frequent dietary assessment may be required. Dietary data collection should probably be conducted at a frequency or timing relative to diagnosis when it is likely that changes in diet may occur. Thus, one may argue that 1 posttherapy dietary assessment, e.g., at 2 y postdiagnosis in breast cancer, may capture reasonably well differences in dietary patterns among cases. However, such an assessment will be unlikely to capture differences in diet during therapy and therefore will be unable to determine whether such differences influence cancer prognosis.

Studies of cancer prognosis, will, of course, need to consider other factors that are known to influence recurrence or survival rates. Information about specific diagnostic and therapeutic factors, such as stage and grade of disease, hormone receptor status, and use and type of therapy, will be important to consider. With advances in molecular prognosis in breast cancer, inclusion of biospecimens that enable investigation of these factors will also likely be important.

**Epidemiologic studies of diet and breast cancer prognosis**

In consideration of the above factors in designing studies of diet and breast cancer prognosis, most current studies limit enrollment to women with early-stage disease, minimizing the impact of advanced disease on prognosis, which may overwhelm any effects of dietary or other lifestyle factors on prognosis. Such studies have also typically enrolled individuals after they have completed chemotherapy or radiation therapy, under the assumption that changes in diet during that time are influenced by therapy and do not represent long-term dietary patterns and potential effects on long-term prognosis may be ignored. Current epidemiologic studies of breast cancer recurrence and survival can generally be classified as randomized controlled trials or as prospective cohort studies; major studies are outlined in Table 3 and described below.

**Randomized controlled trials.** Initial randomized trials of dietary interventions and breast cancer prognosis were small—30 or fewer individuals per arm of trial, and 4 or fewer events (deaths) in any arm (26,27)—and provide little insight into whether such interventions may be helpful. However, 2 larger trials of dietary interventions and breast cancer prognosis are being conducted, and preliminary analyses from 1 study have been presented.

**TABLE 3  Epidemiologic studies designed to study diet, lifestyle, and breast cancer prognosis**

<table>
<thead>
<tr>
<th>Study name</th>
<th>Setting</th>
<th>Approximate number enrolled</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Randomized controlled trials</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Women’s Intervention Nutrition Study (WINS)</td>
<td>U.S. (multicenter)</td>
<td>2437</td>
</tr>
<tr>
<td>Women’s Healthy Eating and Living (WHEL) Study</td>
<td>U.S. (multicenter)</td>
<td>3088</td>
</tr>
<tr>
<td><strong>Prospective cohort studies</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Health, Eating, Activity and Lifestyle (HEAL) Study</td>
<td>Puget Sound, Los Angeles County, New Mexico</td>
<td>1182</td>
</tr>
<tr>
<td>Life After Cancer Epidemiology (LACE) Study</td>
<td>Kaiser Permanente Northern California, Utah, other</td>
<td>2212</td>
</tr>
<tr>
<td>Shanghai Breast Cancer Survivors Study (Shanghai BCSS)</td>
<td>Shanghai</td>
<td>~3500</td>
</tr>
<tr>
<td>DietCompLyf Study</td>
<td>U.K. (multicenter)</td>
<td>~840</td>
</tr>
<tr>
<td>Pathways</td>
<td>Kaiser Permanente Northern California</td>
<td>~325</td>
</tr>
</tbody>
</table>

* As of early July 2006.
Women’s Intervention Nutrition Study. WINS is a multicenter randomized controlled trial of low-fat dietary pattern and breast cancer prognosis (28). In this study, 2437 postmenopausal women with early-stage primary invasive breast cancer were randomized to either a low-fat dietary intervention ($n = 975$) or a usual diet control group ($n = 1462$); randomization occurred up to 1 year after surgery for breast cancer. After a median follow-up of 60 months, 96 women in the intervention group and 181 women in the control group experienced a breast cancer recurrence, suggesting a decreased risk of recurrence in the intervention group (29). The relative hazard was 0.76 [95% confidence interval (CI), 0.60–0.98]. The intervention group also experienced a lower overall mortality rate (relative hazard = 0.81, 95% CI, 0.65–0.99). These preliminary results are suggestive of a favorable impact of a low-fat diet on breast cancer prognosis, and more detailed analyses should be forthcoming from this study.

Women’s Healthy Eating and Living Study. The WHEL Study is focused on examining the effect of a high-vegetable, low-fat diet on risk of recurrence and mortality after breast cancer. This trial has enrolled over 3000 women with early-stage breast cancer from 1995 to 2000 (2,30). The intervention has been described in detail (31). Follow-up is ongoing, and principal results from this study are expected in 2008. Although effects of the intervention on the main outcomes are not known, analyses have demonstrated that women in the intervention group appear to have changed their diets, as evidenced by dietary assessment (32) and reductions in serum estradiol levels (33).

Prospective cohort studies. In addition to the studies described below, as noted previously, the Nurses’ Health Study is 1 of the few prospective studies of cancer etiology that can provide insight into the effects of postdiagnosis lifestyle factors on breast cancer diagnosis, as repeat assessments in the cohort result in assessment of diet and other lifestyle factors after breast cancer diagnosis. In addition, it is possible to analyze data from randomized trials as if they were designed as prospective cohort studies. This has been done, for example, in an analysis of plasma carotenoid levels measured in samples collected at enrollment into the study and breast cancer recurrence in 1551 women randomized to the control arm of the WHEL Study (34). In this analysis, women with higher carotenoid levels had lower risk of breast cancer recurrence, with a relative risk comparing high to low quartiles of 0.57 (95% CI, 0.37–0.89).

Health, Eating, Activity, and Lifestyle Study. The Health, Eating, Activity, and Lifestyle (HEAL) Study is a 3-center study of breast cancer prognosis that was initiated under funding from the Surveillance, Epidemiology, and End Results (SEER) Program, which is supported by the National Cancer Institute. The SEER Program supports high-quality cancer registries, and this infrastructure provided the context for identification of potential breast cancer patients for recruitment into the study. Overall, 1182 women were enrolled from July 1996 through March 1999 in 3 centers: New Mexico, Los Angeles County, and Seattle/Puget Sound (35). Enrollment was limited to women with early-stage breast cancer, and baseline data collection occurred 4–12 months postdiagnosis, with a follow-up interview 2 years after diagnosis. A principal aim was to enroll an ethnically diverse study population, including substantial numbers of Hispanics in New Mexico and African Americans in Los Angeles. Indeed, study participants in Los Angeles are cases from 1 of 2 case-control studies of breast cancer risk factors in African Americans (35).

Although associations of lifestyle factors and breast cancer prognosis from the HEAL Study have not been published, other findings from the HEAL Study have recently been published. For example, it has been observed in this cohort that physical activity levels dropped from before diagnosis to after diagnosis (36) and that the women gained weight in the years after diagnosis (37).

Life after Cancer Epidemiology Study. The Life after Cancer Epidemiology (LACE) Study is a mailed-questionnaire-based prospective cohort study of breast cancer survivors (38). The cohort was established under funding from the National Cancer Institute. Its design is similar to that of prospective studies of etiology, with enrollment of study participants and periodic contact through questionnaires mailed at uniform calendar times. Participants were enrolled from January 2000 through April 2002 and are early-stage breast cancer cases identified from several sources. Enrollment into the study and baseline data collection occurred on average ~2 years postdiagnosis. Overall, 2321 women with breast cancer were enrolled, with 1911 identified from the Kaiser Permanente Northern California (KPNC) Cancer Registry, which reports cancers to the California State Cancer Registry, 270 from the Utah Cancer Registry, a part of the SEER Program, and 140 from women who were eligible for, but chose not to participate in, the WHEL Study.

A description of the cohort and methods has been published (38). Associations of body size and breast cancer recurrence, combining women in the LACE Study with women in the control arm of the WHEL Study, have been published and suggest that weight gain after breast cancer is not related to this outcome (39).

Shanghai Breast Cancer Survival Study. The Shanghai Breast Cancer Survival Study (BCSS) is an ongoing study of breast cancer survivors in Shanghai, China. Participants have been identified through the Shanghai Cancer Registry, with recruitment beginning in 2002. Initial funding to establish this cohort was provided by the Department of Defense Breast Cancer Research Program. To date, over 3500 women have been enrolled in this study, with initial data collection at 6 months postdiagnosis and follow-up data collections at 18 and 36 months postdiagnosis. There are plans to expand this cohort to 5000 or more breast cancer survivors, if subsequent funding is obtained. As with other epidemiologic studies conducted in China, there has been a high response and follow-up rate in this cohort to date.

To date, no findings directly relating lifestyle factors to cancer prognosis have been published from this cohort. Recently, observations describing quality of life by various demographic and prognostic factors in the first 2236 women enrolled in this cohort were published (40).

DietCompLyf Study (Role of diet, lifestyle, and complementary therapies on breast cancer survival study). The DietCompLyf Study began in 1998 on a pilot basis, with a major focus on the role of phytoestrogens and other dietary factors in breast cancer survival (Leathem AJ, personal communication). Based at University College in London, England, the study was expanded in 2004 to include recruitment of breast cancer survivors from ~40 cancer centers in the United Kingdom. Initial baseline data collection in this cohort has occurred ~9–15 months after initial breast cancer diagnosis. The aim is to enroll a cohort of ~3000 members; as of June 2006, ~850 women with breast cancer had been enrolled. An abstract describing this study was presented recently at the American Institute for Cancer Research Annual Meeting in 2006.

Pathways: a study of breast cancer survivorship. The Pathways Study is a cohort study that is enrolling women with breast cancer as soon after cancer diagnosis as is practical, with baseline in-person interviews conducted generally within 2 months.
of diagnosis. As such, the Pathways Study is 1 of the only studies of breast cancer survivorship that may provide direct contemporaneous data collection in the first few months after diagnosis. Cohort members are women diagnosed with invasive breast cancer who are members of the KPNC health plan, and potentially eligible women are identified on a daily basis through search of online pathology reports. Areas of interest are both lifestyle factors, including diet, physical activity, and use of complementary and alternative therapies, and molecular factors, including collection of blood and tumor samples to examine genetic polymorphisms and epigenetic changes in tumor DNA. The aim is to enroll several thousand women, with periodic follow-up by mailed questionnaire at 6 and 18 mo after diagnosis and at similar intervals thereafter. Recruitment began at the end of January 2006, and as of mid-September 2006, ~460 women had been enrolled.

The large and growing population of breast cancer survivors necessitates better scientific knowledge regarding the potential role of modifiable factors in breast cancer prognosis. Until recently, most of the knowledge from epidemiologic studies on the role of diet and other lifestyle factors on breast cancer recurrence or survival after primary breast cancer has come from small studies or from studies that were not designed to examine these questions. Conversion of studies that were designed to investigate questions of cancer etiology into studies that examine questions related to cancer prognosis may have design limitations that limit their ability to provide information of relevance to the cancer survivors. Limitations include varying lengths of time between assessment of diet and diagnosis of cancer, bias related to selective survival, and absence of information on postdiagnosis lifestyle factors.

In the context of breast cancer, at least 2 randomized trials and 5 prospective studies are ongoing that promise in future years to provide some of the first data that are directly relevant to the question of postdiagnosis diet and lifestyle factors in breast cancer recurrence and survival. These studies should add to the information that has been produced from earlier studies (3) and ongoing analyses (17,19) from conversion of cancer etiology studies and create a body of knowledge on which to provide a basis for guidance on diet and lifestyle factors after breast cancer diagnosis. Similar epidemiologic studies for cancers of other sites are lacking and are an area of needed research.

Literature Cited


