Lifestyle Factors and Health Risk Behaviors

21

Vida L. Tyc and James L. Klosky

21.1 Introduction

Despite advances in medical treatments for childhood cancer, many pediatric cancer survivors are at risk for developing treatment-related late effects and second cancers [1–3]. As many cancer-related complications do not become apparent until the survivor enters adulthood, the implementation of timely interventions is critical in preventing or ameliorating late treatment sequelae and their adverse effects. In a recent report from the Childhood Cancer Survivor Study (CCSS), the largest cohort of cancer survivors assembled in the U.S., it was estimated that 42 % of pediatric cancer survivors will experience a serious or life threatening illness by 30 years post-diagnosis, including cardiovascular disease, stroke, pulmonary disease, kidney failure, or second malignancies. In fact, cancer survivors are 8 times more likely than their siblings to experience many of these severe or life threatening health conditions [4]. The practice of unhealthy behaviors such as substance use, poor diet, and inadequate levels of physical activity, can further compound these risks.

As it is now typical for survivors of childhood cancer to live well into adulthood, prevention of adverse late effects and second malignancies, through adoption of healthy lifestyles, is a key component of survivorship care [5]. Long-term health issues, specific to cancer survival, are fast emerging as a public health concern [6]. This chapter will highlight areas of the health behavior profile of childhood cancer survivors that call for intervention and examine promising behavioral lifestyle interventions that may potentially minimize the risks associated with the late effects of cancer treatment. Where possible, we will review current behavioral guidelines and provide specific recommendations for promoting healthy behavioral changes in childhood cancer survivors in the healthcare setting.

21.2 Behaviors that Put Survivors at Risk

21.2.1 Smoking

Cigarette smoking is the single most dangerous behavior associated with preventable causes of cardiac, pulmonary, neoplastic, and other major diseases [7]. Several antineoplastic therapies used to treat pediatric malignancies, including

V.L. Tyc, Ph.D. (✉)
Department of Pediatrics, Pediatric Epidemiology Center, University of South Florida, 3650 Spectrum Blvd, Suite 100, Tampa, FL 33612, USA
e-mail: Vida.Tyc@epi.usf.edu

J.L. Klosky, Ph.D.
Department of Psychology, St. Jude Children's Research Hospital, 262 Danny Thomas Place, Memphis, TN 38105-3678, USA
e-mail: james.klosky@stjude.org

G.A. Mucci and L.R. Torno (eds.), *Handbook of Long Term Care of The Childhood Cancer Survivor*, Specialty Topics in Pediatric Neuropsychology,
DOI 10.1007/978-1-4899-7584-3_21,

radiation therapy and cardiopulmonary toxic chemotherapies, have been associated with organ dysfunction that can be potentiated by cigarette use [4]. Specific to cancer survivors, tobacco use increases the risk of lung cancer among Hodgkin lymphoma survivors treated with chest irradiation by 20-fold [8]. Because of its relevance to a patient's immediate medical condition, smoking status has often been included as one of the "vital signs" [9].

Smoking rates among adult survivors of childhood cancer are slightly lower than that of their healthy counterparts. According to a report from the CCSS, 28 % of cancer survivors reported "ever" smoking and 17 % were current smokers [10]. The prevalence of current smoking was approximately 20 % in a population-based cohort in the United Kingdom, the British CCSS [11]. Similar smoking rates have been reported in smaller survey studies of young adult survivors [12, 13]. These rates are particularly concerning in that survivors are less likely than their peers to successfully quit smoking once having started [14–16]. Smoking is also associated with the practice of other risky health behaviors. For example, an assessment of 796 childhood cancer survivors enrolled on a smoking cessation trial revealed that 31 % of the sample engaged in one or no health risk behaviors in addition to smoking while 63 % engaged in two to three additional health risk behaviors [17]. Approximately 8 % of smokers also reported engaging in risky alcohol use.

Approximately half of childhood cancer survivors who smoke are trying to quit, despite high levels of nicotine dependence which are often reported [18]. Quit attempts were common among survivors in the CCSS cohort with 58 % of current smokers reporting a quit attempt in the previous year [19]. Among survivors who contemplated quitting, not all were confident that they could successfully quit. Characteristics of survivors who made more quit attempts included younger age, increased social support for quitting, perceived vulnerability to smoking-related illnesses, and social networks comprised of non-smokers. Survivors with more smokers in their social networks smoked more heavily. Exposure to household smoking bans and restrictive workplace smoking policies also affect the survivor's smoking behaviors and increase the likelihood of quitting [18]. Based on the reported correlates of smoking among survivors, approaches that increase the survivor's social support for quitting, capitalize on their perceived risk, and engineer their social environment in ways that constrain their smoking behavior appear to be the most promising [18].

21.2.2 Interventions and Recommendations: Smoking

To date, only a limited number of smoking cessation interventions have been empirically evaluated among young adult cancer survivors and these have demonstrated that tobacco use can be reduced in this high risk population. Emmons and colleagues [20] conducted the first randomized smoking cessation trial (Partnership for Health; PFH) with young adult cancer survivors enrolled on the CCSS. In this trial, participants were randomized to either a self-help or peer counseling program that included up to six peer-delivered telephone calls, tailored and targeted written materials related to their smoking behavior and cancer history, and free nicotine replacement therapy (NRT). The peer-delivered intervention focused on building the survivor's self-efficacy and reducing barriers to quitting. A doubling of quit rates at 8-months (16.8 % vs. 8.5 %; $p<0.01$) and 12-months (15 % vs. 9 % $p<0.01$) was observed in the peer counseling condition relative to the self-help condition, and this intervention effect was sustained over time [21]. Although quit rates were higher overall and among NRT users in the peer counseling condition, no significant interactions between NRT use and intervention group were found. These study findings suggest that survivors may benefit from tailored interventions that increase their self-efficacy and behavioral skills to successfully quit smoking. Results also highlight the effectiveness of peer-to-peer counseling as an intervention strategy for smoking cessation that could have

broader application for health promotion interventions conducted with survivors.

Building on the findings from the first trial, a follow-up study was conducted (PFH-2) to examine delivery of intervention components in a more disseminable self-guided format [22]. In the PFH-2 study, participants were randomly assigned to either a web-based intervention or a print materials condition that included provision of self-help materials organized by levels of readiness to quit smoking. Both conditions focused on survivorship issues and included key components of the original PFH-1 peer-delivered intervention, including a letter encouraging smoking cessation from the site oncologist and free pharmacotherapy for participants and their spouses/partners. Smokers who were childhood or young adult cancer survivors were recruited from five cancer centers in the US and Canada.

Equivalent rates of cessation were reported for the two groups (16 %) at a 15-month follow-up; these rates were comparable to the quit rates achieved in the more intensive peer-delivered counseling intervention. Both interventions were viewed as substantive and appealing and were relatively comparable in terms of "dose" based on participant report of use. The use of pharmacotherapy was low in this sample of survivors (requested by 12 % of sample with no differences between the intervention conditions) despite its availability at no cost. Results are promising and suggest that survivorship programs can offer cessation services in either the print or web-format without sacrificing effectiveness. The ability to disseminate effective interventions and provide survivors with options in programming based on their preference is especially important to the survivor community who may not have regular access to treatment facilities or survivorship care.

Results from several studies also highlight the need for routine screening of known risk factors during childhood and adolescence that are associated with later smoking. Klosky et al. [23] demonstrated that intentions for future smoking, reported as early as age 10, was a significant predictor of later tobacco use among adult survivors of childhood cancer. Similarly, childhood attention problems were predictive of smoking in adulthood survivors [24] when assessed nearly a decade later. A nearly threefold increased risk of adult smoking has also been reported among survivors who display antisocial behavior during adolescence [25]. These risk factors may serve as good behavioral markers that inform prevention efforts by health care providers. Cognitive [26], educational [27, 28] and behavioral risk counseling interventions [29] have proven to be beneficial in reducing short-term smoking risk among adolescents with a cancer history. More studies that establish the efficacy of pediatric interventions in preventing smoking onset and progressive smoking during the young adult survivorship years are certainly warranted.

Health care providers can build on the existing literature to address the survivor's smoking by using available systems of care. A strong message from the health care provider to not start smoking, to quit smoking, and to avoid secondhand smoke may motivate behavioral change among cancer survivors. An approach that uses a combination of evidenced-based brief behavioral cessation counseling, pharmacological management of tobacco dependence, and proactive referral to free regional and national tobacco quitlines (e.g. 1-800-QUITNOW) or web-based cessation services may be most effective [30–32]. Free stop smoking quitlines are now available in 50 states and can assist the smoker in forming a quit plan, offer nicotine replacement therapy, and arrange for follow-up contacts. Enrolling smokers in multi-session telephone counseling as an adjunct to face-to face provider-delivered counseling ensures that smokers receive professional, evidence-based ongoing counseling services that may not be otherwise possible. In fact, smokers who use telephone counseling are more likely to achieve long-term cessation compared to those who do not [33]. Treatment components of the current U.S. Public Health Service (PHS) guidelines and the abridged guidelines for physicians are publicly available for review [30–32].

Despite the availability of national guidelines for smoking cessation, rates of tobacco-control service delivery are low within survivorship care settings. A recent survey of 132 institutions with survivorship programs reported that survivors

may not have access to recommended smoking services or resources that could help them successfully quit [34]. Surprisingly, only 3 % of programs screened patients for tobacco use at every visit, 39 % of sites offered smoking prevention, and 25 % offered smoking cessation services. This is in sharp contrast to the PHS guidelines for the treatment of smoking in the healthcare setting that call for routine assessment of smoking status, prevention, and cessation as the standard of care for all patients [30, 31]. Survey respondents clearly acknowledged the significance of the health care provider in the delivery of smoking cessation services as a part of the survivor's ongoing care and rated smoking cessation as more important than cancer screening and other prevention-oriented activities. However, staffing, time constraints, cost of services, and level of interest among survivors emerged as barriers to offering services. In order to improve compliance with PHS guidelines, survivorship programs must first develop an effective organizational infrastructure that allows for identification and tracking of all smokers and promotes consistency of anti-tobacco messaging. Given the evidence that young cancer survivors are more likely to smoke than older survivors [35, 36], delivery of these services early in the survivorship continuum may be necessary.

As in the clinical arena, changes in smoking status are monitored in very few survivorship research trials despite emerging evidence of the effects of smoking on a number of cancer outcomes (e.g. treatment efficacy, toxicities, and morbidity, quality of life, survival time, recurrence) [37]. Lack of adequate support for collection and storage of data is often cited by institutional and cooperative groups as the primary reason for this exclusion. Gritz and colleagues [37] advocate for systematic collection of smoking history and smoking status as core data in all oncology clinical trials. They have identified a list of standardized items used to classify smoking status in both research trials and clinical practice. This important information could add to interpretation of trial outcomes affected by smoking and enhance scientific knowledge in this area.

21.2.3 Illicit Drug Use

Marijuana is the most commonly used illegal drug in the US, and is considered by adolescents and young adults (AYA) to be the drug with the lowest health risk [38]. Yet, several lines of research suggest that marijuana use is a predictor for the development of certain cancers. In a cohort study of 64,855 Northern California Kaiser Permanente subscribers aged 15–49 years, Sidney et al. [39] found that among non-tobacco users, marijuana smokers had a threefold increased risk for developing prostate cancer, and a 1.4-fold increased risk for developing cervical cancer. Using the same cohort, Efird et al. [40] also found a 1.9-fold increased risk of developing adult-onset glioma in individuals who have smoked marijuana, compared to those who never smoked marijuana, after controlling for sex, race, education, smoking status, alcohol consumption, and coffee intake. Although findings are more mixed when considering smaller case control studies, associations have also been identified between marijuana use and head and neck squamous cell carcinoma [41] and lung cancer [42, 43]. The ill effects of marijuana use extend within families as associations between parental marijuana use during the gestational period and childhood cancers including leukemia, astrocytoma, and rhabdomyosarcoma [44–47] have been identified. As one in ten survivors of childhood cancer will experience a subsequent malignant neoplasm in adulthood unrelated to their original diagnosis [48], avoiding marijuana use is important to reducing their risk of future cancers.

Survivors treated with alkylating agents (such as Busulfan, Carmustine, and Lomustine), anthracyclines (such as Danorubicin, Doxorubicin, Epirubicin, and Idarubicin), anti-tumor antibiotics (such as Bleomycin), radiation therapy (including cardiopulmonary organ exposure), hematopoietic cell transplant (with or without chronic graft-versus-host-disease), and specific surgical procedures are already at high risk for cardiac- and pulmonary-related late effects, and marijuana use may further exacerbate these vulnerabilities. For example, in Wolff and O'Donnell's [49]

review of adverse pulmonary effects of illicit drug use, inhaled marijuana use was associated with increased airway inflammation, acute bronchospasm, airflow obstruction, diffusion impairment, emphysema, impaired immunity, and tumor production. Similarly, Tetrault et al. [50] found marijuana use associated with bronchodilation (short-term effect), as well as chronic cough, phlegm production, and wheezing (long-term effects). When compared to tobacco only smokers or non-smoking controls, marijuana users also experienced increased risk for tar exposure, alveolar macrophage tumoricidal dysfunction, oxidative stress, and bronchial mucosal histopathologic abnormalities [51]. Considering these findings, survivors of childhood cancer should avoid marijuana use to protect themselves from further health risks.

Specific to survivors of childhood cancer, historical estimates of marijuana use among AYAs have been reported to be as high as 49 % [52], with more recent studies reporting rates of 10 % for current (within the past 30 days) use and 34–46 % for past/ever use [13, 53]. Findings have been mixed when comparing rates of marijuana use between childhood cancer survivors and their peers. For example, Thompson et al. [53] found that adolescent survivors were less likely to have tried marijuana as compared to race and gender matched classroom peers (34 % vs. 53 %), but no group difference emerged among those with a history of marijuana use in regard to frequency of lifetime, past year, or past month usage. In contrast, significant differences for marijuana use were not found between survivors and siblings [15]. Furthermore, risk factors for ever engaging in marijuana use among adolescent survivors include higher reported number of best friends, being rated as less prosocial by peers, being less sensitive-isolated, and having a history of alcohol, tobacco and illicit drug use [53]. Among cancer specific risk factors, only older age at diagnosis has been positively associated with self-reports of marijuana use.

Although not as prevalent as marijuana use, Bauld et al. [52] reports that 24 % of young adult survivors of childhood cancer have engaged in cocaine and/or methamphetamine use which was captured by the category "other illicit drug use" in their study. More recently, between 0 % and 8 % of adolescent/young adult (AYA) survivors of childhood cancer report current illicit drug use including cocaine, heroin, methamphetamine, illicit steroids, or glue/aerosols sniffing [13]. However, adolescent survivors are just as likely as race- and gender-matched classroom peers to have tried illicit drugs (27 % vs. 24 %) in the past [53]. Of those survivors and peers who reported illicit drug use, the median categorical frequency of lifetime use endorsed by these adolescents was 20–39 times, with median frequency categories of use within the past year and month being 3–9 and 0–2, respectively. Those with a history of using illicit drugs reported having used, on average, three illicit drugs other than marijuana in their lifetime. In addition to tobacco and marijuana use, risk factors for ever having used "other" illicit drugs included increased peer acceptance, higher leadership-popularity scores, and lower sensitive-isolated ratings by classmates [53]. Older age at diagnosis was positively associated with self-reports of illicit drug use, with male survivors being more likely to report high illicit substance exposure as compared to female survivors.

Whereas marijuana use has primarily been associated with pulmonary complications, cocaine and methamphetamine use promotes cardiac problems. Specific complications associated with cocaine use include dilated cardiomyopathy, left ventricular dysfunction, cardiac arrhythmias (including sudden cardiac death), and myocardial ischemia [54–56]. Methamphetamine use increases heart rate and pressure (resulting in irreversible damage to blood vessels in the brain, often producing stroke), and hyperthermia which may result in cardiovascular system failure and death [57–59]. Because survivors of childhood cancer may already have cardiac- and pulmonary-related late effects associated with their cancer treatment, illicit drug use would place this already vulnerable population at high risk for primary and secondary health complications.

21.2.4 Intervention and Recommendations: Illicit Drug Use

The Children's Oncology Group Long-Term Follow-Up Guidelines for Survivors of Childhood, Adolescent, and Young Adult Cancers (version 3.0) provides recommendations for the screening/management of late effects based on treatment exposures received during pediatric cancer therapy [60]. The guidelines are organized by therapeutic agent, potential late effect, host/treatment/behavioral risk factors for developing the specified late effect, highest risk factors, along with recommendations for periodic evaluation based on the specific treatment exposure and potential late effect. Illicit drug use is included as a behavioral risk factor for the development of several late effects based on referenced evidence from the literature. For example, in Section #28 (Chemotherapy/Anthracycline Antibiotics) and #71 (Radiation Therapy/Potential Impact to Heart), drug use (including cocaine, diet pills and ephedra) is included as a risk factor for cardiac toxicity, whereas section #36 (Chemotherapy/Plant Alkaloids – vinblastine and vincristine) includes illicit drug use as a risk factor for vasospastic attacks. Clinicians and survivors can refer to these guidelines in managing survivorship care, while accessing the Patient Education Materials or "Health Links" [61] to assist in healthy living after treatment for childhood cancer. More traditional approaches to intervening with those engaging in illicit drug use, drug abuse, or drug dependence may also be necessary in this population. When these cases arise, it is important that the treating clinicians/facility be informed/provided details about the patient's treatment exposures, current late effects, and history as a pediatric cancer patient. This way, safe and appropriate clinical management of the patient's drug problem can be provided.

21.2.5 Alcohol Use

Alcohol has been classified as a Group 1 carcinogen by the World Health Organization [62], and alcohol consumption has been linked to a variety of malignancies including oropharyngeal, esophageal, liver and stomach cancers [63–66], breast and ovarian cancer in women [67, 68], and colorectal cancer in men [69–71]. Risk of alcohol-associated cancer appears to be positively associated with frequency and volume of alcohol consumption, with heavy drinkers being at highest risk for health problems [72]. Although the mechanisms of alcohol-related carcinogenesis are unclear, theories have ranged from alcohol's role in increasing adipose tissue, alcohol's effect on hormonal functioning, cellular vulnerability secondary to alcohol metabolism, and complications in DNA damage/repair [73, 74].

Alcohol may also contribute to the risk of second cancers among survivors [75], and when combined with tobacco use, places drinkers at even higher risk for cancer [76].

Excessive alcohol consumption is already linked with several serious medical conditions including hypertension, stroke, liver cirrhosis and coronary heart disease. Therefore, survivors with chronic hepatitis C, hepatic steatosis secondary to total body or cranial irradiation, anthracycline-related cardiomyopathy, and liver dysfunction after abdominal irradiation are at increased risk for alcohol-related problems [77–79]. As survivors of childhood cancer are often prescribed medications for the treatment/management of various late effects secondary to cancer treatment, alcohol use may be contraindicated in these survivors due to potentially serious alcohol/medication interactions [80].

Previous research describing alcohol consumption among survivors of childhood cancer has been mixed, and definitions of alcohol outcomes (i.e. current drinking, binge drinking, risky drinking, excessive drinking) have varied. Compared to controls (which have ranged from community peers, siblings, or population norms), survivors have been described as engaging in less frequent alcohol use [52, 81–83], equivalent use [84, 85], or increased use [86]. Among adolescent survivors of childhood cancer, Klosky et al. [87] found in age and sex adjusted models that survivors were less likely to engage in current use of beer/wine or binge drinking when compared to siblings,

but were just as likely to consume mixed drinks/hard liquor. When considering young adult survivors participating in the CCSS, Lown and colleagues [88] found that survivors were less likely to report risky or heavy drinking as compared to siblings, but were more likely to be current drinkers as compared to population peers. These findings highlight differences that can result when different control groups are employed in this research literature.

A variety of demographic, psychosocial, and medical/treatment variables have also been identified as being risk or protective risk factors for alcohol use. In regard to demographic factors, being male [86, 88], lower educational attainment [82, 86, 88] and younger age [88] has been associated with increased/risky alcohol consumption, whereas having an African American background [89] and older age at cancer diagnosis [88] has been found to be protective among survivors of childhood cancer. Psychosocial variables such as depression, anxiety (both generalized and specific to cancer), somatization, increased life stressors, life dissatisfaction, activity limitations, and perceptions of poor health have all been linked to increased/risky alcohol consumption among survivors [82, 88]. In terms of cancer specific variables, a diagnosis of brain tumor or leukemia, or cognitively compromising treatment have all been found to be protective of alcohol use [81, 88].

21.2.6 Interventions and Recommendations: Alcohol Use

The American Cancer Society (ACS) recommends that alcohol should be limited to no more than 2 drinks per day for men and 1 drink per day for women [90]. Women have a smaller daily allowance for alcohol consumption because of relatively smaller body sizes, and slower metabolism of alcohol. This recommendation is complicated in that low to moderate alcohol use has been associated with decreased risk of heart disease. However, there are more effective ways of lowering heart disease risk including avoiding tobacco use, maintaining an active/healthy lifestyle (including physical activity, healthy weight, and diet low in saturated and trans fats), along with controlling blood pressure and cholesterol [90]. As such, survivors who do not drink alcohol should not start, and those who do drink should limit their alcohol consumption. For those survivors whose drinking has escalated to include alcohol abuse or dependence, more traditional intervention approaches to address this problem may be necessary. For more information regarding alcohol intervention options among medically vulnerable populations, refer to the National Institute on Alcohol Abuse and Alcoholism webpage at www.niaaa.nih.gov.

21.2.7 Physical Activity

Physical inactivity has been demonstrated to increase risk of metabolic syndrome, type 2 diabetes, cardiovascular disease, hypertension, and osteoporosis in the general population [91–94]. Childhood cancer survivors, particularly those who have been treated for ALL, are at particular risk for these health problems if they adopt an inactive lifestyle. Given their elevated risk of anthracycline-induced cardiac toxicity, childhood ALL survivors must be diligent about meeting recommended levels of physical activity [4, 95–97]. Decreased levels of physical activity, combined with the effects of some pediatric cancer treatments, can also result in many survivors becoming overweight or obese [98, 99].

Although there is considerable variability in the levels of physical activity reported by childhood cancer survivors across studies, they generally appear to be more sedentary than their siblings or peers without cancer [100–102]. Finnegan and colleagues [100] found that young adult cancer survivors were 1.2 times less likely than sibling controls to meet the previous Centers for Disease Control (CDC) recommendations for physical activity defined as 30 min of moderate intensity activity per day on at least 5 days each week or 20 min of vigorous intensity physical activity on 3 days or more per week.

Based on data from the CCSS cohort, 53 % of childhood ALL survivors reported not meeting these same guidelines, and 23 % reported being physically inactive [101]. In a smaller study, 63 % of survivors of different types of cancer were not meeting CDC guidelines for physical activity [12]. The current CDC recommendations for physical activity differ from those that were previously in place at the time most of the research was conducted on this topic. The CDC now recommends that, each week, adults perform 150 min of moderate-intensity aerobic activity or 75 min of vigorous-intensity activity and at least 2 days of muscle strengthening activities [103].

Survivors who engage in low levels of physical activity are likely to be female, older, a racial or ethnic minority, less educated or unable to work, depressed, underweight or obese [101, 102]. Those who received cranial radiation therapy (CRT) or amputation are also more likely to be physically inactive [101, 102]. The long-term effects of CRT have been associated with obesity, growth hormone insufficiency, and problems with balance and posture and these have been linked to physical inactivity [101]. Medulloblastoma and osteosarcoma survivors are at highest risk for physical inactivity. Survivors who smoke are also less likely than nonsmokers to meet CDC guidelines for physical activity [102]. In terms of social-cognitive variables, survivors who report more cons to physical activity are less likely to be active while those with higher levels of self-efficacy for physical activity are more likely to have adopted a physically active lifestyle [100]. Survivors with neurocognitive problems are also less likely to meet the current CDC guidelines for weekly physical activity [104]. Given the inverse relationship between physical activity and neurocognitive impairment [104], it may be that interventions that increase exercise can improve cognitive skills among survivors with deficits, similar to what has been demonstrated with aging adults. Many factors associated with physical activity levels may be modifiable with appropriate interventions that address them as barriers to participation in regular physical activity.

21.2.8 Interventions and Recommendations: Physical Activity

There have been a limited number of interventions to promote physical activity among childhood cancer survivors and most have yielded only moderate success [105–109]. Outcomes have varied across studies and have included cardiovascular endpoints, total exercise time, perceived exercise tolerance, muscle strength, functional mobility, and fatigue. Most studies have relied on self-report measures of physical activity and interventions have been relatively short-term (10–16 weeks).

Features of successful approaches aimed at increasing physical activity levels of survivors have included integration of exercise into their ongoing daily activities in the home setting as opposed to more formalized, structured exercise programs. Home-based exercise programs offer a more appealing and practical option than formalized, structured exercise programs for adult survivors who often report limited time availability as a barrier to engaging in regular physical activity [110]. Using an original home-based exercise intervention for severely fatigued survivors of childhood cancer, Blaauwbrook and colleagues [105] provided participants with pedometers and encouraged goal setting and completion of daily activity logs. Participants also received regular telephone counseling related to physical activity goals that incorporated problem-solving, instruction on lifestyle changes, and self-regulation strategies. Within 10 weeks, significant increases in physical activity and reduced fatigue were reported pre-post intervention and at follow-up. Similarly, improvements in functional capacity, as well as exercise time and tolerance, were reported among survivors exposed to a combined regimen of structured exercise and home-based physical activity [108]. Less robust effects have been reported for survivors who participate in structured exercise programs alone [106].

Given the variability in cancer treatments and types of exercise individuals can do (e.g. aerobics,

strength training, flexibility), it may not be feasible to expect that general training programs or evidence-based exercise guidelines will be developed and universally applicable to all survivors across ages and diagnostic groups. Little information is available about the clinical characteristics of survivors that can predict who will likely benefit from certain exercise training programs with improvements in exercise capacity [111]. There is also insufficient evidence to determine the dose–response relationship between exercise and the management of/or prevention of later health problems [112]. Additionally, challenges remain including how to assist survivors with maintaining high levels of motivation, preventing boredom, overcoming fatigue and achieving long-term participation in physical activity [113]. Therefore, it is likely that interventions will need to be individualized to survivors based on age, gender, functional status, time availability, exercise experience, and personal limitations [113].

Encouraging survivors to engage in regular exercise that promotes achievement and maintenance of adequate fitness levels should become part of routine survivorship care [114]. If it is determined that the survivor is physically deconditioned through exercise testing, it is important to examine whether the deconditioning is due to inactivity, nutritional status, medications, or disease or treatment-related pathophysiology [111]. Recommendations regarding the type, frequency, intensity, and duration of physical activity that will optimize the survivor's long-term health should be considered when designing an individual survivor's exercise prescriptions. Lower aerobic capacity and reduced muscle strength have been reported among children, adolescents, and young adults who have survived cancer compared to their peers who have never had the disease [115–117]. Therefore, it is possible that survivors may report higher fatigue levels, slower recovery times, and slower adaptation times [111]. Adverse effects of treatment (e.g. cardiac compromise secondary to anthracycline exposure) may also require caution in considering exercise type and intensity [116]. Longer exercise programs, however, may be beneficial for survivors with weight management goals. Provision of information about the potential benefits of regular exercise, activity-related side effects, and strategies to overcome perceived barriers to exercise may be necessary to promote more frequent exercise among this vulnerable cohort [118].

21.2.9 Nutrition

Healthy nutritional practices can help prevent or ameliorate obesity, cardiovascular disease, osteoporosis, and secondary cancers [64, 119–121], complications often associated with treatment for childhood cancer [4]. Yet, the nutritional habits of many childhood cancer survivors are not consistent with dietary recommendations that may help reduce their risk of these health problems and other chronic diseases. Overall, survivors report dietary behaviors that are similar to those in the general population [122–127]. Many survivors consume high fat diets, do not maintain adequate fruit and vegetable intake, and do not meet recommended dietary intakes for vitamins D, Calcium and other important nutrients [122, 125, 127]. One study reported that although half of their sample of adult survivors of childhood ALL met the minimum daily goals of fruit and vegetable consumption and dietary fat restrictions, participants reported dietary sodium and added sugar intake that exceeded recommended levels as well as low consumption of dietary fiber [125]. Adherence to dietary guidelines was not associated with either body mass index (BMI) or waist circumference in this study. Another study of long-term survivors of childhood ALL [127] found that reported carbohydrate and fat intake exceeded recommendations in 38 % and 47 % of the participants, respectively, at the expense of foods high in nutrients important to bone health.

To date, the dietary research with childhood cancer survivors has been characterized by a number of methodological limitations. Studies have been cross-sectional in design, are based on small samples, and few include adequate control groups or standardized measures of dietary intake [3, 122, 125]. The literature has demonstrated, that like healthy populations, survivors who eat a

healthy diet are likely to be younger, female, more educated and from higher SES backgrounds, and non-minority status [83, 118, 122]. Dietary patterns of minority survivors have also been largely ignored [126].

21.2.10 Interventions and Recommendations: Nutrition

Intervention research in the nutritional arena has been limited in quality and quantity such that little specificity is provided regarding the unique dietary needs of various cohorts and minority survivors [128]. These limitations should not diminish the importance of educating survivors about a healthy diet, which is an integral part of comprehensive care for the childhood cancer survivor. Current dietary guidelines for cancer survivors closely mirror the recommendations for primary cancer prevention [64, 129]. Several private organizations and federal agencies [64, 129, 130] provide nutritional guidelines that can promote health and reduce risk of chronic disease.

Like their healthy peers, cancer survivors may benefit from health messages and behavioral interventions that promote increased nutrient density of their diets while encouraging a healthy body weight. Additionally, development of evidence-based and risk-based guidelines that recommend healthy food choices associated with reduction of serious treatment-related late effects are clearly warranted. Low consumption of fruits and vegetables, low dietary fiber intake (e.g. few whole grains), and increased sodium and sugar provide targets for intervention. Likewise, dietary interventions should focus on minimizing intake of foods high in saturated fat and refined carbohydrates while ensuring adequate intake of vitamins D, potassium, magnesium, calcium, and folate [127]. Cohen and colleagues [131] reported that a large proportion of childhood cancer survivors, less than 13 years of age and less than 5 years from completion of treatment, were consuming more than their recommended energy requirements, placing this group at risk for obesity and associated endocrine and metabolic disorders over time. Additionally, adolescent studies provide evidence that ALL survivors who are at increased risk for being overweight are those who are overweight (BMI for age $\geq$ 85th percentile) at the end of therapy [132]. These findings suggest that preventative interventions, which promote good nutrition and minimize weight gain among young survivors, be initiated early in treatment to soon after treatment, to prevent potential late effects.

21.2.11 Sun Protection

Non-melanoma skin cancer [NMSC] (including primary basal cell carcinoma and squamous cell carcinoma) is rapidly increasing in the U.S. and represents the most common form of cancer diagnosed today [133–135]. If not detected early, lesions associated with NMSC are often locally invasive and responsible for considerable morbidity and significant health care costs [136]. In the general population, an increased likelihood of developing skin cancer is related to genetic predisposition and exposure to environmental risk factors. Ultraviolet (UV) radiation, from sun exposure, and non-solar forms of ionizing radiation are well known risk factors [137].

According to the CCSS report, skin cancer is the most frequent occurring subsequent cancer in the survivor cohort with NMSC accounting for 41 % of all confirmed subsequent cancers and melanoma for 3 %; 46 % of patients have had multiple occurrences. Although NMSC is a diagnosis primarily of older adults, it was found to occur at a much younger age in the CCSS cohort than expected in the general population, with nearly half of cases occurring in patients less than 30 years of age [136]. Ninety percent of tumors occurred on areas of the skin previously exposed to radiation therapy [136] and radiation therapy was associated with a 6.3-fold increase in risk. Long-term childhood cancer survivors with a history of radiation therapy are at highest risk for developing NMSC and may further increase their risk through sun exposure.

The impact of sun exposure can be dramatically reduced by practicing protective behaviors such as wearing protective clothing, using sunscreen, and

avoiding sunbathing and artificial tanning. An examination of sun protective behaviors among cancer survivors in the CCSS cohort, compared to their siblings, found similar self-reported patterns of sunscreen use and lower rates of sunbathing and artificial tanning behaviors in the previous year among survivors [138]. Most notably, 61 % of CCSS survivors and 60 % of survivors with a history of prior radiation therapy, engaged in sunbathing at least once in the previous year, thereby increasing their exposure to UV radiation. Compared with survivors who did not receive prior radiation therapy, those with radiation therapy exposure showed increased use of sunscreen and less sunbathing and artificial tanning practices. Given that risk-based recommendations are more likely to be provided to survivors at highest risk (those previously exposed to radiation therapy) [139], the better sun protective behaviors practiced by high risk survivors may reflect compliance with these recommendations and suggest an association between perceived risk and lowered engagement in risky behaviors. Increased use of sun protective behaviors among survivors was associated with lighter skin complexion, being female, having had a previous examination for skin cancer, and a history of sunburn. These same characteristics are associated with increased use of sun safety behaviors among the general population [140]. Because of the survivors' increased risk of skin cancer from therapy-related exposures, intervention aimed at reducing their UV exposure and promoting adherence to risk reduction practices is clearly warranted [138].

21.2.12 Intervention and Recommendations: Sun Protection

Promoting sun protection practices, regular skin cancer screening, and careful skin cancer examinations, are reasonable risk reduction strategies for survivors. However, there have been no randomized trials testing these outcomes in childhood cancer survivors. Approaches that have been effective in promoting screening and sun protection behaviors in the general population provide evidence for utilization of similar strategies (e.g. free skin cancer screening, provision of sunscreen, and promotion of routine skin self-examination) in high risk populations. A few randomized trials have targeted adults at high risk for skin cancer [141–143], and concluded that low-cost, tailored risk communication about skin cancer prevention practices can improve sun protection and skin self-examination behaviors. Interventions have typically consisted of some combination of tailored print materials, personalized telephone counseling, links to free skin screening programs, provision of skin self-examination instructions and practice tools, as well as discussion of barriers to better sun protection and strategies to motivate oneself to engage in greater protection. Although the effects from these studies have been modest and behaviors have been difficult to sustain, these interventions merit consideration for use in high risk survivor populations.

For example, Manne and colleagues [143] compared a tailored intervention, consisting of three print mailings and one telephone session, to a generic intervention including these same components, delivered to first degree relatives of melanoma patients who were non-adherent to practices associated with skin cancer risk reduction. Although both interventions resulted in increases in total cutaneous skin examinations (TCE) by a health care provider, skin self-examinations (SSE), and sun protection habits assessed at a 6 and 12 month follow-up, the tailored intervention yielded stronger effects. An almost two-fold increased probability of having a TCE was noted in the tailored intervention group with effects of lesser magnitude reported for SSE and sun protection behaviors.

Using a similar tailored messaging approach, Geller et al. [141] conducted a randomized trial to improve early detection and prevention practices among siblings of recently diagnosed melanoma patients. In this study, investigators evaluated an intervention that included telephone counseling and individualized educational materials tailored to the participant's level of engagement in three target behaviors (e.g. skin self examination, physician screening, and sun protection),

self-efficacy, and beliefs based on responses to a baseline survey. For the usual care condition, melanoma patients were advised by their physician to notify their family members of their diagnosis and encourage screening for family members. Compared to the usual care condition, higher rates of skin self-examination were reported among siblings in the intervention group at 12 months. Improvements in the quality of skin self-examination were also noted. Rates of physician examination and use of sunscreen increased in both groups but there were no group differences in these behavioral practices at 12 months relative to baseline. The higher standard of care used in this study may have lessened the observed intervention effect and contributed to the lack of group differences from baseline to follow-up for these two primary outcomes. Other studies have demonstrated that the use of pictures and photographs, paired with written educational information or a nurse-delivered intervention, may increased patients' adherence to performing skin self-examination [144] and affect one's perceived benefits of engaging in sun protection behaviors [145].

In the absence of proven therapeutic interventions for childhood cancer survivors, health care providers can, at minimum: (a) provide personalized risk information to their patients, (b) encourage regular surveillance for the development of NMSC, and (c) verbally promote increased utilization of sun protection precautions and avoidance of exposures that increase their risk of NMSC. Early detection is also an important tool in skin cancer control, particularly for fair-skinned and sun-sensitive survivors at increased risk due to previous radiation therapy. Delivery of prevention messaging through provision of brochures, tailored materials, instructional sheets, and referral to websites containing "how to" instructions with pictures for performing quality skin self-examinations, is an inexpensive and practical intervention. Information that is tailored to the survivor's treatment history, beliefs, and current behaviors is likely to be viewed as personally relevant and more motivating [146]. Identification of sun protection intentions, perceived benefits, and self-efficacy as mechanisms for change in the practice of skin cancer reduction behaviors [143] has important clinical implications for survivors. It may be important to increase the survivor's confidence that he/she can incorporate protective behaviors, such as sunscreen use, into their daily routines. Intentions could also be targeted by requiring the survivor to commit to times and places to conduct self-examination or undergo an examination by a health care provider [143]. Further testing of convenient, low-cost tailored communications, that address the benefits and barriers of behavioral practices, will be important in achieving optimal skin cancer risk reduction in the childhood cancer survivor population.

21.2.13 Risky Sexual Behavior

Risky sexual behavior has recently been highlighted as a prioritized area of study among survivors of childhood cancer due to its discovered association with sexually transmitted infection (STI) and cancer. Genital human papillomavirus (HPV) is the most common STI [147, 148] and will affect the majority of sexually active people in the US [149]. Among females, for example, up to 80 % will experience lifetime HPV-acquisition [150–152] with prevalence reported at 40 % among 14- to 19-year-olds and 49 % among 20- to 24-year-olds [153] among sexually active AYAs. Oncogenic HPV strains have been linked to cervical, vaginal, vulvar, penile, anal, and oral cancers. Cervical cancer is the second most common cancer among women worldwide and the leading cause of cancer-related deaths in developing countries [133]. Regular screening using the Papanicolaou (Pap) test has been the most successful method for identifying cervical intraepithelial neoplasia, a precursor to cervical cancer. Because engagement in cervical cancer screening is variable, and cervical cancer is typically asymptomatic until it has progressed beyond the point of effective treatment, primary prevention of cervical and other HPV-related malignancies is the logical next step. Both males and females experience complications related to HPV infection, but the primary health threat is

for women. As such, the bulk of this review will focus on risky sexual behavior and HPV-related complications among females surviving childhood cancer.

Women surviving childhood cancer are at increased risk for HPV-related complication due to a variety of medical, cognitive, behavioral, and demographic factors. Children and adolescents with a history of hematopoietic stem cell transplantation (HSCT), for example, experience extreme immunosuppression as a result of pretransplant conditioning. Although most patients achieve immune reconstitution by 2 years post-transplant, many do not. Slowed or complicated immune recovery in these survivors increases the likelihood of infection from bacteria, fungi and viruses, such as HPV [154]. Similarly, generalized immune suppression is a classic disease feature of Hodgkin lymphoma and this immune deficiency is worsened by cancer treatment, often persisting long after treatment [155–158]. Women with a history of pelvic irradiation are also more likely to experience HPV-related cervical and vaginal dysplasia and carcinomas of the genital tract with the etiology being attributed to recurrence of original malignancy, mutation of cervicovaginal mucosa cells due to radiation exposure, natural HPV dysplastic processes, or a combination of these mechanisms driven by treatment-induced immunosuppression [159, 160].

Sexual behavior is a necessary cause of genital HPV infection, but it has been suggested that survivors of childhood cancer are at decreased risk for STIs secondary to decreased engagement in risky sexual behavior. Recent data suggests that this may not be the case. When risky sexual behavior was examined among a large cohort of adolescent survivors of childhood cancer and their siblings, no differences were identified across groups in regard to history of sexual intercourse, age at first intercourse, lifetime number of sexual partners, or method used to prevent pregnancy or STD at last intercourse [87]. However, Sundberg and colleagues [161] examined differences in sexual behavior across adult survivors and community control groups and found that female survivors reported experiencing fewer sexual partners in the last 12 months, and fewer partnered relationships. Male survivors reported fewer lifetime sexual partners (8.6 vs. 12.6) as compared to controls. Across diagnoses, males with a history of CNS tumor had fewer sexual partners within the last 12 months and in lifetime compared to other diagnostic groups but no differences were found across women.

It is also important to note that survivors who perceive themselves to be infertile may be at particularly high risk for engaging in riskier sexual behaviors, which in turn, increases HPV exposure risk [162]. Survivors are more likely than non-cancer population controls, for example, to report having experienced a high risk HIV transmission situation [84]. Cognitive deficits, including inattention and hyperactivity, are commonly reported late effects of cancer treatment [163, 164] and may also contribute to engagement in risky sexual behavior. Evidence linking inattention and/or hyperactivity to increased risky sexual behavior (e.g., earlier initiation of sexual activity, increased number of partners, increased casual sexual encounters) has been established among those with a history of ADHD [165]. As survivors of childhood cancer are at risk for experiencing executive dysfunctions of this nature, they are consequently at increased risk for unplanned/impulsive engagement in risky sexual behavior (with or without being influenced by alcohol and/or illicit drugs) and contracting STIs, such as HPV.

In population-based studies, the expression of cervical cancer has been associated with lower education, lower household income, and Hispanic ethnicity [166]. Socioeconomic differences in male and female sexual behavior, along with access to cervical cancer screening, have been suggested to potentially explain these findings [167]. Among childhood cancer survivors, women who are college educated, medically insured, and older are more likely to have undergone Pap testing within the previous 3 years as compared to survivors who are less educated, without insurance, and younger [168]. As survivors of childhood cancer are more likely to report unemployment, lower educational attainment, and lower annual incomes as compared to their siblings [169], they are at increased risk for cervical

cancer and suboptimal cervical cancer screening as a socioeconomic consequence of their childhood cancer treatment.

21.2.14 Interventions and Recommendations: Risky Sexual Behavior

Despite their increased risk for cervical dysplasia and cancers, female survivors of childhood cancer are not engaging in cervical cancer screening at rates recommended by the American Cancer Society. After adjusting for age, ethnicity, education, income and health insurance, women surviving childhood cancer are less likely than their healthy siblings to have undergone a Pap smear within the previous 3 years [168], with Hispanic survivors being the least likely to have undergone this screening [89]. Survivors of childhood cancer without insurance and those over the age of 30 years are already less likely to report secured medical care, and this risk increases as the survivor ages and time since diagnosis increases [170]. Although interventions are needed to increase cervical cancer screening among survivors, increased attention has been placed on primary prevention.

Recent efforts to reduce cervical cancer have led to the development of vaccines to protect against HPV, which are currently available and have been demonstrated to be safe and clinically effective [171–173]. In June of 2006, the U.S. Food and Drug Administration [174] approved Gardasil (Merck & Co., Inc.), a quadrivalent vaccine developed to protect females aged 9–26 years from HPV types 6, 11, 16, and 18, which together account for 70 % of cervical cancers and 90 % of genital warts [175]. Then, in October of 2009, Gardasil was approved for use in U.S. males 9–26 years of age to protect against genital warts, and in 2010 this indication expanded to include protection against HPV-related anal cancers [176, 177]. Also in 2009, Cervarix (GlaxoSmithKline), a bivalent vaccine that protects against HPV types 16 and 18, was approved for use among U.S. females [176]. In clinical trials, these vaccines, when administered as directed, were efficacious in providing safe and effective protection for males and females against the specified HPV types [173–180]. Based on these favorable findings, routine HPV vaccination is currently recommended by the Advisory Committee on Immunization Practices (ACIP) for adolescent girls aged 11- and 12-years [173], and girls should initiate the vaccine series prior to the onset of sexual activity due to the mechanism of HPV transmission [174]. Based on this and other evidence, the *Children's Oncology Group's Long-Term Follow-Up Guidelines for Survivors of Childhood, Adolescent and Young Adult Cancer Version 3.0* has recommended HPV vaccination for all eligible females surviving childhood cancer [60]. The endorsement of the HPV vaccine by these guidelines is an important first step in addressing the need for HPV vaccination in childhood cancer survivors, but interventions are needed to translate these recommendations into a successful HPV vaccination strategy.

21.3 Conclusions

Although engagement in healthy lifestyles could prevent or reduce the impact of some chronic health problems associated with childhood cancer treatment, findings across studies demonstrate that childhood cancer survivors are no more likely than their siblings or the general population to engage in health protective behaviors. The fairly high rates of tobacco use, physical inactivity, inadequate nutrition, and heavy alcohol use are disappointing, particularly if survivors have been informed of their treatment exposures and related risks during routine medical care visits and risk-based long-term follow-ups. Results from health behavior studies also suggest that individual-level factors such as knowledge and perceived risk are not sufficient to motivate change among survivors. Although not adequately studied, interpersonal, community, and environmental influences may be more important predictors of behavioral change among survivors.

While the current literature provides a good description of health behaviors among childhood

cancer survivors, relatively few specific recommendations for effective behavioral risk-reduction approaches have emerged. Overall, studies that have evaluated the impact and durability of targeted behavioral interventions have not been impressive. Unfortunately, the methodological weaknesses of these studies limit their impact such that there remains an unmet need for more rigorous behavioral interventions, with proven efficacy, in various high risk survivor populations. Limitations have included single site convenience samples, lack of appropriate comparison groups, lack of theoretical frameworks to guide methodology, and use of non-standardized measures [126]. Most studies have limited information on racially diverse populations, as most have included an over-representation of white non-Hispanic participants. Additionally, the majority of interventions have largely focused on a single health behavior. As risky behaviors typically co-occur, it remains to be seen if interventions that target multiple behaviors are more effective.

As the health behavior profiles of childhood cancer survivors resemble, but are not identical to those of their healthy counterparts, it is not clear whether survivors would benefit from the same interventions developed for their peers without a cancer history [181]. Additional research on whether the factors that facilitate or impede behavior change are similar between survivors and their healthy peers, and how much of a role their cancer status plays in health behavioral outcomes, may shed light on this question. Based on some of the successful research conducted to date, is likely that promotion of healthy lifestyles in the survivor population will require development of uniquely targeted interventions [181]. Whether these interventions are effective in promoting biomarker-validated behavioral changes that ultimately impact health status and other disease-related endpoints has yet to be determined. Despite these remaining questions, opportunities exist for health care providers to make use of existing findings cited in this chapter to inform their practices and promote lifestyle changes that may improve the health and quality of life for survivors. For additional information, clinical practice guidelines for screening and management of potential late effects resulting from treatment for pediatric cancer are available through the Children's Oncology Group Long-Term Follow-Up Guidelines [182].

References

1. Bhatia, S., & Sklar, C. (2002). Second cancers in survivors of childhood cancer. *Nature Reviews Cancer, 2*, 124–132.
2. Marina, N. (1997). Long-term survivors of childhood cancer. The medical consequences of cure. *Pediatric Clinics of North America, 44*, 1021–1042.
3. Oeffinger, K. C., Buchanan, G. R., Eshelman, D. A., Denke, M. A., Andrews, T. C., Germack, J. A., et al. (2001). Cardiovascular risk factors in young adult survivors of childhood acute lymphoblastic leukemia. *Journal of Pediatric Hematology/Oncology, 23*, 424–430.
4. Oeffinger, K. C., Mertens, A. C., Sklar, C. A., Kawashima, T., Hudson, M. M., Meadows, A. T., et al. (2006). Chronic health conditions in adult survivors of childhood cancer. *The New England Journal of Medicine, 355*, 1572–1582.
5. Friedman, D. L., Whitton, J., Leisenring, W., Mertens, A. C., Hammond, S., Stovall, M., et al. (2010). Subsequent neoplasms in 5-year survivors of childhood cancer: The Childhood Cancer Study. *Journal of the National Cancer Institute, 102*, 1083–1095.
6. Demark-Wahnefried, W., Aziz, N. M., Rowland, J. H., & Pinto, B. M. (2005). Riding the crest of the teachable moment: Promoting long-term health after diagnosis of cancer. *Journal of Clinical Oncology, 23*, 5814–5830.
7. Centers for Disease Control and Prevention. (2004). *The health consequences of smoking: A report of the Surgeon General*. Atlanta: US Department of Health and Human Services, Centers for Disease Control and Prevention.
8. Travis, L. B., Gospodarowicz, M., Curtis, R. E., Anderson, M., Glimelius, B., Joensuu, T., et al. (2002). Lung cancer following chemotherapy and radiotherapy for Hodgkin's disease. *Journal of the National Cancer Institute, 94*, 182–192.
9. Fiore, M. C., Jorenby, D. F., Schensky, A. E., Smith, S. S., Bauer, R. R., & Baker, T. B. (1995). Smoking status as the new vital sign: Effect on assessment and intervention in patients who smoke. *Mayo Clinic Proceedings, 70*, 209–213.
10. Emmons, K. M., Li, F. P., Whitton, J., Mertens, A. C., Hutchinson, R., Diller, L., et al. (2002). Predictors of smoking initiation and cessation among childhood cancer survivors: A report from the Childhood Cancer Survivor Study. *Journal of Clinical Oncology, 20*, 1608–1616.
11. Frobisher, C., Winter, D. L., Lancashire, E. R., Reuten, R. C., Taylor, A. J., & Eiser, C. (2008).

Extent of smoking and age at initiation of smoking among adult survivors childhood cancer in Britain. *Journal of the National Cancer Institute, 100*, 1068–1081.
12. Rabin, C., & Politi, M. (2010). Need for health behavior interventions for young adult cancer survivors. *American Journal of Health Behavior, 34*, 70–76.
13. Schultz, K. A. P., Chen, L., Chen, Z., Zeltzer, L. K., Nicholson, H. S., & Neglia, J. P. (2010). Health and risk behaviors in survivors of childhood acute myeloid leukemia: A report from the Children's Oncology Group. *Pediatric Blood & Cancer, 55*, 157–164.
14. Haupt, R., Byrne, J., Connelly, R. R., Mostow, E. N., Austin, D. F., Holmes, G. R., et al. (1992). Smoking habits in survivors of childhood and adolescent cancer. *Medical and Pediatric Oncology, 20*, 301–306.
15. Larcombe, I., Mott, M., & Hunt, L. (2002). Lifestyle behaviors of young adult survivors of childhood cancer. *British Journal of Cancer, 87*, 1204–1209.
16. Tao, M. L., Guo, M. D., & Weiss, R. (1998). Smoking in adult survivors of childhood acute lymphoblastic leukemia. *Journal of the National Cancer Institute, 90*, 219–225.
17. Butterfield, R. M., Park, E. R., Puleo, E., Mertens, A., Gritz, E. R., & Emmons, K. (2004). Multiple risk behaviors among smokers in the childhood cancer survivors study cohort. *Psychooncology, 13*, 619–629.
18. deMoor, J. S., Puleo, E., & Ford, J. S. (2011). Disseminating a smoking cessation intervention to childhood and young adult cancer survivors: Baseline characteristics and study design of the partnership for health-2 study. *BMC Cancer, 11*, 165.
19. Emmons, K. M., Butterfield, R. M., Puleo, E., Park, E. R., Mertens, A., Gritz, E. R., et al. (2003). Smoking among participants in the childhood cancer survivor cohort: The partnership for health study. *Journal of Clinical Oncology, 21*, 189–196.
20. Emmons, K. M., Puleo, E., Park, E., Gritz, E. R., Butterfield, R. M., Weeks, J. C., et al. (2005). Peer-delivered smoking counseling for childhood cancer survivors increases rates of cessation: The partnership for health study. *Journal of Consulting and Clinical Psychology, 23*, 6516–6523.
21. Emmons, K. M., Puleo, E., & Mertens, A. (2009). Long-term smoking cessation outcomes among childhood cancer survivors in the Partnership for Health study. *Journal of Clinical Oncology, 27*, 52–60.
22. Emmons, K. M., Puleo, E., Sprunck-Harrild, K., Ford, J., Ostroff, J. S., Hodgson, D., et al. (2013). Partnership for health-2, a web-based versus print smoking cessation intervention for childhood and young adult cancer survivors; randomized comparative effectiveness study. *Journal of Medical Internet Research, 15*, e218.
23. Klosky, J. K., Tyc, V. L., Hum, A., Lensing, S., Buscemi, J., Garces-Webb, D. M., et al. (2010). Establishing the predictive validity of intentions to smoke among preadolescents and adolescents surviving cancer. *Journal of Clinical Oncology, 28*, 431–436.
24. Kahalley, L. S., Robinson, L. A., & Tyc, V. L. (2010). Attentional and executive dysfunction as predictors of smoking within the Childhood Cancer Survivor Study cohort. *Nicotine & Tobacco Research, 12*, 344–354.
25. Krull, K. R., Huang, S., & Gurney, J. G. (2010). Adolescent behavior and adult health status in childhood cancer survivors. *Journal of Cancer Survivorship, 4*, 210–217.
26. Butler, R. W., Copeland, D. R., Fairclough, D. L., Mulhern, R. K., Katz, E. R., Kazak, A. E., et al. (2008). A multicenter, randomized clinical trial of a cognitive remediation program for childhood survivors of a pediatric malignancy. *Journal of Consulting and Clinical Psychology, 76*, 367–378.
27. Cox, C. L., McLaughlin, R. A., Rai, S. N., Steen, B. D., & Hudson, M. M. (2005). Adolescent survivors: A secondary analyses of a clinical trial targeting behavioral change. *Pediatric Blood & Cancer, 45*, 144–154.
28. Hollen, P. J., Hobbie, W. L., & Finley, S. M. (1999). Testing the effects of a decision-making and risk-reduction program for cancer-surviving adolescents. *Oncology Nursing Forum, 26*, 1475–1486.
29. Tyc, V. L., Rai, S. N., Lensing, S., Klosky, J. L., Stewart, D. B., & Gattuso, J. (2003). Intervention to reduce intentions to use tobacco among pediatric cancer survivors. *Journal of Clinical Oncology, 21*, 1366–1372.
30. Fiore, M. C., Bailey, W. C., Cohen, S. J., Dorfman, S. F., Goldstein, M. G., Gritz, E. R., et al. (2000). *Treating tobacco use and dependence. Clinical practice guideline*. Rockville, MD: US Department of Health and Human Services, Public Health Service.
31. Fiore, M. C., Jaen, C. R., Baker, T. B., Bailey, W. C., Benowitz, N. L., Currey, S. J., et al. (2008). *Treating tobacco use and dependence: 2008 update. Clinical practice guideline*. Rockville, MD: US Department of Health and Human Services, Public Health Service.
32. Agency for Healthcare Policy and Research. (2000). *Treating tobacco use and dependence*. Washington, DC: US Department of Health and Human Services, Public Health Service.
33. Stead, L. F., Perera, R., & Lancaster, T. (2007). A systematic review of interventions for smokers who contact quitlines. *Tobacco Control, 16*, 3–8.
34. deMoor, J. S., Puleo, E., & Butterfield, R. M. (2007). Availability of smoking prevention and cessation services for childhood cancer survivors. *Cancer Causes andControl, 18*, 423–430.
35. Bellizzi, K. M., Rowland, J. H., & Jeffery, D. D. (2005). Health behaviors of cancer survivors: Examining opportunities for cancer control intervention. *Journal of Clinical Oncology, 23*, 8884–8893.

36. Coups, E. J., & Ostroff, J. S. (2005). A population-based estimate of the prevalence of behavioral risk factors among adult cancer survivors and noncancer controls. *Preventive Medicine, 40*, 702–711.
37. Gritz, E. R., Dresler, C., & Sarna, L. (2005). Smoking, the missing drug interaction in clinical trials: Ignoring the obvious. *Cancer Epidemiology, Biomarkers & Prevention, 14*, 2287–2293.
38. Johnston, L. D., O'Malley, P. M., Bachman, J. G., & Schulenberg, J. E. (2004). *National survey results on drug use from the Monitoring the Future Study, 1975–2003, II: College students and adults ages 19–45. NIH publication 04-5508*. Bethesda: National Institute of Drug Abuse.
39. Sidney, S., Quesenberry, C. P., Jr., Friedman, G. D., & Tekawa, I. S. (1997). Marijuana use and cancer incidence (California, United States). *Cancer Causes and Control, 8*, 722–728.
40. Efird, J. T., Friedman, G. D., Sidney, S., Klatsky, A., Habel, L. A., Udaltsova, N. V., et al. (2004). The risk for malignant primary adult-onset glioma in a large, multiethnic, managed-care cohort: Cigarette smoking and other lifestyle behaviors. *Journal of Neuro-Oncology, 68*, 57–69.
41. Zhang, Z. F., Morgenstern, H., Spitz, M. R., Tashkin, D. P., Yu, G. P., Marshall, J. R., et al. (1999). Marijuana use and increased risk of squamous cell carcinoma of the head and neck. *Cancer Epidemiology, Biomarkers & Prevention, 8*, 1071–1078.
42. Hsairi, M., Achour, N., Zouari, B., Ben Romdhane, H., Achour, A., Maalej, M., et al. (1993). Etiologic factors in primary bronchial carcinoma in Tunisia. *La Tunisie Médicale, 71*, 265–268.
43. Sasco, A. J., Merrill, R. M., Dari, I., Benhaim-Luzon, V., Carriott, F., Cann, C. I., et al. (2002). A case-control study of lung cancer in Casablanca, Morocco. *Cancer Causes and Control, 13*, 609–616.
44. Robison, L. L., Buckley, J. D., Daigle, A. E., Wells, R., Benjamin, D., Arthur, D. C., et al. (1989). Maternal drug use and risk of childhood nonlymphoblastic leukemia among offspring: An epidemiologic investigation implicating marijuana (a report for the Childrens Cancer Study Group). *Cancer, 63*, 1904–1911.
45. Wen, W. Q., Shu, X. O., Seinbuch, M., Severson, R. K., Reaman, G. H., Buckley, J. D., et al. (2000). Paternal military service and risk for childhood leukemia in offspring. *American Journal of Epidemiology, 151*, 231–240.
46. Kuijten, R. R., Bunin, G. R., Nass, C. C., & Meadows, A. T. (1990). Gestational and familial risk factors for childhood astrocytoma: Results of a case-control study. *Cancer Research, 50*, 2608–2612.
47. Grufferman, S., Schwartz, A. G., Ruymann, F. B., & Maurer, H. M. (1993). Parents' use of cocaine and marijuana and increased risk of rhabdomyosarcoma in their children. *Cancer Causes and Control, 4*, 217–224.
48. Armstrong, G. T., Liu, W., Leisenring, W., Yasui, Y., Hammond, S., Bhatia, S., et al. (2011). Occurrence of multiple subsequent neoplasms in long-term survivors of childhood cancer: A report from the Childhood Cancer Survivor Study. *Journal of Clinical Oncology, 29*, 3056–3064.
49. Wolff, A. J., & O'Donnell, A. E. (2004). Pulmonary effects of illicit drug use. *Clinics in Chest Medicine, 25*, 203–216.
50. Tetrault, J., Crothers, K., Moore, B. A., Mehra, R., Concato, J., & Fiellen, D. A. (2007). Effects of marijuana smoking on pulmonary functioning and respiratory complications: A systemic review. *Archives of Internal Medicine, 167*, 221–228.
51. Mehra, R., Moore, B. A., Crothers, K., Tetrault, J., & Fiellin, D. A. (2006). The association between marijuana smoking and lung cancer: A systemic review. *Archives of Internal Medicine, 166*, 1359–1367.
52. Bauld, C., Toumbourou, J. W., Anderson, V., Coffey, C., & Olsson, C. A. (2005). Health-risk behaviors among adolescent survivors of childhood cancer. *Pediatric Blood & Cancer, 45*, 706–715.
53. Thompson, A. L., Gerhardt, C. A., Miller, K. S., Vannatta, K., & Noll, R. B. (2009). Survivors of childhood cancer and comparison peers: The influence of peer factors on later externalizing behavior in emerging adulthood. *Journal of Pediatric Psychology, 34*, 1119–1128.
54. Jones, J. H., & Weir, W. B. (2005). Cocaine-associated chest pain. *The Medical Clinics of North America, 89*, 1323–1342.
55. Karch, S. B. (2005). Cocaine cardiovascular toxicity. *Southern Medical Journal, 98*, 794–799.
56. Velasquez, E. M., Anand, R. C., & Newman, W. P., 3rd. (2004). Cardiovascular complications associated with cocaine use. *Journal of the Louisiana State Medical Society, 156*, 302–310.
57. Lynch, J., & House, M. A. (1992). Cardiovascular effects of methamphetamine. *Journal of Cardiovascular Nursing, 6*, 12–18.
58. National Institute of Drug Abuse. (2006). *Methamphetamine: Abuse and addiction* (NIH Publication No. 06-4210).
59. National Institute of Drug Abuse. (2006). *MDMA (ecstasy) abuse* (NIH Publication No. 60-4728).
60. Children's Oncology Group. (2011). *Long-term follow-up guidelines for survivors of childhood, adolescent, and young adult cancers*. Accessed December 19, 2011, from http://www.survivorshipguidelines.org/
61. Children's Oncology Group. (2008). *Long-term follow-up guidelines for survivors of childhood, adolescent, and young adult cancers: Appendix II patient education materials "health links"*. Memphis, TN: St. Jude Children's Research Hospital.
62. International Agency for Research on Cancer, World Health Organization. (1988). *Alcohol drinking* (p. 8). Lyon: World Health Organization, International Agency for Research on Cancer. http://monographs.iarc.fr/ENG/Monographs/vol44/volume44.pdf

63. Lubin, J. H., Purdue, M., Kelsey, K., Zhang, Z. F., Winn, D., Wei, Q., et al. (2009). Total exposure and exposure rate effects for alcohol and smoking and risk of head and neck cancer: A pooled analysis of case-control studies. *American Journal of Epidemiology, 170*, 937–947.
64. World Cancer Research Fund, American Institute for Cancer Research. (2007). *Food, nutrition, physical activity, and the prevention of cancer: A global perspective*. American Institute for Cancer Research. Accessed June 29, 2009, from http://www.dietandcancerreport.org/downloads/Second_Expert_Report.pdf
65. Voigt, M. D. (2005). Alcohol in hepatocellular cancer. *Clinics in Liver Disease, 9*, 151–169.
66. Benedetti, A., Parent, M. E., & Siemiatycki, J. (2009). Lifetime consumption of alcoholic beverages and risk of 13 types of cancer in men: Results from a case-control study in Montreal. *Cancer Detection and Prevention, 32*, 352–362.
67. Bagnardi, V., Blangiardo, M., La Vecchia, C., & Corrao, G. (2001). Alcohol consumption and the risk of cancer: A meta-analysis. *Alcohol Research & Health, 25*, 263–270.
68. Chen, W. Y., Rosner, B., Hankinson, S. E., Colditz, G. A., & Willett, W. C. (2011). Moderate alcohol consumption during adult life, drinking patterns, and breast cancer risk. *JAMA, 306*, 1884–1890.
69. Park, J. Y., Dahm, C. C., Keogh, R. H., Mitrou, P. N., Cairns, B. J., Greenwood, D. C., et al. (2010). Alcohol intake and risk of colorectal cancer: Results from the UK Dietary Cohort Consortium. *British Journal of Cancer, 103*, 747–756.
70. Su, L. J., & Arab, L. (2004). Alcohol consumption and risk of colon cancer: Evidence from the national health and nutrition examination survey I epidemiologic follow-up study. *Nutrition and Cancer, 50*, 111–119.
71. Cho, E., Smith-Warner, S. A., Ritz, J., van den Brandt, P. A., Colditz, G. A., Folsom, A. R., et al. (2004). Alcohol intake and colorectal cancer: A pooled analysis of 8 cohort studies. *Annals of Internal Medicine, 140*, 603–613.
72. American Cancer Society. (2007). Accessed December 19, 2011, from http://www.cancer.org/acs/groups/content/@healthpromotions/documents/documdoc/acsq-017622.pdf
73. Otake, S., Takeda, H., Suzuki, Y., Fukui, T., Watanabe, S., Ishihama, K., et al. (2005). Association of visceral fat accumulation and plasma adiponectin with colorectal adenoma: Evidence for participation of insulin resistance. *Clinical Cancer Research, 15*, 3642–3646.
74. Yamamoto, S., Nakagawa, T., Matsushita, Y., Kusano, S., Hayashi, T., Irokawa, M., et al. (2010). Visceral fat area and markers of insulin resistance in relation to colorectal neoplasia. *Diabetes Care, 33*, 184–189.
75. Day, G. L., Blot, W. J., Shore, R. E., Schoenberg, J. B., Kohler, B. A., Greenberg, R. S., et al. (1994). Second cancer following oral and pharyngeal cancers: Role of tobacco and alcohol. *Journal of the National Cancer Institute, 86*, 131–137.
76. Hashibe, M., Brennan, P., Chuang, S., Boccia, S., Castellsague, X., Chen, C., et al. (2009). Interaction between tobacco and alcohol use and the risk of head and neck cancer: Pooled analysis in the international head and neck epidemiology consortium. *Cancer Epidemiology, Biomarkers & Prevention, 18*, 541–550.
77. Nathan, P. C., Ford, J. S., Henderson, T. O., Hudson, M. M., Emmons, K. M., Casillas, J. N., et al. (2009). Health behaviors, medical care, and interventions to promote healthy living in the Childhood Cancer Survivor Study Cohort. *Journal of Clinical Oncology, 27*, 2363–2373.
78. Rehm, J., Room, R., Graham, K., Monteiro, M., Gmel, G., & Sempos, C. T. (2003). The relationship of average volume of alcohol consumption and patterns of drinking to burden of disease – on overview. *Addiction, 98*, 1209–1228.
79. Gutjahr, E., & Gmel, G. (2001). Defining alcohol-related fetal medical conditions for social-cost studies in western societies: An update of the epidemiological evidence. *Journal of Substance Abuse, 13*, 239–264.
80. Thakker, K. D. (1998). An overview of health risks and benefits of alcohol consumption. *Alcoholism: Clinical and Experimental Research, 22*, S285–S298.
81. Frobisher, C., Lancashire, E. R., Reulen, R. C., Winter, D. L., Stevens, M. C., & Hawkins, M. M. (2010). Extent of alcohol consumption among adult survivors of childhood cancer: The British Childhood Cancer Survivor Study. *Cancer Epidemiology, Biomarkers & Prevention, 19*, 1174–1184.
82. Carswell, K., Chen, Y., Nair, R. C., Shaw, A. K., Speechley, K. N., & Barrera, M. (2008). Smoking and binge drinking among Canadian survivors of childhood and adolescent cancers: A comparative, population-based study. *Pediatric Blood & Cancer, 51*, 280–287.
83. Tyc, V. L., Hadley, W., & Crokett, G. (2001). Prediction of health behaviors in pediatric cancer survivors. *Medical and Pediatric Oncology, 37*, 42–46.
84. Phillips-Salimi, C. R., Lommel, K., & Andrykowski, M. A. (2011). Physical and mental health status and health behaviors of childhood cancer survivors: Findings from the 2009 BRFSS survey. *Pediatric Blood & Cancer, 58*, 964–970. doi:10.1002/pbc.23359.
85. Verrill, J. R., Schafer, J., Vannatta, K., & Noll, R. B. (2000). Aggression, antisocial behavior and substance abuse in survivors of pediatric cancer: Possible protective effects of cancer and its treatment. *Journal of Pediatric Psychology, 25*, 493–502.
86. Rebholz, C. E., Kuehni, C. E., Strippoli, M. P. F., Rueegg, C. S., Michel, G., Hengartner, H., et al. (2012). Alcohol consumption and binge drinking in

young adult childhood cancer survivors. *Pediatric Blood & Cancer, 58*, 256–264.
87. Klosky, J. L., Howell, C., Li, Z., Foster, R. H., Mertens, A. C., Robison, L. L., et al. (2012). Risky health behavior among adolescents in the Childhood Cancer Survivor Study Cohort. *Journal of Pediatric Psychology, 37*(6), 634–646.
88. Lown, A. E., Goldsby, R., Mertens, A. C., Greenfield, T., Bond, J., Whitton, J., et al. (2008). Alcohol consumption patterns and risk factors among childhood cancer survivors compared to siblings and general population peers. *Addiction, 103*, 1139–1148.
89. Castellino, S. M., Casillas, J., Hudson, M. M., Mertens, A. C., Whitton, J., Brooks, S. L., et al. (2005). Minority adult survivors of childhood cancer: A comparison of long term outcomes, health care utilization, and health related behaviors from the childhood cancer survivors study. *Journal of Clinical Oncology, 23*, 6499–6507.
90. American Cancer Society. (2011). *Alcohol use and cancer*. Accessed December 18, 2011, from http://www.cancer.org/Cancer/CancerCauses/DietandPhysicalActivity/alcohol-use-and-cancer
91. Carnethon, M. R., Gulati, M., & Greenland, P. (2005). Prevalence and cardiovascular disease correlates of low cardiorespiratory fitness in adolescents and adults. *JAMA, 294*, 2891–2988.
92. Helmrich, S. P., Ragland, D. R., Leung, R. W., & Paffenbarger, R. S. (1991). Physical activity and reduced occurrence of non-insulin-dependent diabetes mellitus. *The New England Journal of Medicine, 325*, 147–152.
93. Hu, F. B., Willett, W. C., Li, T., Stampfer, M. J., Colditz, G. A., & Manson, J. E. (2004). Adiposity as compared with physical activity in predicting mortality among women. *The New England Journal of Medicine, 351*, 2694–2703.
94. Whelton, S. P., Chin, A., Xin, X., & He, J. (2002). Effect of aerobic exercise on blood pressure: A meta-analysis of randomized, controlled trials. *Annals of Internal Medicine, 325*, 147–152.
95. Garmey, E. G., Liu, Q., Sklar, C. A., Meacham, L. R., Mertens, A. C., Stovall, M. A., et al. (2008). Longitudinal changes in obesity and body mass index among adult survivors of childhood acute lymphoblastic leukemia. A report from the Childhood Cancer Survivor Study. *Journal of Clinical Oncology, 26*, 4639–4645.
96. Gurney, J. G., Ness, K. K., & Sibley, S. D. (2006). Metabolic syndrome and growth hormone deficiency in adult survivors of childhood acute lymphoblastic leukemia. *Cancer, 107*, 1303–1312.
97. Mertens, A. C., Liu, Q., Neglia, J. P., Wasilewski, K., Leisenring, W., Armstrong, G. T., et al. (2008). Cause-specific late mortality among 5-year survivors of childhood cancer: The Childhood Cancer Survivor Study. *Journal of the National Cancer Institute, 100*, 1368–1379.
98. Oeffinger, K. C., Mertens, A. C., Sklar, C. A., Yasui, Y., Fears, T., Stovall, M., et al. (2003). Obesity in adult survivors of childhood acute lymphoblastic leukemia: A report form the Childhood Cancer Survivor Study. *Journal of Clinical Oncology, 21*, 1359–1365.
99. Meacham, L. R., Gurney, J. G., Mertens, A. C., Ness, K. K., Sklar, C. A., Robison, L. L., et al. (2005). Body mass index in long-term adult survivors of childhood cancer. *Cancer, 103*, 1730–1739.
100. Finnegan, L., Wilkie, D. J., Wilbur, J., Campbell, R. T., Zong, S., & Katula, S. (2007). Correlates of physical activity in young adult survivors of childhood cancers. *Oncology Nursing Forum, 34*, E60–E69.
101. Florin, T. A., Fryer, G. E., Miyoshi, T., Weitzman, M., Mertens, A. C., Hudson, M. M., et al. (2007). Physical inactivity in adult survivors of childhood acute lymphoblastic leukemia: A report from the Childhood Cancer Survivor Study. *Cancer Epidemiology, Biomarkers & Prevention, 16*, 1356–1363.
102. Ness, K. K., Leisenring, W. M., Huang, S., Hudson, M. M., Gurney, J. G., Whelan, K., et al. (2009). Predictors of inactive lifestyle among adult survivors of childhood cancer: A report from the Childhood Cancer Survivor Study. *Cancer, 115*, 1984–1994.
103. Haskell, W. L., Lee, I. M., Pate, R. R., Powell, K. E., Blair, S. N., Franklin, B. A., et al. (2007). Physical activity and public health recommendations for adults from the American College of Sports Medicine and the American Heart Association. *Medicine and Science in Sports and Exercise, 39*, 1423–1434.
104. Krull, K. R., Annett, R. D., Pan, Z., Ness, K. K., Nathan, P. C., Srivastava, D. K., et al. (2011). Neurocognitive functioning and health-related behaviors in adult survivors of childhood cancer: A report from the Childhood Cancer Survivor Study. *European Journal of Cancer, 47*, 1380–1388.
105. Blaauwbroek, R., Bouma, M., Tuinier, W., Groenier, K. H., de Greef, M. H., Meyboom-de Jong, B., et al. (2009). The effect of exercise counseling with feedback from a pedometer on fatigue in adult survivors of childhood cancer: A pilot study. *Support Care Cancer, 17*, 1041–1048.
106. Collett, B., Acosta, A., Whitsett, S., McTiernan, A., & Friedman, D. (2007). Exercise intervention for pediatric cancer survivors: Feasibility and preliminary efficacy. *Journal of Clinical Oncology, 25*, 20013.
107. Keats, M. R., & Culos-Reed, S. N. P. (2008). A community-based physical activity program for adolescents with cancer (project trek): Program feasibility and preliminary findings. *Journal of Pediatric Hematology/Oncology, 30*, 272–280.
108. Sharkey, A. M., Carey, A. M., & Heise, C. T. (1993). Cardiac rehabilitation after cancer therapy in children and young adults. *The American Journal of Cardiology, 71*, 1488–1490.
109. Takken, T., van Der Torre, W., Zwerink, M., Hulzebos, E. H., Bierings, M., Helders, P. J., et al. (2009). Development, feasibility, and efficacy of a

community-based exercise training program in pediatric cancer survivors. *Psycho-Oncology, 18*, 440–448.
110. Arroyave, W. D., Clipp, E. C., Miller, P. E., Jones, L. W., Ward, D. S., Bonner, M. J., et al. (2008). Childhood cancer survivors' perceived barriers to improving exercise and dietary behaviors. *Oncology Nursing Forum, 3435*, 121–130.
111. van Brussel, M., van der Net, J., Hulzebose, E., Helders, P. J., & Takken, T. (2011). The Utrecht approach to exercise in chronic childhood conditions: The decade in review. *Pediatric Physical Therapy, 23*, 2–14.
112. Humpel, N., & Iverson, D. C. (2005). Review and critique of the quality of exercise recommendations for cancer patients and survivors. *Support Care Cancer, 13*, 493–502.
113. Winter, C., Muller, C., Hoffmann, C., Boos, J., & Rosenbaum, D. (2010). Physical activity and childhood cancer. *Pediatric Blood & Cancer, 54*, 501–510.
114. Bertorello, N., Manicone, R., Galletto, C., Barisone, E., & Fagioli, F. (2011). Physical activity and late effects in childhood acute lymphoblastic leukemia long-term survivors. *Journal of Pediatric Hematology/Oncology, 28*, 354–363.
115. McKenzie, D. C., Coutts, K. D., Rogers, P. C., Jespersen, D. K., & Petrula, A. (2000). Aerobic and anaerobic capacities of children and adolescents successfully treated for solid tumors. *Clinical Exercise Physiology, 2*, 39–42.
116. van Brussel, M., Takken, T., Lucia, A., van der Net, J., & Helders, P. J. (2005). Is physical fitness decreased in survivors of childhood leukemia? A systematic review. *Leukemia, 19*, 13–17.
117. van Brussel, M., Takken, T., van der Net, J., Engelbert, R. H., Bierings, M., Shoenmakers, M. A., et al. (2006). Physical function and fitness in long-term survivors of childhood leukaemia. *Pediatric Rehabilitation, 9*, 267–274.
118. Mulhern, R. K., Tyc, V. L., Phipps, S., Crom, D., Barclay, D., Greenwald, C., et al. (1995). Health-related behaviors of survivors of childhood cancer. *Medical and Pediatric Oncology, 25*, 159–165.
119. Atkinson, S. A. (2008). Vitamin D status and bone biomarkers in childhood cancer. *Pediatric Blood & Cancer, 50*, 479–482.
120. Brownell, K. D. (2002). The environment and obesity. In C. G. Fairburn & K. D. Brownell (Eds.), *Eating disorders and obesity*. New York: Guilford Press.
121. Hill, J. O., & Peters, J. C. (1998). Environmental contributions to the obesity epidemic. *Science, 280*, 1371–1374.
122. Demark-Wahnefried, W., Werner, C., Clipp, E. C., Guill, A. B., Bonner, M., Jones, L. W., et al. (2005). Survivors of childhood cancer and their guardians: Current health behaviors and receptivity to health promotion programs. *Cancer, 103*, 2171–2180.
123. Mayer, E. I., Reuter, M., & Dopfer, R. E. (2000). Energy expenditure, energy intake, and prevalence of obesity after therapy for acute lymphoblastic leukemia during childhood. *Hormone Research, 53*, 193–199.
124. Reeves, M., Eakin, E., Lawler, S., & Demark-Wahnefried, W. (2008). Health behaviors in survivors of childhood cancer. *Australian Family Physician, 36*, 95–96.
125. Robien, K. P., Ness, K. K., & Klesges, L. M. (2008). Poor adherence to dietary guidelines among adult survivors of childhood acute lymphoblastic leukemia. *Journal of Pediatric Hematology/Oncology, 30*, 815–822.
126. Stolley, M. R., Sharp, L. K., Arroyo, C., Ruffin, C., Restrepo, J., & Campbell, R. (2009). Design and recruitment of the Chicago Healthy Living Study. *Cancer, 115*, 4385–4396.
127. Tylavsky, F. A., Smith, K., Surprise, H., Garland, S., Yan, X., McCammon, E., et al. (2010). Nutritional intake of long-term survivors of childhood acute lymphoblastic leukemia: Evidence for bone health interventional opportunities. *Pediatric Blood & Cancer, 55*, 1362–1369.
128. Stolley, M. R., Restrepo, J., & Sharp, L. K. (2010). Diet and physical activity in childhood cancer survivors: A review of the literature. *Annals of Behavioral Medicine, 39*, 232–249.
129. Doyle, C., Kushi, L. H., Byers, T., Courneya, K. S., Demark-Wahnefried, W., Grant, B., et al. (2006). Nutrition and physical activity during and after cancer treatment: An American Cancer Society guide for informed choices. *CA: A Cancer Journal for Clinicians, 56*, 323–353.
130. National Cancer Institute. (2002). *Facing forward series: Life after cancer treatment* (Report No. 02-2424).
131. Cohen, J., Wakefield, C. E., Fleming, C. A. K., Gawthorne, R., Tapsell, L. C., & Cohn, R. J. (2011). Dietary intake after treatment in child cancer survivors. *Pediatric Blood & Cancer, 58*, 752–757. doi:10.1002/pbc.23280.
132. Love, E., Schneiderman, J. E., Stephens, D., Lee, S., Barron, M., Tsangaris, E., et al. (2011). A cross-sectional study of overweight in pediatric survivors of acute lymphoblastic leukemia. *Pediatric Blood & Cancer, 57*, 1204–1209.
133. American Cancer Society. (2008). *Cancer facts and figures*. Atlanta: American Cancer Society.
134. Diepgen, T. L., & Mahler, V. (2002). The epidemiology of skin cancer. *British Journal of Dermatology, 146*, 1–6.
135. Garner, K. L., & Rodney, W. M. (2000). Basal and squamous cell carcinoma. *Primary Care, 27*, 447–458.
136. Perkins, J. L., Liu, Y., & Mitby, P. A. (2005). Nonmelanoma skin cancer in survivors of childhood and adolescent cancer: A report from the Childhood Cancer Survivor Study. *Journal of Clinical Oncology, 23*, 3733–3741.

137. Padgett, J. K., & Hendrix, J. D. (2001). Cutaneous malignancies and their management. *Otolaryngologic Clinics of North America, 34*, 523–553.
138. Buchanan, N., Leisenring, W., Mitby, P. A., Meadows, A. T., Robison, L. L., Hudson, M. M., et al. (2009). Behaviors associated with ultraviolet radiation exposure in a cohort of adult survivors of childhood and adolescent cancer. *Cancer, 115*, 4374–4384.
139. Nathan, P. C., Greenberg, M. L., Ness, K. K., Hudson, M. M., Mertens, A. C., Mahoney, M. C., et al. (2008). Medical care in long-term survivors of childhood cancer: A report from the Childhood Cancer Survivor Study. *Journal of Clinical Oncology, 26*, 4401–4409.
140. Glanz, K., Lew, R. A., Song, V., & Cook, V. A. (1999). Factors associated with skin cancer prevention practices in a multiethnic population. *Health Education & Behavior, 26*, 344–359.
141. Geller, A. C., Emmons, K. M., Brooks, D. R., Powers, C., Zhang, Z., Koh, H. K., et al. (2006). A randomized trial to improve early detection and prevention practices among siblings of melanoma patients. *Cancer, 107*, 806–814.
142. Glanz, K., Schoenfeld, E. R., & Steffen, A. (2010). A randomized trial of tailored skin cancer prevention messages for adults: Project SCAPE. *American Journal of Public Health, 100*, 735–741.
143. Manne, S., Jacobsen, P. B., Ming, M. E., Winkel, G., Dessureault, S., & Lessin, S. R. (2010). Tailored versus generic interventions for skin cancer risk reduction for family members of melanoma patients. *Health Psychology, 29*, 583–593.
144. Oliveria, S. A., Dusza, S. W., Phelan, D. L., Ostroff, J. S., Berwick, M., & Halpern, A. C. (2004). Patient adherence to skin self-examination: Effect of nurse intervention with photographs. *American Journal of Preventive Medicine, 26*, 152–155.
145. Boer, H., Huurne, E., & Taal, E. (2006). Effects of pictures and textual arguments in sun protection public services announcements. *Cancer Detection and Prevention, 30*, 432–438.
146. Noar, S. M., Benac, C. N., & Harris, M. S. (2007). Does tailoring matter? Meta-analytic review of tailored print health behavior change interventions. *Psychological Bulletin, 133*, 673–693.
147. Sauvageau, C., Duval, B., Gilca, V., Lavoie, F., & Quakki, M. (2007). Human papilloma virus vaccine and cervical cancer screening acceptability among adults in Quebec, Canada. *BMC Public Health, 7*, 304.
148. Weinstock, H., Berman, S., & Cates, W., Jr. (2004). Sexually transmitted diseases among American youth: Incidence and prevalence estimates, 2000. *Perspectives on Sexual and Reproductive Health, 36*, 6–10.
149. Centers for Disease Control and Prevention. (2011). *Genital HPV infection- fact sheet*. Accessed October 10, 2011, from http://www.cdc.gov/std/HPV/STDFact-HPV.htm
150. Mariam, A. (2005). Cervical cancer vaccines available in 2007. *Drug Discovery Today, 10*, 949–950.
151. Markowitz, L. E., Dunne, E. F., Saraiya, M., Lawson, H. S., Chesson, H., Unger, E. R., et al. (2007). Quadrivalent human papillomavirus vaccine: Recommendations of the Advisory Committee on Immunization Practices (ACIP). *MMWR - Recommendations and Reports, 56*, 1–24.
152. Myers, E. R., McCroy, D. C., Nanda, K., Bastian, L., & Matchar, D. B. (2000). Mathematical model for the natural history of human papillomavirus infection and cervical carcinogenesis. *American Journal of Epidemiology, 151*, 1158–1171.
153. Dunne, E. F., Unger, E. R., & Sternberg, M. (2007). Prevalence of HPV infection among females in the United States. *JAMA, 297*, 813–819.
154. Klosky, J. K., Gamble, H. L., Spunt, S. P., Randolph, M. E., Green, D. M., & Hudson, M. M. (2009). Human papillomavirus vaccination in survivors of childhood cancer. *Cancer, 24*, 5627–5636.
155. Serraino, D., Franceschi, S., Talamini, R., Barra, S., Negri, E., Carbone, A., et al. (1991). Socio-economic indicators, infectious diseases and Hodgkin's disease. *International Journal of Cancer, 47*, 352–357.
156. Gross, G., Ellinger, K., Roussaki, A., Fuchs, P. G., Peter, H. H., & Pfister, H. (1988). Epidermodysplasia verruciformis in a patient with Hodgkin's disease: Characterization of a new papillomavirus type and interferon treatment. *Journal of Investigative Dermatology, 91*, 43–48.
157. Hennig, E. M., Nesland, J. M., Di Lonardo, A., & Venuti, A. (1999). Multiple primary cancers and HPV infection: Are they related? *Journal of Experimental & Clinical Cancer Research, 18*, 53–54.
158. Katz, R. L., Veanattukalathil, S., & Weiss, K. M. (1987). Human papillomavirus infection and neoplasia of the cervix and anogenital region in women with Hodgkin's disease. *Acta Cytologica, 31*, 845–854.
159. Quayle, A. J. (2002). The innate and early immune response to pathogen challenge in the female genital tract and the pivotal role of epithelial cells. *Journal of Reproductive Immunology, 57*, 61–79.
160. Fujimura, M., Ostrow, R. S., & Okagaki, T. (1991). Implication of human papillomavirus in postirradiation dysplasia. *Cancer, 68*, 2181–2185.
161. Sundberg, K. K., Lampic, C., Arvidson, J., Helstrom, L., & Wettergren, L. (2011). Sexual function and experience among long-term survivors of childhood cancer. *European Journal of Cancer, 47*, 397–403.
162. Zebrack, B. J., Casillas, J., Nohr, L., Abedams, H., & Zeltzer, L. K. (2004). Fertility issues for young adult survivors of childhood cancer. *Psychooncology, 13*, 689–699.
163. Moleski, M. (2000). Neuropsychological, neuroanatomical, and neurophysiological consequences of CNS chemotherapy for acute lymphoblastic leukemia. *Archives of Clinical Neuropsychology, 15*, 603–630.

164. Mulhern, R. K., Fairclough, D., & Ochs, D. J. (1991). A prospective comparison of neuropsychologic performance of children surviving leukemia who received 18-Gy, 24-Gy, or no cranial irradiation. *Journal of Clinical Oncology, 9*, 1348–1356.
165. Barkley, R. A., Fischer, M., & Smallish, L. (2006). Young adult outcome of hyperactive children: Adaptive functioning in major life activities. *Journal of the American Academy of Child and Adolescent Psychiatry, 45*, 192–202.
166. Benard, V. B., Johnson, C. J., Thompson, T. D., Roland, K. B., Lai, S. M., Cokkinides, V., et al. (2008). Examining the association between socioeconomic status and potential human papillomavirus-associated cancers. *Cancer, 113*, 2910–2918.
167. Parkin, D. M., & Bray, F. (2006). Chapter 2: The burden of HPV-related cancers. *Vaccine, 24*, 11–25.
168. Yeazel, M. W., Oeffinger, K. C., Gurney, J. G., Mertens, A. C., Hudson, M. M., Emmons, K. M., et al. (2004). The cancer screening practices of adult survivors of childhood cancer: A report from the Childhood Cancer Survivor Study. *Cancer, 100*, 631–640.
169. Gurney, J. G., Krull, K. R., Kadan-Lottick, N., Nicholson, H. S., Nathan, P. C., Zebrack, B., et al. (2009). Social outcomes in the Childhood Cancer Survivor Study cohort. *Journal of Clinical Oncology, 27*, 2390–2395.
170. Oeffinger, K. C., Mertens, A. C., Hudson, M. M., Gurney, J. G., Casillas, J., Chen, H., et al. (2004). Health care of young adult survivors of childhood cancer: A report from the Childhood Cancer Survivor Study. *Annals of Family Medicine, 2*, 61–70.
171. Harper, D. M., Franco, E. L., Wheeler, C. M., Moscicki, A. B., Romanowski, B., Roteli-Martins, C. M., et al. (2006). Sustained efficacy up to 4.5 years of a bivalent L1 virus-like particle vaccine against human papillomavirus types 16 and 18: Follow-up from a randomised control trial. *Lancet, 367*, 1247–1255.
172. Koutsky, L. A., & Harper, D. M. (2006). Chapter 13: Current findings from prophylactic HPV vaccine trials. *Vaccine, 24*(Suppl 3), S114–S121.
173. Centers for Disease Control. (2007). Quadrivalent human papillomavirus vaccine: Recommendations of the Advisory Committee on Immunization Practices (ACIP). *Morbidity and Mortality Weekly Report (MMWR), 56*, 1–26.
174. FDA. (2006). *FDA licenses new vaccine for prevention of cervical cancer and other diseases in females caused by human Papillomavirus: rapid approval marks major advancement in public health*. Retrieved June 8,2008, from http://www.fda.gov/bbs/topics/NEWS/2006/NEW01385.html.
175. Villa, L. L., Costa, R. L., Petta, C. A., Andrade, R. P., Ault, K. A., Giuliano, A. R., et al. (2005). Prophylactic quadrivalent human papillomavirus (types 6, 11, 16, and 18) L1 virus-like particle vaccine in young women: A randomised double-blind placebo-controlled multicentre phase II efficacy trial. *Lancet Oncology, 6*, 271–278.
176. Centers for Disease Control and Prevention. (2010). FDA licensure of quadrivalent human papillomavirus vaccine (HPV4, Gardasil) for use in males and guidance from the Advisory Committee on Immunization Practices (ACIP). *Morbidity and Mortality Weekly Report (MMWR), 59*, 630–632.
177. Centers for Disease Control and Prevention. (2010). FDA licensure of bivalent human papillomavirus vaccine (HPV2, Cervarix) for use in females and updated HPV vaccination recommendations from the Advisory Committee on Immunization Practices (ACIP). *Morbidity and Mortality Weekly Report (MMWR), 59*, 626–629.
178. Villa, L. L. (2007). Overview of the clinical development and results of a quadrivalent HPV (types 6, 11, 16, 18) vaccine. *International Journal of Infectious Diseases, 11*, S17–S25.
179. Villa, L. L., Costa, R. L., Petta, C. A., Andrade, R. P., Paavonen, J., Iversen, O. E., et al. (2006). High sustained efficacy of a prophylactic quadrivalent human papillomavirus types 6/11/16/18 L1 virus-like particle vaccine through 5 years of follow-up. *British Journal of Cancer, 95*, 1459–1466.
180. Saslow, D., Castle, P. E., Cox, J. T., Davey, D. D., Einstein, M. H., Ferris, D. G., et al. (2007). American Cancer Society Guideline for human papillomavirus (HPV) vaccine use to prevent cervical cancer and its precursors. *CA: A Cancer Journal for Clinicians, 57*, 7–28.
181. Rabin, C. (2011). Review of health behaviors and their correlates among young adult cancer survivors. *Journal of Behavioral Medicine, 34*, 41–52.
182. Landier, W., Bhatie, S., Eshelman, D. A., Forte, K. J., Sweeney, T., Hester, A. L., et al. (2004). Development of risk-based guidelines for pediatric cancer survivors: The Children's Oncology Group Long-Term Follow-Up Guidelines from the Children's Oncology Group Late Effects Committee and Nursing Discipline. *Journal of Clinical Oncology, 22*, 4979–4990.