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Survivorship: Healthy Lifestyles, Version 2.2014:

Clinical Practice Guidelines in Oncology

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Abstract

Healthy lifestyle habits have been associated with improved health outcomes and quality of life and, for some cancers, a reduced risk of recurrence and death. The NCCN Guidelines for Survivorship therefore recommend that cancer survivors be encouraged to achieve and maintain a healthy lifestyle, with attention to weight management, physical activity, and dietary habits. This section of the NCCN Guidelines focuses on recommendations regarding physical activity in survivors, including assessment for the risk of exercise-induced adverse events, exercise prescriptions, guidance for resistance training, and considerations for specific populations (eg, survivors with lymphedema, ostomies, peripheral neuropathy). In addition, strategies to encourage health behavioral change in survivors are discussed.

Healthy Lifestyles

Healthy lifestyle habits, such as engaging in routine physical activity, maintaining a healthy diet and weight, and avoiding tobacco use, have been associated with improved health outcomes and quality of life. For some cancers, a healthy lifestyle has been associated with a reduced risk of recurrence and death.^{1–6} Therefore, survivors should be encouraged to achieve and maintain a healthy lifestyle, including attention to weight management, physical activity, and dietary habits. Survivors should be advised to limit alcohol intake and avoid tobacco products, with emphasis on tobacco cessation if the survivor is a current smoker or user of smokeless tobacco. Clinicians should also advise survivors to practice sun safety habits as appropriate, such as using a broad-spectrum sunscreen, avoiding peak sun hours, and using physical barriers. Finally, survivors should be encouraged to see a primary care physician regularly and adhere to age-appropriate health screenings, preventive measures (eg, immunizations), and cancer screening recommendations.

The NCCN Panel made specific recommendations regarding physical activity, weight management, nutrition, and supplement use, which are discussed herein. Although achieving all of these healthy lifestyle goals may be difficult for many survivors, even small reductions

		Cancer				
Denlinger et al.	Crystal S. Denlinger, MD	Bayer HealthCare; ImClone Systems Incorporated; MedImmune Inc.; OncoMed Pharmaceuticals; Astex Pharmaceuticals; Merrimack Pharmaceuticals; and Pfizer Inc.	Eli Lilly and Company	None	None	1/9/14
	in weight among overweight or obese survivors or small increases in physical activity					
	Don Dizon, MD	None	None	None	American Journal of Clinical Oncology; ASCO; UpToDate	4/4/14
	Debra L. Friedman, MD, MS	None	None	None	None	7/31/14
	Mindy Goldman, MD	None	None	None	Lumetra	8/23/14
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	Allison King, MD	None	None	None	None	8/12/13
	Grace H. Ku, MD	None	Seattle Genetics, Inc.	None	None	5/6/14
	Elizabeth Kvale, MD	None	None	None	None	10/7/13
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	Kristin Leonardi-Warren, RN, ND	None	None	None	None	1/6/14
	Jennifer A. Ligibel, MD	None	None	None	None	10/3/13
	Mary S. McCabe, RN, BS, MS	None	National Cancer Institute	None	None	5/6/14
	Michelle Melisko, MD	Genentech, Inc.; Celldex Therapeutics; and Galena Biopharma	Agendia BV	None	None	8/19/14
	Jose G. Montoya, MD	None	None	None	None	12/6/13
	Kathi Mooney, RN, PhD	University of Utah	None	None	None	7/15/14
	Mary Ann Morgan, PhD, FNP-BC	None	None	None	None	5/5/14
	Javid J. Moslehi, MD	None	ARIAD Pharmaceuticals, Inc.; Millennium Pharmaceuticals, Inc.; Novartis Pharmaceuticals Corporation; and Pfizer Inc.	None	None	1/27/14
	Tracey O'Connor, MD	None	None	None	None	6/13/13
	Linda Overholser, MD, MPH	None	Antigenics Inc.; and Colorado Central Cancer Registry Care Plan Project	None	None	10/10/13
	Electra D. Paskett, PhD	Merck & Co., Inc.	None	Pfizer Inc.	None	5/7/14
	Jeffrey Peppercorn, MD, MPH					Pending
	Muhammad Raza, MD	None	None	None	None	8/23/12
	M. Alma Rodriguez, MD	Amgen Inc.; and Ortho Biotech Products, L.P.	None	None	None	8/5/14
	Karen L. Syrjala, PhD	None	None	None	None	5/1/14
	Susan G. Urba, MD	None	Eisai Inc.	None	None	8/21/14
	Mark T. Wakabayashi, MD, MPH	None	None	None	None	6/19/13
	Phyllis Zee, MD	Philips/Respironics	Merck & Co., Inc.; Jazz Pharmaceuticals; Vanda Pharmaceuticals; and Purdue Pharma LP	None	None	3/26/14

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among sedentary individuals are thought to yield meaningful improvements in cancer-specific outcomes and overall health.⁷

Physical Activity

During cancer treatment, many survivors become deconditioned and can develop impaired cardiovascular fitness because of the direct and secondary effects of therapy.⁸ Randomized trials have shown that exercise training is safe, tolerable, and effective for most survivors. Structured aerobic and resistance training programs after treatment can improve cardiovascular fitness and strength and can have positive effects on balance, body composition, and quality of life.^{9–17} The effectiveness of exercise training is especially well studied in women with early-stage breast cancer. Survivors of breast cancer who exercise have improved cardiovascular fitness and therefore an increased capacity to perform daily life functions, resulting in a better quality of life.^{16–20}

GENERAL PRINCIPLES OF HEALTHY LIFESTYLES

- All survivors should be encouraged to achieve and maintain a healthy lifestyle with attention to weight management (SNWM-2*), physical activity (SPA-1), and healthy dietary habits (SDWA-1*)
- Healthy lifestyle habits have been associated with improved overall health and quality of life. For some cancers, a healthy lifestyle has been associated with a reduced risk of recurrence and death.
- For a healthy lifestyle, all survivors should be encouraged to:
 - Achieve and maintain a healthy body weight throughout life (SNWM-2*)
 - Pay attention to calories consumed versus calories expended via diet and exercise
 - Calculate and monitor body mass index (BMI) (SNWM-A*)
 - Engage in physical activity regularly (SPA-1)
 - Avoid sedentary and a sedentary lifestyle
 - Strive for at least 150 minutes of moderate or 75 minutes of vigorous activity per week, spread out over the course of the week.
 - Maintain a healthy diet high in fruits, vegetables, and whole grains (SNWM-1*)
- Minimize alcohol intake
 - Limit intake to 1 drink per day for a woman and 2 drinks per day for a man
- Avoid tobacco products
 - Attempt tobacco cessation if currently smoking or using smokeless tobacco
- Practice sun safety
 - Use a sunscreen with an SPF of at least 30 that protects against UVA and UVB rays and is water resistant
 - Apply generously and reapply every 2 hours or after swimming/excessive sweating
 - Consider using physical barriers whenever possible (eg, hats, shirts with sleeves, avoidance of direct sun during peak hours)
 - Follow up with primary care physician regularly
 - Adhere to age-appropriate health screening, preventive measures (SMEN-1*), and cancer screening recommendations (See NCCN Guidelines for Detection, Prevention, & Risk-Reduction)
- Routine use of dietary supplements is not recommended for the purposes of cancer control (SSUP-1*)

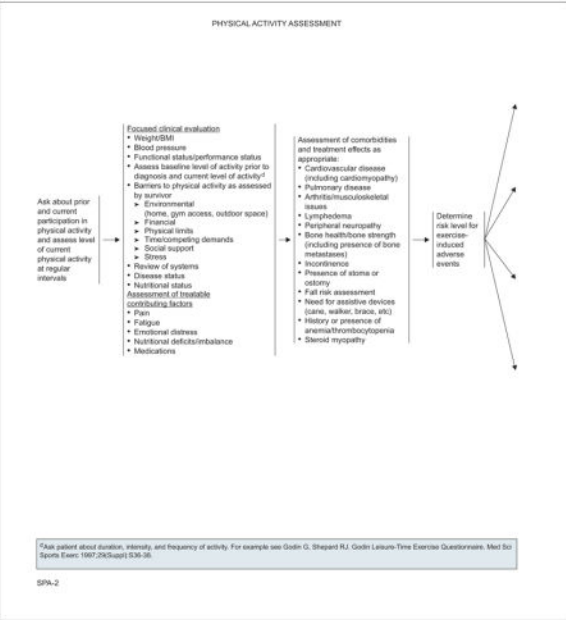
*Available online, in these guidelines, at NCCN.org.
 *See list of NCCN Clinical Practice Guidelines in Oncology (NCCN Guidelines), available online, at NCCN.org.

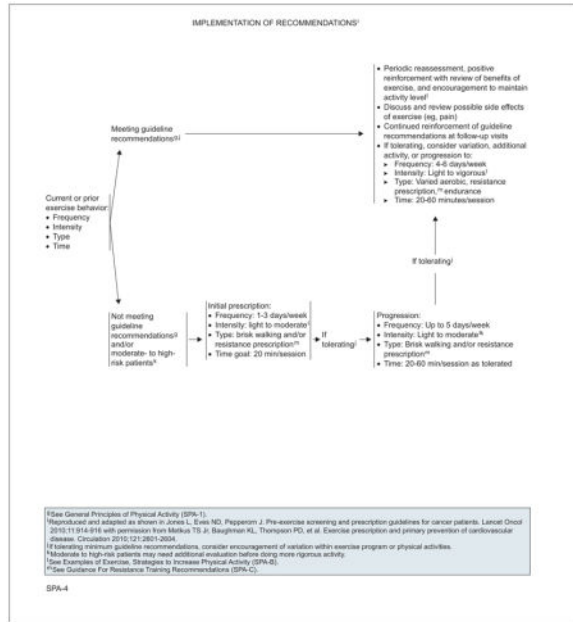
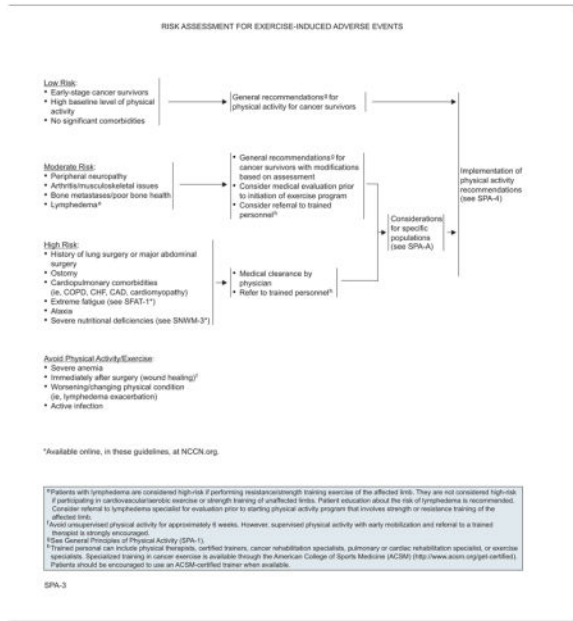
HL-1

- GENERAL PRINCIPLES OF PHYSICAL ACTIVITY**
- All survivors should be encouraged to avoid inactivity or a sedentary lifestyle and return to daily activities as soon as possible
 - Patients who are able should be encouraged to engage in physical activity⁴ daily.
 - Physical activity and exercise recommendations should be tailored to individual survivor's abilities and preferences
 - General recommendations for cancer survivors⁴
 - Overall volume of weekly activity should be at least 150 minutes of moderate-intensity activity or 75 minutes of vigorous-intensity activity or equivalent combination
 - Individuals should engage in 2 to 3 sessions per week of strength training that includes major muscle groups
 - Major muscle groups should be stretched on the days exercises are performed

⁴Physical activity includes exercise, daily routine activities, and recreational activities.
 Pfaad CL, Doyle C, Demark-Watneff W, et al. Nutrition and physical activity guidelines for cancer survivors. *CA Cancer J Clin*. 2012;62:342-374, and Sforzo KL, Courneya RJ, Matthews C, et al. American College of Sports Medicine roundtable on exercise guidelines for cancer survivors. *Med Sci Sports Exerc*. 2010;42:1439-1426.
⁵Light exercise: no noticeable change in breathing pattern; moderate exercise: can talk, but not sing; vigorous exercise: can say a few words without stopping to catch a breath (see Examples of Exercise [SPA-6])

SPA-1





CONSIDERATIONS FOR SPECIFIC POPULATIONS¹

- **Lymphedema:**
 - Survivors with lymphedema should use compression garments when engaging in exercise
 - Work with trained exercise professional if considering weight training or resistance training
 - Undergo baseline and periodic evaluation for development or exacerbation of lymphedema
 - Initiate strength training exercise involving affected body part only if lymphedema stable:
 - No need for lymphedema therapy within past 3 months
 - No recent limb infections requiring antibiotics
 - No change in limb circumference >10%
 - No change in ability to perform activities of daily living
 - Resistance training/weight lifting: gradually increase resistance by smallest increment possible with monitoring
 - Stop exercise and refer to lymphedema specialist if exacerbation of lymphedema occurs
 - Continued full use of the extremity and range-of-motion exercises are encouraged to maintain strength and range of motion even in the presence of lymphedema
- **Stem cell transplant:**
 - Initiate physical activity as tolerated, with clearance by transplant provider
 - Survivors with indwelling catheters should avoid swimming until catheter is removed
 - Avoid hot tubs for 1 year after transplant
 - Public gym use should not be discouraged because the benefits of exercise outweigh the risk of exposure
- **Distony:**
 - Empty ribcage bag before engaging in exercise
 - Weight lifting/resistance exercises should start with low resistance and progress slowly under the guidance of trained exercise professionals
 - Avoid contact sports and exercises that result in excessive intra-abdominal pressure
 - Infection precautions recommended
- **Peripheral neuropathy:**
 - Stability, balance, and gait should be assessed before engaging in exercise
 - Consider alternative aerobic exercise (stationary biking, water aerobics) rather than walking if neuropathy affects stability
 - Monitor discomfort in hands when using hand-held weights. Consider using dumbbells with soft/tubber coating, and/or wear padded gloves (eg, cycling gloves)
- **Bone loss/bone metastases:**
 - Survivors with osteoporosis or bone metastases should have fracture risk and/or bone density assessed before initiation of exercise program as clinically indicated

¹When possible, survivors in these populations should initiate exercise program under supervision by trained personnel. Trained personnel can include physical therapists, certified trainers, cancer rehabilitation specialists, or exercise specialists. Specialized training in cancer exercise is available through the American College of Sports Medicine (ACSM) (<http://www.acsm.org/get-certified>). Patients should be encouraged to use an ACSM-certified trainer when available.

SPA-A

EXAMPLES OF PHYSICAL ACTIVITY

Light Exercise ¹ (No noticeable change in breathing pattern)	Moderate Exercise ² (Can talk, but not sing)	Vigorous Exercise ² (Can say a few words without stopping to catch a breath)
<ul style="list-style-type: none"> • Leisurely biking at 5 miles/hour or less • Activity-promoting video game • Light housework (light sweeping, dusting) • Bowling • Playing catch • Slow walking • Garage work • Child care • Yoga • Tai chi 	<ul style="list-style-type: none"> • Ballroom/live dancing • Biking on level ground or with few hills • General gardening • Baseball, softball, volleyball • Doubles tennis • Using a manual wheelchair • Using hand cycles (ergometers) • Brisk walking • Water aerobics • Yoga 	<ul style="list-style-type: none"> • Aerobic/line dancing • Biking faster than 10 miles/hour • Heavy gardening • Hiking uphill • Jumping rope • Martial arts • Race walking, jogging, running • Running sports (basketball, hockey, soccer) • Swimming (fast pace or laps) • Singles tennis • Stair climbing • High-intensity yoga

STRATEGIES TO INCREASE PHYSICAL ACTIVITY

- Physician and/or fitness expert recommendation
- Supervised exercise program or classes
- Telephone counseling
- Motivational counseling
- Evaluate readiness to change, importance of change, self-efficacy
- Cancer survivor-specific print materials (see SURV-B 2 of 2)³
- Set short- and long-term goals

¹Available online, in these guidelines, at NCCN.org

²From the National Heart, Lung, and Blood Institute (http://www.nhlbi.nih.gov/health/0public/heart/obesity/hsa_042phy_act.html) and the Compendium of Physical Activities (<https://sites.google.com/site/compendiumofphysicalactivities/>).

³Reproduced and adapted from U.S. Department of Health & Human Services. Be Active Your Way: A Fact Sheet for Adults. Washington, DC: U.S. Department of Health and Human Services; Available at: <http://www.health.gov/PDF/04guidelinesfactSheetAdults.aspx>. Accessed February 22, 2013.

SPA-B



In addition, observational studies have consistently found that physical activity is linked to decreased cancer incidence and recurrence, and increased survival for certain tumor types.^{13,21–29} For example, one meta-analysis of 6 studies including more than 12,000 survivors of breast cancer found that postdiagnosis physical activity reduced all-cause mortality by 41% ($P < .00001$) and disease recurrence by 24% ($P = .00001$).²³ Data from other meta-analyses primarily consisting of observational studies of survivors of colorectal, ovarian, non-small cell lung, brain, prostate, and breast cancers show that physical activity is associated with both decreased all-cause mortality and/or cancer-specific mortality.^{21,24,28,30} In fact, analyses of data from 986 survivors of breast cancer from the National Runners' and Walkers' Health Studies found that mortality decreased with increased rates of energy expenditure.²⁹ Evidence in other disease sites is less robust, but also suggests survival benefits associated with exercise in survivors after treatment.³⁰

Data also support the idea that inactivity/sedentary behavior is a risk factor for cancer incidence and mortality, and impacts mood and quality of life in survivors, independent of the level of an individual's recreational or occupational physical activity.^{1,31,32} For example, in a cohort of more than 2000 survivors of nonmetastatic colorectal cancer, those who spent more leisure time sitting had a higher mortality than those who spent more time in recreational activity.¹

Evaluation and Assessment for Physical Activity—Survivors should be asked about readiness for participation and their current level of physical activity at regular intervals. The Godin Leisure-Time Exercise Questionnaire is one tool that can be used to assess a survivor's exercise behavior, with a modified version also able to assess daily time in moderate-to-vigorous activity.^{33,34}

For survivors who are not meeting the guideline recommendations (see later discussion), barriers to physical activity should be discussed and addressed, if possible. Common barriers

include not having enough time to exercise, not having access to an acceptable exercise environment, uncertainty about safety of exercise posttreatment, lack of knowledge regarding appropriate activities, and physical limitations.³⁵ In addition, alleviation of pain, fatigue, distress, or nutritional deficits can facilitate the initiation of an exercise program.

Risk Assessment for Exercise-Induced Adverse Events—Exercise is considered safe for most survivors.^{16,17,36} However, a significant portion of survivors may have comorbid conditions or risk factors that make them unable to safely exercise without trained supervision.³⁷ Therefore, a risk assessment is required for all survivors before prescribing a specific exercise program.^{16,38} The type of cancer, treatment modalities received, and the number and severity of comorbidities determine risk levels.³⁶ Thus, disease and treatment history, late and long-term effects, and comorbidities should be assessed. Exercise is typically contraindicated in survivors immediately (≈ 30 days) after surgery (except for supervised physical activity with early mobilization and referral to a trained therapist) and in those with severe anemia, a worsening condition, or active infection.^{16,38} A standardized preparticipation screening questionnaire, such as the The Physical Activity Readiness Questionnaire for Everyone (PAR-Q+),³⁹ can also be considered to identify patients for whom unsupervised physical activity is likely safe versus those for whom it may pose undue risk.

Survivors with myeloma, peripheral neuropathy, bone metastases, poor bone health, arthritis, or musculoskeletal issues are considered at moderate risk for exercise-induced adverse events. Stability, balance, and gait should be assessed in survivors with peripheral neuropathy before they engage in exercise, and exercise choice should be made based on the results (ie, stationary bike or water aerobics for survivors with poor balance). Survivors with osteoporosis, myeloma, or bone metastases should have fracture risk and/or bone density assessed as clinically indicated before initiating an exercise program. Moderate-risk survivors can often follow the general recommendations for physical activity; however, medical clearance and/or referrals to trained personnel, such as a physical therapist, certified trainer, cancer rehabilitation specialist, pulmonary or cardiac rehabilitation specialist, or exercise specialist, can also be considered. Specialized training in cancer exercise is available through the American College of Sports Medicine (ACSM; <http://www.acsm.org/get-certified>). Survivors should be encouraged to use an ACSM-certified trainer when available.

Survivors at high-risk for exercise-associated adverse events include those with a history of lung surgery or major abdominal surgery, an ostomy, cardiopulmonary comorbidities (eg, chronic obstructive pulmonary disease, chronic heart failure, coronary artery disease cardiomyopathy), ataxia, severe nutritional deficiencies, or extreme fatigue. These survivors should receive medical clearance and referral to trained personnel for a supervised exercise program.³⁶ In general, exercise should be individualized to the participant based on current exercise level and medical factors, and should be progressed in terms of intensity, duration, and frequency as tolerated.

Survivors with lymphedema are considered at moderate risk if they are performing resistance/strength-training exercise of the affected limb, but at low risk if they are

participating in cardiovascular/aerobic exercise or strength training of unaffected limbs.^{40–45} Resistance training in survivors with or at risk for lymphedema is discussed in more detail in the section “Resistance and Strength Training,” opposite column.

Physical Activity Recommendations for Survivors—Both the American Cancer Society and the ACSM have made physical activity recommendations for cancer survivors.^{15,16} The panel supports these recommendations and has adapted them as follows:

- All survivors should be encouraged to avoid inactivity or a sedentary lifestyle and return to daily activities as soon as possible.
- Survivors who are able should be encouraged to engage in daily physical activity, including exercise, routine activities, and recreational activities.
- Physical activity and exercise recommendations should be tailored to individual survivors’ abilities and preferences.
- General recommendations for cancer survivors:
 - Overall volume of weekly activity should be at least 150 minutes of moderate-intensity activity or 75 minutes of vigorous-intensity activity, or an equivalent combination
 - Individuals should engage in 2 to 3 sessions per week of strength training (see next section on “Resistance and Strength Training”) that includes major muscle groups
 - Major muscle groups should be stretched on the days exercises are performed.

The panel acknowledges that most survivors do not meet these exercise recommendations, and a significant portion report that they perform no leisure-time activity.^{46,47} However, the evidence suggests that even light-intensity physical activity can improve physical functioning in survivors.⁴⁸ For survivors who are inactive, clinicians must not advise the immediate initiation of a high-intensity, high-frequency program.⁴⁹ Instead, the panel suggests that clinicians provide sufficient information to encourage survivors to avoid inactivity.³⁸ The panel recommends starting inactive survivors with 1 to 3 light/moderate-intensity sessions of 20 minutes or more per week, with progression based on tolerance, as outlined in the guidelines.⁴⁹ For survivors tolerating the minimum guideline recommendations, clinicians should consider encouraging variation within the exercise program or increasing the amount of time engaged in physical activities/exercise modalities. Walking and using a stationary bike are safe for virtually all survivors.

Resistance and Strength Training—The health benefits of resistance training include improvement in muscle strength and endurance, improvements in functional status, and maintenance/improvement in bone density. Studies in survivors have shown improvements in lean body mass, muscular function, and upper body strength.^{50–53} A recent systematic review of 15 studies of resistance training interventions during and/or after cancer treatment concluded that meaningful improvements in physiologic and quality-of-life outcomes can be

achieved.⁵¹ A similar review of 11 randomized controlled trials came to similar conclusions.⁵³

Multijoint exercises (eg, chest press, shoulder press, squats, lunges, pushups) are recommended over exercises focused on a single joint, and all major muscle groups (chest, shoulders, arms, back, abdomen, and legs) should be incorporated into a resistance training program. For survivors who do not currently engage in resistance training, clinicians should recommend that they start with 1 set of each exercise and progress up to 2 to 3 sets as tolerated. A weight that would allow the performance of 10 to 15 repetitions is recommended; however, individualizing recommendations for resistance and strength training is important.

Strength training has been shown to be safe for survivors at risk for or with lymphedema, and may even improve lymphedema symptoms.^{40–44} Still, caution is advised in this population,⁴⁵ and referral to a lymphedema specialist for evaluation before starting a physical activity program that involves strength or resistance training of the affected limb should be considered. The panel lists special considerations for strength training in this population of survivors in the guidelines, including the use of compression garments, working with a professional trainer, slow progression as tolerated, and baseline and periodic evaluation of lymphedema. The National Lymphedema Network has published a position statement with additional guidance for exercise in individuals with lymphedema.⁵⁴

Interventions to Increase Physical Activity—Dozens of studies have looked at the efficacy of a variety of behavioral interventions for increasing exercise behavior in cancer survivors.¹⁶ However, data comparing different interventions are limited, and there is currently no “best” physical activity program for cancer survivors.^{55–58} Several studies have examined the physical activity and counseling preferences of survivors, with the goal of informing possible strategies to best encourage increased activity in this population.^{59–61}

The panel suggests several strategies to help increase physical activity. These strategies include a simple recommendation from a physician, physical therapist, and/or certified exercise physiologist.^{62–64} In addition, participation in supervised exercise programs or classes or use of a pedometer may be helpful for survivors.^{65–68} Print materials, telephone counseling, motivational counseling, and theory-based behavioral approaches (discussed in the next section) are other strategies that may be effective for increasing physical activity in the survivor population.^{66,68–72}

Health Behavioral Change

Lifestyle behaviors are one area cancer survivors can control if they are encouraged to change and are aware of resources to help them. Ambivalence about changing behavior is common in the general population, but among cancer survivors levels of motivation are often heightened, especially close to the time of diagnosis.^{10,62,73}

Some data suggest that recommendations from the oncologist can carry significant weight for patients with cancer, yet many providers do not discuss healthy lifestyle changes with survivors.^{62–64} Print materials and telephone counseling are other strategies that may be

effective for improving healthy behavior in the survivor population, and several trials show support for these strategies.^{66,68,71,72} In fact, a recent trial showed that telephone-based health behavior coaching had a positive effect on physical activity, diet, and body mass index in survivors of colorectal cancer.⁷¹ Moreover, results of the recently completed Reach Out to Enhance Wellness (RENEW) trial showed that an intervention of telephone counseling and mailed materials in 641 older, obese, and overweight survivors of breast, prostate, and colorectal cancers not only resulted in improved diet quality, weight loss, and physical activity but also had a long-lasting effect that was sustained a year after the intervention was complete.

Another strategy, motivational counseling, may be an effective technique for increasing physical activity and other healthy behaviors in cancer survivors.^{69,70} Motivational counseling focuses on exploring the survivor's thoughts, wants, and feelings and is directed at moving through ambivalence so survivors choose to change their behavior.⁷⁴ Other behavioral strategies may also be useful, such as improving self-efficacy (ie, the belief that one can perform the actions of new activity and maintain this practice by addressing barriers and planning for behavior change) and self-monitoring.^{75,76}

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