Primary Care Clinicians, Cancer Survivorship, and Lifestyle Medicine

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Primary care physicians (PCPs) are routinely expected to manage patients with complex medical problems and will now be called upon to address a growing population of cancer survivors. The current number of oncologists may not be able to keep up with the demands of the growing number of survivors. An inflection point is emerging in which PCPs will need to assume the long-term care of these patients.[1] Cancer survivors need a smooth transition from acute cancer therapies to long-term cancer care; primary care providers must integrate with oncologists to assist in this transition.[2] Although high-profile campaigns are dedicated to cancer awareness, treatment, and fundraising, none address the fundamental issue of lifestyle choices and their impact on not only cancer prevention but survivorship as well. The incorporation of lifestyle medicine recommendations plays a significant role in this transition, as discussed in the body of this manuscript.

Cancer is the second-leading cause of mortality in the Western world and will soon exceed cardiovascular disease as the primary cause.[3] In the United States, approximately 1.8 million patients were diagnosed with cancer resulting in nearly 600,000 deaths in 2020.[4,5] Because more than 75% of patients with malignancies survive 5 years or longer after treatment, cancer often becomes a chronic condition.[6] Other chronic conditions are often the result of lifestyle and are responsible for most of our healthcare expenditure.[1] Currently, nearly 17 million Americans have a history of cancer; this number is projected to exceed 22 million by 2030.[7]

The deciphering of the human genome has revealed many secrets of the influences of genes and their variants on multiple chronic conditions. With such understanding, we have also come to realize that the impact of genetic influences on the development of malignancies may, in fact, only be minimal, accounting for only 5%-10% of cancers.[8] This underscores the importance of lifestyle as it relates to cancer. Avoiding tobacco, minimizing UV exposure, minimizing alcohol intake, and adhering to safe sexual practices are commonsense measures that are well understood to reduce certain future cancer risks. Less addressed is the importance of dietary recommendations and their relevance in cancer prevention and survivorship.[9] The Western diet, high in saturated fats, sugar, and highly processed foods, is inflammatory in nature and interferes with our immunity.[10] The low consumption of fruits and vegetables (fiber) results in an increase in dysbiosis and gut inflammation, resulting in immunity suppression.[11-13] Because a large portion of our immune response is dependent on the gut microbiome, the nutrients we feed these organisms control their actions as well as their protective effects through the production of

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TABLE 1. **General recommendations for all cancer survivors: Dietary**[1,15,16,a]

Decrease substantially or eliminate	Increase or consume heavily
Inflammatory foods (no fiber)	Anti-inflammatory foods (high fiber)
Low-nutrient/high-calorie foods • Meat, processed/cured meats, and animal dairy products (milk, cheese, eggs, etc) • Highly refined sugars/sugar substitutes (including high-fructose corn syrup, Stevia, Truvia, Splenda, Equal, Sweet'n Low, etc) • Highly processed foods, alcohol, and sugar/sugar substitute–sweetened beverages	**High-nutrient/low-calorie foods** • Whole grains, vegetables, fruits and pulses (legumes) such as beans/lentils, and calcium-fortified plant-based dairy (soy, almond, rice, oat) **High-nutrient/high-calorie foods: In moderation** • Nuts, seeds, and avocados

[a] Dietary and stress-reducing recommendations are well documented.

short-chain fatty acids. These serve to protect the colonic endothelial layer, decreasing the flow of toxins into the circulatory system that increase inflammation.[14,15] Foods with inflammatory properties vs foods that are anti-inflammatory are summarized in **TABLE 1**.[1,15,16]

Breast cancer is the most common malignancy among women, affecting 2.4 million women worldwide and claiming the lives of more than 625,000 annually.[17] Poor dietary patterns and sedentary lifestyles result in inflammation, obesity, and an excess of estrogen, which are major risk factors for breast cancer.[16,18] Prostate cancer is the most common malignancy among men, affecting 1.6 million worldwide and taking the lives of nearly 400,000 annually.[16,17] As with breast cancer, prostate cancer is associated with dietary factors, obesity, and inflammation, which is also associated with disease aggressiveness. A higher intake of animal foods appears to be correlated with prostate cancer.[16,19] Colorectal cancer is the third most commonly diagnosed non–gender-specific cancer, affecting 1.7 million worldwide and claiming the lives of 832,000 annually.[16,17] Risk factors for colorectal cancer include a lack of physical activity, obesity, and the dietary components of the standard American diet: a high consumption of red meats and/or processed foods, and a low consumption of vegetables, grains, fruits, legumes, and fiber, resulting again in the promotion of inflammation.[16,20]

To date, more than 100 different cancers have been identified. Guidelines for follow-up of cancer survivors with site-specific cancers are readily available and are in print from numerous professional organizations, including the American Society of Clinical Oncology, the National Comprehensive Cancer Network, the American College of Surgeons, and the American Cancer Society. It is unreasonable to expect any oncologist or PCP to keep up-to-date with the entirety of all such recommendations; importantly, many guidelines have not been proven to be effective in decreasing recurrence nor in improving overall disease-free survival. On the other hand, extensive evidence exists that lifestyle changes can have a major impact on cancer survivorship.[1,15,16,21-23]

Cancer patients face a unique predicament in that any new ache or pain, lump or bump, or rash or itch may be a sign of a potential recurrence; such fears are omnipresent because the number one concern of most is recurrence. The mission of survivorship care is to move a patient forward to resume a normal life. The role of the PCP is to reassure the patient that such fears, although real, are poorly substantiated, and that the patient is being carefully monitored for any future adverse event that might signal the return of cancer or the development of a secondary primary malignancy. Nonetheless, the fear of recurrence leads to emotional concerns and requires behavior modifications.[24] Although non-lifestyle factors, such as genetic variants, have been associated with susceptibilities to the development of a majority of chronic diseases, there is evidence that the hereditability of such aberrations may, in fact, only be modest, as previously mentioned.[8,25] As such, lifestyle medicine has now become recognized as an important intervention to prevent and reverse many chronic conditions. Primary care physicians can help their patients who are cancer survivors, as well as other patients, by becoming familiar with ideas and treatments arising from a lifestyle medicine perspective.[16]

Lifestyle medicine is rapidly emerging as a new subspecialty, but it is far from being new; in fact, it has been practiced for thousands of years.[1,15,16] As opposed to conventional medicine, which focuses on disease management with a "pill for every ill," lifestyle medicine addresses the prevention and reversal of chronic conditions by empowering patients to assume responsibility for their own well-being by adopting healthy lifestyle modifications. In no one is this a more important and potentially effective intervention than cancer patients. Decades ago, a cancer diagnosis was considered a death sentence; this is no longer true, as survival rates have dramatically increased. The positive effects of lifestyle medi-

cine interventions have been demonstrated in patients with chronic conditions, including cancer.[1,16,26] We, as healthcare professionals, have an opportunity to intervene and to affect the health and well-being of cancer survivors.

Cancer survivorship is not simply a function of monitoring for recurrence and secondary malignancies; it also involves reducing the mortality resulting from comorbidities that can be modified through the adoption of a healthy lifestyle: a whole-food, plant-based diet; maintenance of a healthy body mass index (BMI); and stress management.[1,27] The two leading causes of death in the Western world are cardiovascular disease and cancer.[16] These diseases share common risk factors including obesity and inflammation; addressing these issues can impact not only cancer, but also multiple other chronic conditions, such as diabetes, hyperlipidemia, obesity, cardiovascular disease, and even dementia.[15]

Inflammation is responsible for the majority of chronic conditions and fuels obesity and diabetes, which are both risk factors for the development of many malignancies.[28] The state of chronic inflammation in which the Western world currently lives is primarily the result of the many ultra-processed foods that we consume. Processing procedures strip the nutritional value of foods and add dozens, if not hundreds, of chemicals to decrease cost of production, increase shelf life, and make foods taste better; none of these chemicals were ever meant to be consumed by the human body, which triggers an immune response that leads to a state of chronic inflammation.[14,15] The importance of healthy lifestyle changes (maintaining a near-normal BMI, consuming a healthy diet, increasing physical activity, and managing stress) has been documented to be effective in decreasing cancer development and progression.[1,28,29] Physical activity is important in managing obesity, which is associated with insulin resistance and contributes to the development of the metabolic syndrome.[15] Physical activity is not simply a strategy for weight control; it decreases the inflammatory reaction of the body and mitigates carcinogenesis.[30] Physical activity decreases stress and can reduce unhealthy patterns related to "emotional eating" and obesity, which is a risk factor for nearly all cancers.[31]

Of recent interest is the recognition of the importance of the human gut microbiome and its role in the development of cancer.[15,16] The gut microbiome harbors more than 100 trillion bacteria, yeast, fungi, and protozoa that are responsible for providing up to 70% of immunity; this synergistic association is largely dependent on diet.[32] The microbiota has now been recognized as playing a major role in breast, colon, and prostate cancers.[15,16] Alterations in the gut microbiome, as influenced by our Western lifestyle, are directly related to the development of chronic conditions. Evidence for a strong correlation between gut microflora dysbiosis and disease is expanding exponentially and is particularly relevant to the development of cancer as well as cardiovascular disease; both are exacerbated by the many therapeutics used in the treatment of cancers.[15,33-36]

CLINICIAN EDUCATION REGARDING BENEFITS OF HEALTHY LIFESTYLE RECOMMENDATIONS

Clinicians may have difficulty in finding reliable lifestyle medicine resources for their own education. Some well-recognized and respected programs are listed below:

- Plant-based nutrition certification, Cornell University: https://ecornell.cornell.edu/certificates/nutrition/plant-based-nutrition/
- American College of Lifestyle Medicine certification: https://www.lifestylemedicine.org/ACLM/Certification/Become_Certified.aspx
- Lifestyle conference attendance (eg, The Plantrician Project: www.plantricianproject.org)
- T. Colin Campbell Center for Nutrition Studies: http://nutritionstudies.org
- Physicians Committee for Responsible Medicine: www.pcrm.org

Screening tests for cancer, eg, mammography for breast cancer, prostate-specific antigen for prostate cancer, and fecal immunochemical test and colonoscopy for colon cancer, are not preventive; they only serve to detect cancer and are, therefore, reactive. *Cancer detected is a failure of prevention.* Lifestyle medicine's crucial role focuses on the prevention of disease. PCPs can take a proactive approach by preventing cancer through the prescription of lifestyle modifications as early as possible, beginning with encouraging parents of young children to adopt a healthy diet and exercise habits.[37] It is time to transition youth away from sedentary activities (gaming and internet time) and consumption of processed snack foods/convenience-based meals and encourage face-to-face social interactions and physical activities.[37,38]

Fully recognizing the enormous time pressures placed on PCPs, we advocate for 3 principles to be provided to patients (**TABLE 1**[1,15,16]; **TABLE 2**[1,16]; **TABLE 3**[15,28,39-44]). Incorporating lifestyle medicine regarding cancer survivorship need not be difficult. Numerous resources are available for a rapid education in lifestyle medicine (see Sidebar: Practitioner Education Regarding Benefits of Healthy Lifestyle Recommendations).[16]

Current guidelines for postcancer care may need to be updated frequently as new information and therapeutics become available. We may already be overdriven by surveil-

TABLE 2. **General recommendations for all cancer survivors: Stress reduction (anti-inflammation)**[1,16,a]

Promote/recruit social support (family, friends, and community)
Exercise: 30 minutes/day, 5-7 days per week of aerobic (low or high intensity)/anaerobic activity
Practice stress-reducing activities: Mindfulness, aromatherapy, journaling, gardening, etc

[a] Dietary and stress-reducing recommendations are well documented.

TABLE 3. **General recommendations for all cancer survivors: Supplements**[15,28,39-44,a]

Supplement	Recommended dosage
Multivitamin with trace elements and minerals	1 tablet/day
Aspirin[42-44]	81 mg/day (caution if concurrent anticoagulant therapy)
Vitamin D_3	2000 IU/day
Calcium citrate (if calcium carbonate, take with food)	1200 mg/day
Flaxseed oil	1000 mg/day (ground flaxseed: 2-3 tbsp/day)

[a] Emphasis should be placed on meeting nutritional needs from Table 1. Supplement suggestions are based on preliminary findings and should be discussed with each patient.

lance guidelines that further burden the healthcare system. Numerous organizations recommend a history and physical examination every 3 to 6 months for 2 to 5 years; yet there is little evidence of the effectiveness of this in decreasing recurrence nor in increasing overall disease-free survival. A recent publication addresses the ineffectiveness of close surveillance in oral pharyngeal squamous cell carcinoma.[45]

Although each cancer requires surveillance after treatment, many are specific to certain malignancies.[21] Most recurrences appear within the first 2 years of initial diagnosis. Patients should be closely monitored by oncologists and their surgical oncology colleagues for an initial 12 to 24 months. Basic recommendations are presented in (**TABLE 4**); such recommendations are based on disease state and the lack of new symptoms (detection of a new mass, skin lesion, localized bone pain, new onset of chronic headaches, cough, etc). Long-term follow-up of cancer patients will become routine in the primary care setting.

In the long-term care of cancer survivors, attention should also focus on the potential long-term side effects of therapies used in treatment. For example, multiple comorbidities often overlap (eg, diabetic neuropathy may be exacerbated by chemotherapy-associated neuropathy). Specific attention must be directed to conditions such as cardiovascular disease resulting from chemotherapy, radiation, and monoclonal antibody therapies.[1,15] Secondary primary malignancies now account for nearly 17% of all malignancies, as reported by the National Cancer Institute's Surveillance, Epidemiology, and End Results (SEER) program.[1] Lifestyle recommendations are now recognized as a factor in decreasing the development of secondary malignancies, as they minimize the chronic inflammatory state of the Western population.[1] Numerous proposals have been put forth to decrease the development of such malignancies, including modifications of toxic therapies currently used to treat primary cancers.[46,47]

Thromboembolic events (deep venous thrombosis and pulmonary embolism) are serious consequences common to all malignancies.[1] Osteoporosis is a silent disease often unrecognized until a fracture event. This is a major concern because hormonal blockade therapies can result in demineralization of bones and, occasionally, a lethal event. Additionally, multiple commonly prescribed drugs, ie, proton pump inhibitors, glucocorticoids, and psychotropic and antidepressant agents, can also contribute to bone weakening.[1] An important challenge is to ensure long-term adherence to therapies that require a minimum of 5 to 10 years of adherence, such as the recommendation of long-term antiestrogen therapy for breast cancer.[1] Attention must be paid to the interactions between medications that may result from polypharmacy-based practices.[15]

Many patients inquire about the use of supplements to protect them from cancer. There are more than 15,000 available supplements on the market—the majority of which have not been proved to have any effect on cancer development or recurrence. All are labeled with "This statement has not been evaluated by the Food and Drug Administration." The best advice for patients is to obtain their core nutrients and phytonutrients from natural, healthy whole foods.

General recommendations for cancer survivors, in addition to dietary advice and physical activity, include daily consumption of vitamin D_3 (2000 IU/day), aspirin (81 mg/day),

TABLE 4. **Minimal imaging and laboratory testing follow-up recommendations following initial diagnosis**[a]

Diagnosis	Recommendation
Breast cancer	Monthly BSE Annual mammography/tomosynthesis in conjunction with CBE If *BRCA* gene positive: annual mammogram/tomosynthesis alternating with MRI every 6 months
Prostate cancer	PSA every 6-12 months after diagnosis for first 5 years, then annually Referral for investigation of urinary symptoms
Colorectal cancer	CEA every 6 months Colonoscopy 1 and 4 years following surgery, and then at 5-year intervals

BSE, breast self-examination; CBE, clinical breast examination; CEA, carcinoembryonic antigen; MRI, magnetic resonance imaging; PSA, prostate-specific antigen.

[a] Regarding *BRCA*, annual mammography and CBE should be done in close conjunction as a normal mammogram does not negate a CBE. Mammography is only 80% accurate, and a CBE is a necessity to confirm or refute a radiologic evaluation. These minimal recommendations are based on stage and aggressiveness of a cancer diagnosis. Note: Such recommendations are subject to change as new information becomes available.

and ground flaxseed (2-3 tablespoons daily) **(TABLE 3)**.[15,39-44] All are anti-inflammatory, as are the dietary recommendations presented. In addition to its anti-inflammatory properties, ground flaxseed is an excellent source of fiber, which further results in a decrease in colon and breast cancer recurrence through microbiome enhancement.[15,48,49]

PCPs are already naturally disposed to guiding patients toward the adoption of a healthy lifestyle.[50] A cancer diagnosis presents a tremendous opportunity for the PCP to introduce the importance of lifestyle medicine recommendations, not only as they relate to the malignancy but also to address overall health. A patient diagnosed with cancer is vulnerable and may seek any intervention that may impact overall survival; lifestyle medicine may be exactly what they need. Numerous resources are available for PCPs to become more prepared and confident in the delivery of such care.[1,15] Multiple cancer survivorship issues should be addressed, and numerous variations in care models have been put forth. Healthcare organizations across the country provide varying levels of survivorship care in multiple departments, and such models are in a state of flux and require further refinement.[51] Ultimately, long-term care of cancer survivors will end up in the domain of primary care. As cancer survivorship becomes a more prominent chronic condition management issue for PCPs, lifestyle medicine principles can help optimize health outcomes for this population—the challenge is formidable, but the reward is commensurate. ●

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