

## Physical Activity & Exercise Benefits Cancer Patients and Survivors

### Overview

There is clear evidence that physical activity is a safe and effective means to prevent cancer as well as mitigate disease and treatment-related side effects in both patients and survivors.<sup>1,2</sup> With many cancer patients and survivors reliant on advice from physicians and other health professionals, it is essential that health care providers, patients and survivors are aware of the physical and psychosocial benefits of physical activity.<sup>3-5</sup> Unfortunately, empirically-based physical activity recommendations are often not communicated to either health care providers or cancer patients/survivors. In a report published by the U.S. Department of Health and Human Services, it was noted that only one in three cancer patients were being advised to engage in physical activity.<sup>5</sup> With little guidance and understanding of the benefits of physical activity, cancer patients and survivors are at an increased risk for recurrence and/or onset of additional co-morbidities, and premature mortality.<sup>1,2,6</sup>

**Physical activity, as defined by the World Health Organization, is “any bodily movement produced by skeletal muscles that requires energy expenditure” (p.1).<sup>7</sup> Examples include bodily movements that are part of employment, active transportation, household chores, unstructured play, sport and recreational activities.**

**Exercise is a “sub-category of physical activity that is *planned, structured, repetitive, and purposeful*” where the “improvement or maintenance of one or more physical components of physical fitness (e.g., increase muscular strength, improve aerobic endurance) is the objective” (p.1).<sup>7</sup>**

While much of the research with respect to physical activity and cancer care has focused on structured exercise protocols, it is important to note that both increased general physical activity and structured exercise confer health benefits for the public, cancer patients, and survivors. For the purpose of this *In Practice*, we will refer to the broader term of physical activity, which includes exercise-based research.

### Background

With advancements in health care and an aging population, Nova Scotia is seeing more people living longer following a diagnosis of cancer. However, increased survival raises other health implications, including: acute/late effects from disease or treatment, cancer recurrence, second cancers, additional co-morbidities, and a multitude of psychosocial problems.<sup>8</sup> Therefore, it is important to consider best practices that will optimize and improve quality of survival. Though physical activity has not yet been widely adopted as a part of standard practice for cancer patients and survivors, available evidence across the cancer continuum provides credible data to recommend its inclusion.

Physical activity has been successfully integrated into other disease management programs such as cardiac rehabilitation, with structured physical activity programs and rehabilitative exercise therapy now a cornerstone of cardiac rehabilitation (prevention, recovery, and management).<sup>9-11</sup> It is now common practice to prescribe physical activity to optimize the health of the patient. Physical activity is strongly supported as a means to strengthen the body for physical and psychological stressors, as it can maintain/improve the individuals' functional capacity, minimize potential muscle atrophy, and encourage a more rapid recovery after treatment.<sup>9</sup> Taking a similar approach to cancer care and

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## Background (cont'd)

encouraging patients and survivors to engage in some form of physical activity, could potentially enhance their overall well-being and quality of life both pre and post-treatment.<sup>9-13</sup>

Using the Physical Exercise Across the Cancer Experience Framework, developed by Courneya and Friedenreich,<sup>14</sup> Table 1 provides a summary of the benefits of physical activity across the cancer continuum. Although many factors (e.g., medical, demographic, behavioral, social, environmental) can contribute to low physical activity levels in patients/survivors, making physical activity counselling and prescription a part of standard practice should foster improved acceptance and adoption.

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## Physical Activity Benefits

### Prevention

A substantial body of evidence has demonstrated a convincing link between physical inactivity and cancer risk.<sup>15-17</sup> Physical inactivity has been linked to a greater risk of colon,<sup>16</sup> breast,<sup>16</sup> endometrial,<sup>16</sup> prostate,<sup>15,16</sup> gastric,<sup>17</sup> kidney,<sup>18</sup> bladder,<sup>19</sup> esophageal,<sup>20</sup> lung,<sup>21</sup> and ovarian cancer.<sup>15</sup> Physical activity is also recognized as a way to maintain a healthy weight and prevent overweight/obesity.<sup>22</sup> By maintaining a healthy weight, individuals reduce their risk of disease onset and other comorbid complications.<sup>22,23</sup>

### Pre-Treatment

Physical activity during the pre-treatment phase (e.g., timeline between cancer diagnosis and start of clinical treatment/intervention),<sup>24</sup> is relatively new in oncology. As a result, there is limited data supporting its overall effect with post-treatment outcomes. However, preliminary evidence suggests that pre-treatment physical activity not only prepares the body for the physical and psychological stressors of treatment, it also provides a strong foundation, enabling the cancer patient

to recover more quickly.<sup>24</sup> Pre-treatment physical activity programs are also a means to maintain functional fitness (musculoskeletal, cardiopulmonary) and psychological stability.<sup>9</sup> Encouraging cancer patients to engage in physical activity pre-treatment may not only reduce the severity of the anticipated treatment-related impairments,<sup>24</sup> but it may also enable patients to return to their highest level of function more quickly.

### During Treatment

Whether on active treatment or between treatments, the American College of Sports Medicine strongly advises that **some activity is better than no activity.**<sup>25</sup> Furthermore, the Canadian Cancer Society and the American College of Sports Medicine endorse physical activity as a means to maintain or improve physical and psychological well-being while one is actively undergoing cancer treatment.<sup>25,26</sup> By including physical activity into the overall treatment plan, cancer patients and survivors are better able to manage disease and treatment-related side-effects as described in Table 1.<sup>2,6,11,25</sup>

### Survivorship

It is widely accepted that a cancer diagnosis and its therapies (chemotherapy, radiation, surgery, and hormonal agents) can lead to a variety of “late effects”.<sup>16,27</sup> For example, cancer survivors may face many late or long-term effects such as cardio-toxicity, peripheral neuropathy, bone loss, weight gain, reduced muscle strength, and cognitive impairments (p.143).<sup>28</sup> Because each individual is unique, and therapies vary according to type and stage of cancer, physical activity interventions may need to be adapted to fit individual needs.<sup>25,29</sup> Cancer survivors, who are just beginning or who are re-engaging in physical activity programs, are encouraged to start slowly and progress gradually.<sup>29</sup>

### Supportive/Palliative Care

Continuing to encourage cancer patients to engage in physical activity once their disease has progressed to a palliative stage

is equally important. Patients with advanced disease also reap physical and psychosocial benefits from a physical activity intervention.<sup>30</sup> Palliative cancer patients often have high levels of disease and treatment-related symptoms such as pain, fatigue, nausea, shortness of breath, depression, anxiety, and stress.<sup>30</sup> Physical activity has been found to mitigate/manage some of these physical and psychosocial symptoms.<sup>30</sup> Research also indicates that patients with advanced cancer who engage in physical activity have lower levels of fatigue and a greater sense of invigoration and wellness, and are able to maintain their functional fitness for a longer period of time, despite chronic physical deterioration.<sup>30</sup> Suitable activities for those with advanced cancer include: yoga, tai chi, qi gong, walking, cycling, swimming, and resistance training as they are low impact, accessible, low cost, and do not result in weight loss.<sup>31</sup>

### Summary of Benefits

By engaging in a physical activity program, cancer patients/survivors are able to maintain or improve their muscle strength and overall functional fitness, as well as reduce feelings of fatigue.<sup>32</sup> Thus, cancer patients are able to more fully participate in activities of daily living.<sup>32</sup> These small, but meaningful interactions have a positive impact on the psychosocial well-being of cancer patients.<sup>6,32</sup> Moreover, cancer patients who engage in physical activity regain a sense of independence and autonomy.<sup>32</sup> This is especially important for providing the confidence to continue in activities of daily living as well as returning to work.<sup>6,11</sup>

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**“It is time for health care providers and patients to realize the benefits of physical activity in the prevention and therapy of cancer.”**

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## Physical Activity Benefits (cont'd)

Table 1: Physical and psychological benefits of physical activity across the cancer continuum

Stage of Disease	Improves	Reduces	
<b>Prevention (Pre-screening, screening)</b>	<ul style="list-style-type: none"> <li>• Immune surveillance<sup>33a</sup></li> <li>• Anti-inflammatory effect<sup>34b</sup></li> <li>• Endogenous antioxidant enzyme function<sup>33a</sup></li> <li>• Insulin sensitivity<sup>15a,33a</sup></li> <li>• Maintains normal growth factor production and activation<sup>33a</sup></li> <li>• DNA repair capacity<sup>33a</sup></li> <li>• Range of motion/flexibility<sup>35a</sup></li> </ul>	<ul style="list-style-type: none"> <li>• Obesity, excessive weight gain, and central adiposity (precursor to cancer onset)<sup>15a,33a</sup></li> <li>• Chronic inflammation<sup>34b</sup></li> <li>• Oxidative stress<sup>33a</sup></li> </ul>	
<b>Detection (Pre-treatment)</b>	<ul style="list-style-type: none"> <li>• Functional capacity (musculoskeletal, cardiorespiratory function)<sup>36a</sup></li> <li>• Post-operative outcomes (health-related quality of life)<sup>36a</sup></li> <li>• Psychological benefits, opportunity to change health behavior<sup>36a</sup></li> <li>• Range of motion post-treatment<sup>36a</sup></li> </ul>	<ul style="list-style-type: none"> <li>• Post-operative length of stay<sup>36a</sup></li> <li>• Stress, anxiety<sup>36a</sup></li> <li>• Post-operative complications (e.g., muscle atrophy, cardiopulmonary fitness)<sup>36a</sup></li> </ul>	
<b>During Treatment</b>	<ul style="list-style-type: none"> <li>• Quality of life<sup>13a</sup></li> <li>• Systemic therapy delivery<sup>22c,23a</sup></li> <li>• Maintains functional capacity<sup>37a</sup></li> <li>• Fatigue<sup>37a</sup></li> <li>• Range of motion<sup>11a</sup></li> <li>• Balance<sup>37a</sup></li> <li>• Body composition<sup>13a,11a</sup></li> <li>• Immune response<sup>13a</sup></li> </ul>	<ul style="list-style-type: none"> <li>• Cardiopulmonary system function<sup>13a</sup></li> <li>• Sleep<sup>6a,13a</sup></li> <li>• Body image<sup>6a</sup></li> <li>• Mood<sup>6a</sup></li> <li>• Body composition<sup>6a</sup></li> <li>• Appetite<sup>13a</sup></li> <li>• Self-esteem<sup>13a</sup></li> </ul>	<ul style="list-style-type: none"> <li>• Nausea<sup>38a</sup></li> <li>• Pain<sup>11a</sup></li> <li>• Swelling<sup>11a</sup></li> <li>• Muscle atrophy<sup>6a</sup></li> <li>• Shortness of breath<sup>6a</sup></li> <li>• Anxiety, stress<sup>6a</sup></li> <li>• Risk of depression<sup>6a</sup></li> </ul>
<b>Survivorship (Post-treatment)</b>	<ul style="list-style-type: none"> <li>• Quality of life<sup>39a</sup></li> <li>• Length of survival<sup>1a</sup></li> <li>• Body image<sup>39a</sup></li> <li>• Self-esteem and happiness<sup>39a</sup></li> <li>• Range of motion<sup>39a</sup></li> <li>• Body composition<sup>23a</sup></li> </ul>	<ul style="list-style-type: none"> <li>• Musculoskeletal strength<sup>39a</sup></li> <li>• Cardiopulmonary efficiency<sup>39a</sup></li> <li>• Immune surveillance<sup>39a</sup></li> <li>• Energy levels<sup>39a</sup></li> <li>• Balance<sup>39a</sup></li> </ul>	<ul style="list-style-type: none"> <li>• Risk of recurrence<sup>1a</sup></li> <li>• Mortality<sup>1a</sup></li> <li>• Risk of late effects<sup>40a</sup></li> <li>• Weight gain<sup>39a</sup></li> <li>• Cancer-related fatigue and pain<sup>39a</sup></li> <li>• Anxiety and depression<sup>39a</sup></li> </ul>
<b>Supportive and Palliative Care</b> <i>*Physical activity may improve or maintain physical and psychological wellness in palliative cancer patients</i>	<ul style="list-style-type: none"> <li>• Quality of life<sup>30b,41b</sup></li> <li>• Circulatory function<sup>30b</sup></li> <li>• Preserves respiratory function<sup>42b</sup></li> <li>• Strength<sup>41b</sup></li> <li>• Energy<sup>31b</sup></li> <li>• Sleep<sup>31b</sup></li> <li>• Range of motion/flexibility<sup>31b</sup></li> <li>• Body image<sup>30b</sup></li> <li>• Sense of purpose<sup>30b</sup></li> </ul>	<ul style="list-style-type: none"> <li>• Autonomy and independence<sup>30b</sup></li> <li>• Mood<sup>30b</sup></li> <li>• Appetite<sup>30b</sup></li> </ul>	<ul style="list-style-type: none"> <li>• Stress<sup>31b</sup></li> <li>• Anxiety<sup>31b</sup></li> <li>• Depression<sup>31b</sup></li> <li>• Fatigue<sup>31b</sup></li> <li>• Nausea<sup>31b</sup></li> <li>• Joint contractures<sup>30b</sup></li> <li>• Pain<sup>30b,31b</sup></li> <li>• Muscle atrophy<sup>30b</sup></li> <li>• Shortness of breath<sup>31b</sup></li> <li>• Constipation<sup>31b</sup></li> <li>• Lymphedema<sup>30b</sup></li> </ul>

### Levels of Evidence

Level I (<sup>a</sup>): Evidence from a systematic review of all relevant randomized controlled trials (RCT), or evidence-based clinical practice guidelines based on systematic reviews of RCT.

Level II (<sup>b</sup>): Evidence obtained from at least one well-designed RCT.

Level III (<sup>c</sup>): Evidence obtained from well-designed controlled trials without randomization, quasi-experimental.

## Considerations Before Starting a Physical Activity Program

The level of physical activity will depend on the type and stage of cancer, the patient's energy level, and treatment received.<sup>29,32</sup> The insert enclosed on The National Comprehensive Cancer Network's® (NCCN®) physical activity Survivorship Guidelines outlines a preliminary physical activity assessment, risk assessment, and recommendations for implementation.<sup>29</sup> It is important to note that some patients may exhibit contraindications to physical activity such as bone metastasis, peripheral neuropathy, suppressed immune function, or severe lymphedema.<sup>25,29</sup> A more detailed list of various conditions that would contraindicate physical activity is included in the NCCN insert. Although contraindications exist, research indicates that physical activity is safe for most cancer patients/survivors with the appropriate precautions and activity modifications.<sup>43</sup>

The American College of Sports Medicine, in collaboration with international and national researchers, has developed physical activity guidelines for cancer patients and survivors. A brief outline of these guidelines is provided below. The American College of Sports Medicine also provides cancer survivor-specific guidelines for breast, prostate, colon, hematologic, and gynecologic cancers.

The American College of Sports Medicine Physical Activity and Cancer Survivorship Guidelines<sup>25</sup> recommend:

- Engaging in regular physical activity;
- Avoiding inactivity and returning to normal daily activities as soon as possible following diagnosis;
- Aiming to exercise at least 150 minutes per week; and
- Including strength-training exercises at least two days per week.

Table 2 provides a summary of the evidence for various activities that can be performed, and provides guidance on intensity, frequency, and types of activities for cancer prevention and management.

**Table 2: Physical activity and cancer recommendations across disease trajectory**

Place on Continuum	Type	Intensity	Frequency	Time	
<b>Prevention</b> <sup>35</sup>	<b>Aerobic</b> • Brisk Walking • Cycling • Swimming • Calisthenics • Jogging	Moderate-Vigorous	Bouts of 10 minutes or more	150 minutes per week	
	<b>Resistance</b> • Free weights • Cable pulleys • Elastic resistance bands	1 set of 10-15 repetitions  Gradually work to 2 sets of 10-15 repetitions	2 times per week  Rest muscles at least one day between sessions	Ensure 1-2 minute rest between each set	
<b>Pre-Treatment</b> <sup>24</sup>	<b>Aerobic</b>	Maintain	2 times per week	For a duration that suits the unique needs of the individual	
	<b>Resistance</b>				
	<b>Flexibility</b>				
<b>During Treatment</b> <sup>6</sup>	<b>Aerobic</b>	Maintain	As often as able	For a duration that suits the unique needs of the individual	
	<b>Resistance</b>				
	<b>Flexibility</b> • Gentle stretching				
<b>Survivorship</b> <sup>25</sup>	<b>Aerobic</b> • Brisk Walking • Cycling • Swimming • Calisthenics • Jogging	Vigorous	3-5 days/week	75 minutes/week	
		Moderate		150 minutes/week	
	<b>Resistance</b> • Weights • Resistance machines • Weight Bearing	1 set of 10-15 repetitions	2-3 days/week	Ensure 1-2 minute rest between each set	
		Gradually work to 2 sets of 10-15 repetitions			
	<b>Flexibility</b> • Stretching • Range of motion activities	Target all muscle groups	Daily	Hold each stretch for 30 seconds and repeat on opposite side	
		Focus on areas that may have been impacted by treatment with steroids, radiation, or surgery			
<b>Palliative Care</b> <i>*Currently no guidelines exist</i>	<b>Aerobic</b> • Walking • Cycling • Swimming • Yoga • Tai Chi • Qi Gong	Light to moderate	1-2 times/week	For a duration that suits the unique needs of the individual	
		<b>Resistance</b> • Body weight • Elastic bands • Free weights		1-2 times/week	For a duration that suits the unique needs of the individual
		<b>Flexibility</b> • Stretching • Range of motion activities	Target all muscle groups  Focus on areas that may have been impacted by treatment with steroids, radiation, or surgery	Daily	Hold each stretch for 30 seconds and repeat on opposite side

*\*Light 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.<sup>29</sup>*

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## The Role of Primary Care and Other Health Professionals

Cancer patients and survivors are more likely to participate in and adhere to a physical activity program that is recommended by their family physician or other health care provider.<sup>44</sup> Despite low levels of physical activity, cancer patients and survivors do report an interest and willingness in participating in physical activity across all stages of the disease trajectory.<sup>44</sup> In Nova Scotia specifically, cancer survivors have expressed unmet informational needs related to exercise and physical activity.<sup>45</sup> Cancer patients and survivors often struggle in understanding which activities are safe, at what intensity they can participate, if/where physician support is available, and how to access information about appropriate programming.<sup>46</sup> By promoting proactive physical activity, family physicians and other health care providers can deliver a more holistic approach to care that will provide peace of mind for patients and survivors to safely engage in physical activity and continue to participate in community life.<sup>46</sup>

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**“Regular physical activity is fundamental to good health, through both the prevention and management of a broad range of conditions. It is now clear that includes cancer.”**

*Dr. Robert Strang, MD, MHSc., FRCPC,  
Chief Public Health Officer,  
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As a health care provider, you can have a positive impact on patients' and survivors' willingness to engage in physical activity. Available research shows that a cancer diagnosis can act as a learning moment that typically encourages patients and survivors to change unhealthy lifestyle habits.<sup>23</sup> Thus, it is important to encourage inactive patients to start to engage in physical activity, and continue to assist patients to reach their physical activity goals. There is also value in routinely reminding cancer patients/survivors of the benefits of regular physical activity to enhance participation and adherence.<sup>3</sup>

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## Conclusion

Physical activity is a safe and proactive way to prevent and manage disease- and treatment-related side-effects across the disease trajectory. Patients and survivors, whether on or off treatment or receiving curative or non-curative care, report an interest in and willingness to participate in a physical activity program. Family physicians and other health care providers who promote the benefits of physical activity to their patients/survivors will contribute to the patient's overall wellness and quality of life. Patients who engage in regular physical activity:

- Have a decreased chance of recurrence or onset of co-morbidities;
- Benefit both physically and psychologically;
- Can reduce or mitigate their disease- and treatment-related side-effects; and
- Often experience an enhanced quality of life.

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**“The evidence is clear; physical activity is a critical, albeit a far too often under prescribed and exploited means to enhance the overall health and well-being of both cancer patients and survivors.”**

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## Resources to Support Health Care Providers

***Physical Activity Guidelines and Information:***

**American College of Sports Medicine (ACSM)**

[www.acsm.org/about-acsm/media-room/acsm-in-the-news/2011/08/01/new-guidelines-strongly-recommend-exercise-for-cancer-patients-survivors](http://www.acsm.org/about-acsm/media-room/acsm-in-the-news/2011/08/01/new-guidelines-strongly-recommend-exercise-for-cancer-patients-survivors).

Full article available at:

[www.paliativossinfronteras.com/upload/publica/ACSM-Cancer-consensus-protocol-survivors.pdf](http://www.paliativossinfronteras.com/upload/publica/ACSM-Cancer-consensus-protocol-survivors.pdf)

**National Comprehensive Cancer Network® (NCCN®)**

[www.nccn.org](http://www.nccn.org)

**The Canadian Society for Exercise Physiology (CSEP)**

[www.csep.ca/CMFiles/Guidelines/CSEP\\_PAGuidelines\\_adults\\_en.pdf](http://www.csep.ca/CMFiles/Guidelines/CSEP_PAGuidelines_adults_en.pdf)

\*Appropriate content for patient/survivor

**Canadian Cancer Society, Physical Activity During Treatment**

[www.cancer.ca/en/cancer-information/cancer-journey/living-with-cancer/physical-activity-during-cancer-treatment/?region=on](http://www.cancer.ca/en/cancer-information/cancer-journey/living-with-cancer/physical-activity-during-cancer-treatment/?region=on)

\*Appropriate content for patient/survivor

**Canadian Cancer Society, Physical Activity After Treatment**

[www.cancer.ca/en/cancer-information/cancer-journey/life-after-cancer/your-wellness-plan/physical-activity-after-treatment/?region=on](http://www.cancer.ca/en/cancer-information/cancer-journey/life-after-cancer/your-wellness-plan/physical-activity-after-treatment/?region=on)

\*Appropriate content for patient/survivor

***Links to Community Physical Activity Opportunities for Patients/Survivors:***

**Recreation Nova Scotia**

[www.recreationns.ns.ca](http://www.recreationns.ns.ca)

**Highland Connect**

[www.highlandconnect.ca](http://www.highlandconnect.ca)

**South Shore Connect**

[www.southshoreconnect.ca](http://www.southshoreconnect.ca)

**Canadian Cancer Society, Cancer Information Service**

1.888.939.3333

[www.cancer.ca/en/about-us/for-medial-media-releases/national/2011/canadian-cancer-societys-cancer-information-service-reaches-milestone/?region=on](http://www.cancer.ca/en/about-us/for-medial-media-releases/national/2011/canadian-cancer-societys-cancer-information-service-reaches-milestone/?region=on)

**211 Nova Scotia**

[www.ns.211.ca](http://www.ns.211.ca)

**Heart and Stroke Foundation, Walk About Program**

[www.walkaboutns.ca](http://www.walkaboutns.ca)

**Living Beyond Cancer: What Happens Next?**

[www.youtube.com/watch?v=x9K7338vufQ&feature=youtu.be](http://www.youtube.com/watch?v=x9K7338vufQ&feature=youtu.be)

**Cancer Transitions, Capital Health Cancer Care Program**

902.473.3449

**Cancer Transitions, Cape Breton Cancer Centre**

902.567.8074

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Cancer Care Nova Scotia is a provincial program of the Department of Health and Wellness. Its mandate is to evaluate, coordinate and strengthen the cancer system in Nova Scotia.

Cancer Care Nova Scotia works with and supports professionals and stakeholders in the health care system to bring about patient-centred change. Its ultimate goal is to reduce the burden of cancer on individuals, families, communities and the health care system.

*In Practice* is written specifically for primary care practitioners with information that we hope will make a difference in your cancer practice.

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