The BASES Expert Statement on Exercise and Cancer Survivorship

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BASES EXPERT STATEMENT

The BASES Expert Statement on Exercise and Cancer Survivorship

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Abstract
This statement provides a concise overview of the evidence on the benefits of staying active after a cancer diagnosis and the current guidelines for exercise prescription with this population.

Keywords: cancer, survivor, physical activity

Introduction
Currently, there are at least 2 million people living in the UK following a cancer diagnosis. Due to factors such as an ageing population, earlier detection of cancer and continued improvements in cancer treatments, this number is predicted to rise by more than 3% each year. The most prevalent cancers are those with relatively high incidence and good prognosis, and in the UK these are breast cancer for women (46%) and prostate cancer for men (31%) (Maddams et al., 2009). Even after successful treatment, cancer survivors can face additional challenges such as increased risk for recurrent cancer and other chronic diseases, and persistent adverse effects on physical functioning and quality of life (Stein et al., 2008). Some of the consequences of cancer treatment include fatigue, pain, depression, anxiety, lymphoedema, menopausal symptoms and impotence. A body of research has led to growing awareness among cancer survivors and health professionals of the potential value of exercise in preventing and managing some of these problems. In addition, emerging evidence suggests that being physically active after a cancer diagnosis has a role in improving survival and in secondary cancer prevention. Consequently, the subject of exercise within cancer survivorship has become one of increasing importance and interest for sport and exercise scientists.

Background
Although adequate rest is vital at the time of cancer treatment and during recovery, an overemphasis on energy conservation can be problematic. Insufficient physical activity over time leads to loss of physical conditioning and muscular strength, making it difficult to perform even basic activities of daily living. This was demonstrated in a study comparing the physical performance limitations of 279 short-term (<5 years since diagnosis) and 434 long-term (≥5 years) cancer survivors, with 9370 individuals without a history of cancer (Ness et al., 2006). Over half of the cancer survivors (54% short-term and 53% long-term) reported performance limitations, versus 21% of the sample with no cancer history. The most common difficulties (crouching/kneeling, standing for 2 hours, lifting/carrying 10 pounds and walking quarter of a mile) were all functions essential for performing usual daily
activities. The importance of exercise after a cancer diagnosis has been confirmed by a growing number of studies. This statement was based on appraisal of systematic review evidence and additional high quality studies to produce conclusions and recommendations for exercise in cancer survivorship.

**Evidence from intervention trials**

Evidence on the effects of exercise during and after cancer treatment has been accumulating since the 1980s. In a meticulous systematic review of controlled intervention trials (Speck et al., 2010), data from 66 high-quality studies were synthesised. Exercise interventions after treatment completion indicated significant small to moderate improvements for aerobic fitness, body weight and body fat, quality of life and fatigue, and large effects for muscular strength (Table I). The wide confidence intervals and high heterogeneity for some outcomes reflect the overall inconsistency in findings and methodological aspects within the developing body of evidence. Nonetheless the indications are that exercise post-treatment has overall positive effects on functional and well-being outcomes.

Exercise interventions during cancer treatment (typically chemotherapy, radiotherapy or hormonal therapy) led to significant small to moderate beneficial effects for aerobic fitness, muscular strength, body fat percentage and anxiety. Although promising results have been reported from trials for several other important outcomes during and after treatment (e.g., bone health, immune function, pain) the number of studies and consistency of results are currently insufficient to represent conclusive evidence.

Cancer-related fatigue has been identified as one of the most common and distressing symptoms reported by patients, and also one of the most difficult to treat. Contrary to the concerns of some patients and caregivers that exercise may cause or exacerbate existing fatigue, a recent systematic review of 28 exercise intervention trials reported significant small effect sizes for reducing fatigue during (−0.18) and after (−0.37) cancer treatment (Cramp & Daniel, 2008). This supports the argument that regular exercise helps patients to avoid becoming trapped in a perpetuating cycle of deteriorating physical function and increasing fatigue.

**Evidence on survival**

There is preliminary evidence that in addition to functional and quality of life benefits, physical activity performed post-diagnosis may be associated with improved survival. Meta-analyses of epidemiological studies with breast cancer survivors indicate a reduced risk of disease recurrence and mortality with regular physical activity (Ibrahim & Al-Homaidh, 2011; Patterson et al., 2010). Similarly, studies with colorectal (Meyerhardt et al., 2006a, Meyerhardt et al., 2006b) and prostate (Kenfield et al., 2011, Richman et al., 2011) cancer survivors have suggested that mortality and disease progression are approximately 50% lower in physically active than inactive individuals. Although encouraging, the small body of data and inconsistencies in study methods and results prevent firm conclusions at this stage about the role of physical activity in cancer survival. Similarly, the precise mechanisms through which physical activity may influence cancer recurrence and mortality have not been established, but areas of ongoing research include the role of adiposity, metabolic and sex hormones, growth factors, immunological processes and chronic inflammation.

**Evidence on adverse effects**

Few adverse events associated with exercise have been reported from trials with cancer populations. However, most trials screen out participants deemed at risk. For patients receiving current or recent treatment, general concerns relate to immunosuppression, falls, bone fractures, exacerbation of pain and other symptoms, and complications of cardiotoxic

<table>
<thead>
<tr>
<th>Outcome</th>
<th>Trials pooled</th>
<th>Effect size*</th>
<th>95% confidence interval</th>
<th>Heterogeneity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aerobic fitness</td>
<td>14</td>
<td>0.32</td>
<td>0.04 to 0.59</td>
<td>Medium</td>
</tr>
<tr>
<td>Upper body strength</td>
<td>6</td>
<td>0.99</td>
<td>0.67 to 1.32</td>
<td>Low</td>
</tr>
<tr>
<td>Lower body strength</td>
<td>7</td>
<td>0.90</td>
<td>0.12 to 1.68</td>
<td>High</td>
</tr>
<tr>
<td>Body weight</td>
<td>14</td>
<td>−0.18</td>
<td>−0.31 to −0.06</td>
<td>Low</td>
</tr>
<tr>
<td>Body fat percentage</td>
<td>15</td>
<td>−0.18</td>
<td>−0.31 to −0.05</td>
<td>Low</td>
</tr>
<tr>
<td>Quality of life</td>
<td>16</td>
<td>0.29</td>
<td>0.03 to 0.54</td>
<td>High</td>
</tr>
<tr>
<td>Fatigue</td>
<td>14</td>
<td>−0.54</td>
<td>−0.90 to −0.19</td>
<td>High</td>
</tr>
<tr>
<td>Depression</td>
<td>10</td>
<td>−0.30</td>
<td>−0.65 to 0.05</td>
<td>Medium</td>
</tr>
<tr>
<td>Anxiety</td>
<td>7</td>
<td>−0.43</td>
<td>−0.88 to 0.03</td>
<td>Medium</td>
</tr>
</tbody>
</table>

*Effect sizes are conventionally interpreted as 0.2 = small, 0.5 = moderate, 0.8 = large
treatments. Key precautions and suggested modifications to exercise interventions to minimise risks have been published (Schmitz et al., 2010b). A particular concern for cancer survivors who have undergone removal of lymph nodes is the risk of causing or exacerbating limb lymphoedema through repetitive exercise. To date, preliminary studies and one adequately-powered randomised trial (Schmitz et al., 2010a) have reported no increase in lymphoedema risk in breast cancer survivors participating in progressive resistance training. Nonetheless, continued caution when performing vigorous repetitive exercise is advised. Overall, when considering the risks of exercise, it is important to weigh up the potential harm to cancer survivors of remaining inactive in terms of the increased risk of other chronic conditions such as obesity, diabetes, cardiovascular disease and osteoporosis.

Guidelines for exercise prescription

There is insufficient evidence in the literature regarding the optimal components of exercise prescription for each cancer type. However, current guidelines on exercise testing and prescription have been published by the American College of Sports Medicine for patients with cancer (American College of Sports Medicine [ACSM], 2010; Schmitz et al., 2010b). These are compatible with the American Cancer Society’s recommendation of 30 to 60 minutes of moderate- to vigorous-intensity physical activity at least five days per week for survivors who are otherwise healthy. To date, no formal guidelines for cancer survivors have been published in the UK. However, health-related physical activity guidelines for the general population are appropriate for most cancer survivors. For those with cancer complications or co morbidities that prohibit moderate-intensity exercise, avoidance of total inactivity is nonetheless advised.

Future research

There is a need for greater understanding about the potential effects of different modes of exercise (aerobic, resistance and flexibility) performed during and after cancer treatment on specific short- and long-term health-related outcomes. In particular, the relationship between physical activity and disease-related and survival endpoints requires further investigation in both epidemiological studies and intervention biomarker trials. The majority of the studies have involved women with early-stage breast cancer, and future research should be aimed at other populations (e.g., young people, older adults, ethnic minorities, less common cancer diagnoses, advanced disease). In addition, ways in which exercise can be incorporated in the cancer care pathway alongside other rehabilitation services should be explored.

Conclusions and recommendations

- There is consistent evidence confirming that exercise can be safely performed during and after cancer treatment, provided that individual limitations and specific side effects associated with cancer therapies are considered and monitored.
- Based on research in survivors of the most common cancers, improvements in aerobic and muscular fitness, quality of life and fatigue can be expected through exercise training.
- Unless advised otherwise, cancer survivors should follow the health-related physical activity guidelines provided for the general UK population.
- All cancer survivors including those with existing disease or who are undergoing difficult treatments should be encouraged, as a minimum, to avoid being sedentary.

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References