Lung Cancer (2008) **61**, 117—122

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journal homepage: www.elsevier.com/locate/lungcan

# Motivational readiness for physical activity and quality of life in long-term lung cancer survivors

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Received 27 July 2007; received in revised form 16 November 2007; accepted 11 December 2007

**KEYWORDS**
Exercise;
Quality of life;
Survivor;
Physical activity;
Symptom control;
Motivational readiness;
Stage of change

**Summary** Little is known about the relationship between motivational readiness for physical activity and quality of life (QOL) in long-term lung cancer survivors. Long-term survivors are considered those who are living 5 years or more following a cancer diagnosis. This project examined the relationship between a self-report measure of motivational readiness for physical activity and QOL in a sample of 272 long-term lung cancer survivors. Participants (54% male, average age 70 years old) completed the mailed survey an average of 6 years after being diagnosed with lung cancer. Survey measures included the stage of change for physical activity and a set of single item QOL and symptom scales. Thirty-seven percent of respondents reported they currently engaged in regular physical activity (a total of 30 min or more per day, at least 5 days per week). Kruskal—Wallis tests revealed that those who reported engaging in regular physical activity reported a better overall QOL, better QOL on all five domains of QOL functioning (mental, physical, social, emotional, and spiritual), and fewer symptoms compared to those with a sedentary lifestyle. Physical activity level may have important QOL and symptom management benefits for long-term lung cancer survivors.
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## 1. Introduction

Lung cancer is a major health problem in this country. The American Cancer Society estimates that there will be 213,380 new cases in 2007, and lung cancer is the leading cause of cancer death in this country for both men and

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0169-5002/$ — see front matter © 2008 Elsevier Ireland Ltd. All rights reserved.
doi:10.1016/j.lungcan.2007.12.012

women (ACS). However, little is known about the quality of life (QOL) status of long-term lung cancer survivors who are beyond 5 years post-diagnosis [1]. QOL can be defined as a multidimensional construct that incorporates the physical, mental, emotional, social, and spiritual functioning of the individual [2]. Previous research has demonstrated that health behaviors can greatly impact the QOL of cancer survivors. For example, persistent cigarette smoking after lung cancer diagnosis, exposure to second hand smoke, alcohol use, and being overweight all reduce the QOL [3] of lung cancer survivors. Previous research has also shown that depression is associated with poor QOL [4], and that respiratory symptom burden contributes to diminished QOL in lung cancer survivors [5]. While several studies have shown a relationship between symptoms, QOL and physical fitness in lung cancer patients [6,7] how physical activity level impacts the QOL of long-term lung cancer survivors is not well understood. The further examination of factors associated with QOL in this population is important since lung cancer survivors report lower QOL relative to other cancer survivors [1,8,9].

The physical and mental health benefits of physical activity in the general population have been well documented [10,11]. A growing literature also demonstrates numerous physical and mental benefits of physical activity for the cancer survivor. For instance, physically active breast cancer survivors report less confusion, more vigor, greater social support, and higher QOL compared to sedentary breast cancer survivors [12,13]. A more recent study also reported breast cancer survivors who had improved cardio-respiratory fitness from regular exercise also reported higher QOL [14]. Participation in a cycling program [15] or in a walking program can reduce levels of anxiety and fatigue in cancer patients [16—18]. Participation in a structured exercise program has been shown to improve the QOL of women with breast cancer [19,20] and men with prostate cancer [21]. Motivational readiness, or stage of change, for physical activity level has been shown to be predictive of exercise change in cardiac rehabilitation patients [22], in college students [23], and has been utilized in breast cancer survivors [24]. To date, we were unable to find any published studies of physical activity level in long-term lung cancer survivors. Therefore, how motivational readiness for physical activity impacts the QOL of long-term lung cancer survivors is not well understood.

To examine the relationship between motivational readiness for physical activity and QOL in long-term lung cancer survivors, the stage of change for physical activity level questionnaire was utilized [25]. According to the Transtheoretical Model of Behavior Change [26] an individual's motivational readiness for behavior change will vary across time, and will be impacted by his or her experiences, self-efficacy or confidence level, and personal perceived gains and losses of engaging in the behavior.

## 2. Patients and methods

Participants in this study were enrolled into the Epidemiology and Genetics of Lung Cancer Research Program at Mayo Clinic Rochester [27]. Since 1 January 1997, all patients at our institution who were diagnosed with lung cancer have been offered participation in a prospective cohort study. All patients provided informed consent and the study has been approved by our Institutional Review Board on an annual basis. Our participation rate has been over 90% of eligible lung cancer patients [27,28]. Specifics on ongoing patient recruitment, baseline data retrieval, and patient follow-up have been previously described and are again briefly summarized below. Upon enrollment into the MCLCC, all patients complete baseline health-related surveys at 6 and 12 months, and then they were then mailed similar surveys on an annual basis. In addition, trained study personnel reviewed their medical records at enrollment. Information on demographics, previous or concurrent illnesses, tobacco usage and exposure, tumor staging, nutritional habits, and cancer therapy were abstracted and entered into the database. The Revised TNM Staging System of non-small cell lung cancer was utilized [29]. Of note, all cancer treatment decisions were deferred to the individual patient's healthcare providers, and enrollment into the MCLCC did not in any way influence clinical decision-making.

Participants were long-term lung cancer survivors who are living at least 5 years from diagnosis and had reported physical activity level and QOL data. Their most recently completed forms were used in the analysis when more than one questionnaire was completed over time. Summary measures included means and standard deviations. Differences between groups were tested with two-sided Kruskal—Wallis tests with a 0.05 statistical significance level.

## 3. Measures

### 3.1. Smoking status

Those who reported smoking less than 100 cigarettes in their lifetime were classified as ''never smokers.'' Those who had not smoked a cigarette in the past 30 days were classified as ''former smokers'', and those who reported smoking any cigarette in the past 30 days were classified as ''current smokers'' [30].

### 3.2. Stage of change for physical activity level

This four-item measure asks subjects about their current level of physical activity and about their intention to become more physically active [25,31,32]. Respondents were then classified according to their readiness for physical activity level: (1) **precontemplation**, no current structured physical activity, and no intention to increase in the next 6 months; (2) **contemplation**, are not currently physically active, but plan to start in the next 6 months; (3) **preparation**, some participation in physical activity, but not meeting recommended level of activity; (4) **action**, those who are physically active; and (5) **maintenance**, those who have been physically active for at least 6 months [12,22,23,25,31,32]. This measure has been utilized in cancer patients [33] and in our previous research we have found that this measure can be successfully completed by study participants when using mailed surveys [22,23,33,34].

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