

# Lung Cancer Screening: An Opportunity to Promote Physical Activity?



Alice Avancini, PhD,<sup>a</sup> Lorenzo Belluomini, MD,<sup>a</sup> Morten Quist, PhD,<sup>b</sup>  
Sara Pilotto, MD, PhD<sup>a,\*</sup>

In this issue of *JTO Clinical and Research Reports*, Bonney et al.<sup>1</sup> reported on the physical activity level and selected physical fitness features of participants enrolled in the Australian Lung Screen Trial. The authors reported that, among 178 participants, a quarter were insufficiently active according to the current guidelines, and the median levels of functional capacity and grip strength were within the range for healthy adults.<sup>1</sup> Despite the limitations highlighted by the authors, this study makes a substantial contribution: on one end, characterizing the physical features and habits of individuals at high risk of developing lung cancer—that is, 50 to 80-year-old people who are current or former smokers—and, on the other end, paving the way for a new research area dedicated to physical activity in people attending the lung cancer screening program.

In recent years, physical activity and exercise have consistently gained attention in lung cancer for their beneficial role in primary and tertiary prevention. A consistent body of observational data supports the protective effect of physical activity on lung cancer incidence and survival. A meta-analysis including 28 studies revealed that high levels of physical activity were associated with a lower risk of developing lung cancer (risk ratio = 0.76, 95% confidence interval [CI]: 0.69–0.85) even after adjusting for potential confounders, including smoking status.<sup>2</sup> Interestingly, physical activity may mitigate the risk of lung cancer also in those individuals exposed to smoking; indeed, physically active former and current smokers have a pooled risk reduction of 23% for both.<sup>2</sup> Furthermore, physical activity also impacts survival among patients with lung cancer. On the one hand, engaging in physical activity before the diagnosis is associated with a significant 7% lower hazard of all-cause mortality in patients with lung cancer, and the protective effect rises up to 20% for all-cause and lung-cancer-specific mortality in patients with localized disease.<sup>3</sup> On the other hand, Sloan et al.,<sup>4</sup> in a cohort of 1466 patients with lung cancer, found that those who were physically active after diagnosis may survive an average of four more years compared with those who

did not engage in sufficient physical activity (8.4 y versus 4.4 y;  $p < 0.0001$ ); this benefit was consistent across disease stage and type of lung cancer. From this perspective, according to the definition proposed by the American Society of Clinical Oncology, physical activity may be considered an intervention conferring clinically meaningful benefits to patients with lung cancer.<sup>5</sup> Beyond the survival outcomes, different randomized controlled trials have revealed that physical exercise in patients with lung cancer may be a feasible adjunct treatment conferring a wide range of benefits including mitigating different therapy toxicities and symptoms (such as fatigue, impairments in cardiorespiratory fitness, pulmonary function, muscle strength, and mass) and enhancing the patients' quality of life.<sup>6</sup> In addition, exercise in the context of prehabilitation has been revealed to significantly reduce postoperative complications and the length of hospital stay and accelerate recovery.<sup>6</sup>

Given the meaningful benefits, several national and international societies, including the American Cancer Society, strongly recommend engaging in regular physical activity, both before and after a cancer diagnosis.<sup>7,8</sup>

#### \*Corresponding author.

<sup>a</sup>Section of Innovation Biomedicine - Oncology Area, Department of Engineering for Innovation Medicine (DIMI), University of Verona, Verona, Italy, and <sup>b</sup>Centre for Health Research Department, University Hospitals, University of Copenhagen, Rigshospitalet, Copenhagen, Denmark

Address for correspondence: Sara Pilotto, MD, PhD, Section of Innovation Biomedicine - Oncology Area, Department of Engineering for Innovation Medicine (DIMI), University of Verona and University and Hospital Trust (AOUI) of Verona, Italy, P. le L.A. Scuro 10, 37134, Verona, Italy. E-mail: [sara.pilotto@univr.it](mailto:sara.pilotto@univr.it)

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Unfortunately, despite the published recommendations and the crucial role of physical activity in lung cancer risk and survival, 41% of the general population is reported to be insufficiently active,<sup>9</sup> and it is well-established that, after a lung cancer diagnosis, patients tend to significantly decrease the amount spent in physical activity.<sup>10</sup> From this perspective, there is a strong need to promote physical activity to achieve the aforementioned benefits. Changing a lifestyle behavior is complex, and beyond the policy-environmental strategies, it requires a great dose of motivation from the individuals. In the past decade, researchers have focused on using teachable moments—that is, a health event that motivates individuals to adopt risk-reducing health habits, as potential strategies to correct unhealthy behaviors. One of the most quoted teachable moments is cancer screening, indeed. Experiences in breast and colorectal cancer screening revealed that the combination of tailored diet and physical activity advice and counseling with follow-up support led to significant lifestyle improvements. In detail, patients allocated to the interventional group experienced significant weight loss (mean difference  $-1.6$  kg, 95% CI:  $-2.7$  to  $-0.39$ ), waist circumference (mean difference  $-2.9$  cm, 95% CI:  $-3.8$  to  $-1.91$ ), and an increasing in moderate-vigorous physical activity (standardised mean difference 0.31, 95% CI: 0.13–0.50) and fruit-vegetable intake (SMD 0.33, 95% CI: 0.01–0.64) compared with the controls.<sup>11</sup> Returning to the lung cancer screening setting, whereas a large body of literature has been focused on smoking cessation intervention, to our knowledge, no studies have been conducted to evaluate the impact of physical activity advice.

Could lung cancer screening be a teachable moment for implementing interventions to promote physical activity? The study by Bonney et al.<sup>1</sup> reported that approximately 25% of Australian participants in lung cancer screening were insufficiently active, whereas in a survey conducted in England, this percentage increased to 39%.<sup>12</sup> Although these discrepancies could suggest that physical inactivity may be country-specific in this population, it is also clear that, in any case, a relevant number of persons at high risk of developing lung cancer would need dedicated intervention to become active. The good news is that people attending lung cancer screening may be interested in such intervention. The cross-sectional study by Stevens et al.,<sup>12</sup> which included 459 individuals who were current smokers or recent quitters, found that approximately 64% were willing to receive lifestyle advice, including about physical activity, at a lung cancer screening. Another interesting finding is that lifestyle advice did not impact the decision to attend the screening for 63.2% of participants, whereas 22.9% made them more willing to attend it.<sup>12</sup> Because lung cancer screening uptake is generally low, this

information may be crucial and suggests that delivering lifestyle advice could even help to promote screening participation among people.

How do we promote physical activity among participants in lung cancer screening? Future dedicated studies will be able to answer this question by identifying effective approaches and pathways to enhance people's lifestyles; however, some considerations can be made on the basis of current literature. Lung cancer screening is addressed to involve many people; thus, physical activity interventions should be performed on a broad scale. This imposes the development of interventions that consider their suitability from both an economic and time-related point-of-view for participants and health care providers. In addition, the approach should be tailored according to the current recommendations for cancer prevention and structured using health behavioral theories to motivate individuals to improve their behavior and increase their adherence over time. In this sense, telehealth interventions could effectively match all these needs by using different and cost-saving delivery modalities successfully tested in other contexts, such as educational packages, incentives, regular newsletters, or websites.<sup>13</sup> To effectively offer the intervention, a useful model that may be applied in this context and implemented at the screening appointment could be the well-known Assess, Advice, and Refer process (Fig. 1).<sup>14</sup> This model, which could be adapted to this context, permits the quick identification of individuals who do not meet the current physical activity guidelines using appropriate screening tools (Assess), to raise awareness about the preventive role of physical activity and to recommend participants especially those physically inactive, to increment their physical activity (Advice) and refer them to a dedicated, previously developed intervention (Refer). However, another scenario could arise and should be considered: those cases who had positive screening results. For these individuals who screen positive, it is crucial to maintain or improve their functional level. The choice of future treatments (surgery, chemotherapy, immunotherapy, etc.) is determined by how fit or able the patient will be to tolerate the chosen treatment, considering the risk of complications.<sup>15</sup> In this situation, the appointment for communicating screening results could be essential not only to inform patients about the suspected disease but also to reinforce the importance of an active lifestyle and potentially prevent the decline of physical activity that usually occurs after an oncologic diagnosis. In this sense, whereas the assessment could be similar to those performed at the first screening appointment, the advice should focus on the importance of staying active during the lung cancer journey, emphasizing the psychophysical benefits and the amelioration of anticancer treatment

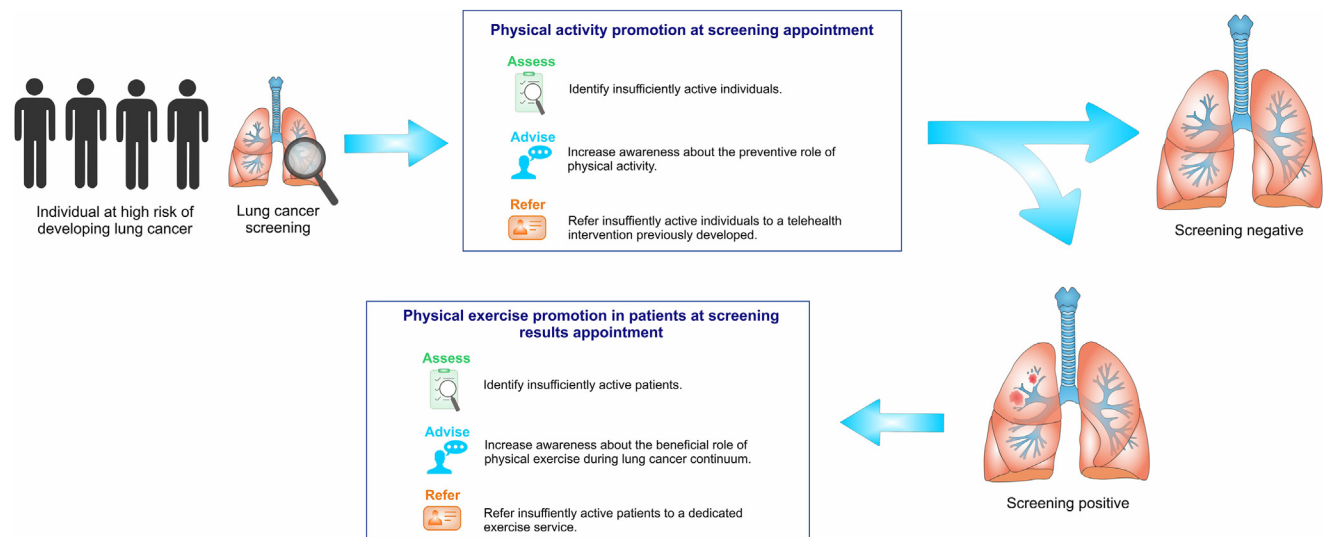


Figure 1. Physical activity and physical exercise promotion in the context of lung cancer screening.

adverse effects. With regard to specialist referral, ideally, given the complexity and the required adaptation of exercise, each insufficiently active patient with an established lung malignancy should receive a personalized intervention. Such intervention should be delivered by a skilled expert, such as an exercise specialist or physiotherapist, able to prescribe a program that considers the potential settings (e.g., prehabilitation or rehabilitation) and treatment plan, the psychophysical features of the patient, and their preferences to program a tailored intervention directed to improve the overall disease course.<sup>14</sup>

Overall, physical activity is becoming crucial in lung cancer settings for both healthy individuals and patients. Cancer screening may offer a crucial teachable moment to promote physical activity in both the case of screening negative and positive, potentially preventing the rate of patients that could become inactive after diagnosis and positively impacting their quality of life and potential prognosis. In the near future, investigations should be addressed to explore these aspects, and because unhealthy behaviors usually tend to cluster, physical activity intervention could be implemented together with other lifestyle approaches, for example, diet and smoking cessation.

## CRedit Authorship Contribution Statement

**Alice Avancini:** Conceptualization, Investigation, Writing – original draft, Project administration, Visualization, Writing – review & editing.

**Lorenzo Belluomini:** Visualization, Writing – review & editing.

**Morten Quist:** Visualization, Supervision, Project administration, Writing – review & editing.

**Sara Pilotto:** Visualization, Supervision, Project administration, Writing – review & editing.

## Disclosure

The authors declare no conflict of interest.

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