Commentary: HIITing the jackpot with prehabilitation before minimally invasive lung cancer surgery

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The concept of preoperative exercise falls under a larger, evolving concept of prehabilitation. Defined by the National Health Service as physical, nutritional, and psychological support and rehabilitation before surgery has even begun, prehabilitation is particularly relevant today: More than 40% of all inpatient operations are performed on those aged 65 years and older.\(^1,2\) National and international efforts, such as the Geriatric Surgery Verification and Strong for Surgery initiatives by the American College of Surgeons and the Peri-Operative Program at McGill University, are creating standardized and personalized plans to optimize patients for surgery and recovery.\(^2-4\)

We commend Zhou and colleagues\(^5\) for presenting important level-II evidence showing that preoperative exercise can add to the safety of minimally invasive lung cancer surgery. Patients who entered the physical exercise (PE) arm of the trial underwent in-hospital moderate to high-intensity interval training (HIIT) every other day for 16 days before surgery. Those in the PE arm had a significantly lower overall and respiratory complication rate (5.9% vs 20.0% and 3.9% vs 18.0%, respectively; \(P = .03\)) and reduced length of stay (11 vs 12 days; \(P = .01\)).\(^5\) Comparatively, a 2016 study of the Society of Thoracic Surgeons database identified a 9.3% major morbidity rate in patients undergoing lobectomy.\(^6\) Thus, the complication rate in the PE arm appears to be relatively lower than average.

The optimal exercise regimen for prehabilitation has yet to be determined. Although the current study makes an argument for HIIT, concerns have remained that HIIT regimens may not be feasible and safe on a larger scale. Traditional pulmonary (pre-)rehabilitation typically relies on aerobic exercise in conjunction with inspiratory muscle training. This approach has been shown to improve functional capacity and reduce complication rates in select patients.\(^6-8\) Prehabilitation regimens primarily utilizing aerobic exercise have fallen short on showing a clear influence on postoperative outcomes.\(^9,10\) Preoperative HIIT before lung cancer surgery has only recently been explored. A randomized trial demonstrated sprint cycling at peak power can increase cardiopulmonary fitness and reduce the rate of pulmonary complications.\(^11\)

An important question for future studies is the feasibility of HIIT regimens for older, frailer patients and its compatibility with neoadjuvant treatment. The median age of 56 years in the current study is significantly lower than expected.\(^5\) For example, the median age of being diagnosed with lung cancer in the United States is 71 years.\(^12\) The implementation of supervised in-person training programs is also limited by travel burden and resource availability in most countries. A current multi-institutional clinical trial (NCT06196008) is utilizing more pragmatic modes of interventions—telephone-coaching and inclusion of family members—to influence physical activity behavior change to maximize perioperative outcomes and promote long-term physical activity.\(^13\) For now, the results presented by Zhou and colleagues\(^5\) reinforce the positive influence prehabilitation can have on patient outcomes and highlight the importance of research in this area.
Conflict of Interest Statement

Dr Kneuertz is a speaker and proctor for Intuitive Surgical. The other author reported no conflicts of interest.

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