Author has nothing to disclose with regard to commercial support.

before lung resection. The average intensive care unit stay, morbidity, and mortality, however, were unchanged between the cohorts.²

Gravier and colleagues¹ presented a more extensive plan of preoperative rehabilitation and a much more elegant measure of pulmonary function. Patients can be enrolled in preoperative rehabilitation, but their participation is effort dependent. How did the postoperative course and complications of the treated patients (whether more or fewer than 15 treatments) compare with those of patients who did not receive any preoperative therapy?

We await the results of current prospective efforts at preoperative pulmonary rehabilitation, including muscle training, avoiding smoking, and adjustment of patient medications, to see whether there will be a substantial effect on lung resection outcomes in patients with lung cancer.

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**REPLY:
PREHABILITATION
FOR INCREASING
VENTILATORY
EFFICIENCY BEFORE
LUNG RESECTION—
AMAZING CONCEPT,**

BUT WE ARE NOT THERE YET!

Reply to the Editor:

We thank you for the opportunity to comment on the letter to the Editor sent by Dr Baciewicz. We concur with Dr Baciewicz that the proposed comparison between the cohort of the study from Gravier and colleagues¹ and patients who did not receive preoperative prehabilitation in terms of postoperative course and clinical complications could be of interest. They could run this analysis with or without propensity matching with the 138 patients who did not

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receive pulmonary prehabilitation in their center during the same study period as a comparator. Nevertheless, this analysis would likely be underpowered because the small sample size in each subgroup. Moreover, conclusions drawn from this analysis, even if positive, should be viewed with caution, because the threshold of 15 sessions was decided on arbitrarily, more on the basis expert opinion than on the basis of robust statistical analysis (area under the curve, 0.68).

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<https://doi.org/10.1016/j.jtcvs.2019.08.039>

**REPLY FROM THE
AUTHORS:
PREHABILITATION
VERSUS STANDARD
CARE—WHAT
IMPACT ON
COMPLICATIONS?**

Reply to the Editor:

We thank Dr Baciewicz for his interest in our article. Indeed, our retrospective cohort study of 50 patients focused on the impact of prehabilitation with analysis of cardiopulmonary exercise testing before and after prehabilitation. Results report that patients included in our prehabilitation program had better physiologic benefits and suggest fewer complications from 15 treatment sessions. As is underlined, however, there remains the question of comparison with patients who have not benefited

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from the proposed program. Unfortunately, because of organizational constraints of our rehabilitation center, patients who were not referred for prehabilitation were not included in our follow-up. In consequence, we do not have data to answer the question, but we can expose some adjuvant elements.

First, we can report previous results from a cohort study in which some patients received the same prehabilitation program. Boujibar and colleagues¹ analyzed data from 34 patients with non-small cell cancer (median forced expiratory volume in 1 second 61% [58%-67%] predicted, and peak oxygen uptake 15.4 mL/kg/min [13.8-17.1 mL/kg/min]) who underwent video-assisted or robot-assisted resection surgery in the thoracic surgery department of Rouen University Hospital from 2014 to 2015 after having benefited from a cardiopulmonary exercise testing in their preoperative evaluation. Nineteen patients among them were referred for preoperative rehabilitation in the same conditions as our work. Their analysis showed significant decreases not only in the occurrence of complications but also in their severity according to the Clavien-Dindo score.

Furthermore, with regard to the effects of preoperative exercise training, Sebio Garcia and colleagues² published in 2016 a meta-analysis of 8 studies reporting a relative risk reduction of 55% in those patients undergoing rehabilitation in comparison with the patients receiving the standard care (relative risk, 0.45; 95% confidence interval, 0.28-0.73).

More recently, Licker and associates³ published a prospective study focusing on postoperative complications. Their analysis of 151 patients randomized in 2 groups (preoperative high-intensity exercise training versus usual care) provided evidence to support a decreased number of complications within the postoperative 30 days (relative risk, 0.70; 95% confidence interval, 0.48-1.02). Note that this study included patients with less severe impairment than in most other studies evaluating preoperative exercise training (forced expiratory volume in second >80% predicted, and peak oxygen uptake around 20 mL/kg/min), which theoretically is associated with a lower postoperative risk.⁴ This suggests that even patients

considered to be at lesser risk can benefit from preoperative training.

In total, the few previously stated elements indicate potential benefits of physical preoperative management regardless of the number of treatments offered. We are convinced of the need to include prehabilitation in the care of patients with non-small cell lung cancer referred for thoracic surgery. In parallel with the implication for practice and research provided by the Cochrane collaboration about rehabilitation in chronic obstructive pulmonary disease,⁵ the question is no longer whether prehabilitation is beneficial relative to conventional care for patients with lung cancer but rather what the optimal way is to apply it. New research should now be directed toward the evaluation of the most efficient methods to apply preoperative exercise training in terms of duration, frequency, intensity, and adjuvants.

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