patient that is unchangeable. The authors are careful to note that while ESM_{CT} correlates with improved post-lung transplant outcomes, the mechanism behind it remains uninvestigated.

Patient outcomes from lung transplant remain difficult to predict with current statistical models, and any patient characteristic that helps better determine organ allocation is valuable to the field. While further studies are needed, this paper suggests that taking a simple measurement, on a study that each pre-lung transplant patient already has, may help determine which patients will have a better outcome.

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Commentary: Determining surgical robustness with chest computed tomography

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Perhaps we should be concerned that we rely heavily on radiographic imaging, potentially at the expense of a good history and physical exam, in surgical decision making; however, I read with great interest the article by Oshima and colleagues.¹ Here they describe a correlation between the density of erector spinae muscles seen on preoperative computed tomography (CT) imaging and outcomes after lung transplantation. Their findings that recipients with lower erector spinae muscle density had less-favorable

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CENTRAL MESSAGE

The authors present an intriguing correlation between erector spinae muscle quality, characterized by radiographic density on CT images, and lung transplantation outcomes.

long-term survival and rates of chronic lung allograft dysfunction are reasonable, plausible, and intriguing.

The erector spinae muscles are important antigravity muscles of the spine. The authors characterize the radiographic density of the erector spinae muscles using Hounsfield units measured on CT imaging to indicate muscle quality or lack of fatty infiltration. This is convenient given

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that the muscle quality can be objectively assessed with Hounsfield units data measured on routine thoracic CT imaging already available for most patients.

However, there are limitations to the current article regarding both the patient population and the general concept. This is a single-center study and may not represent many centers' experience due to disproportionate numbers of younger patients, single lung transplantations, and long waitlist times (suggesting lower acuity). These factors likely influence long-term outcomes. In addition, this study does not address the association of erector spinae muscle quality with short-term outcomes such as ventilator and intensive care unit days, length of hospital stay, perioperative mortality, and discharge to home versus a skilled nursing or rehabilitation unit. There may be valuable associations to identify here as well.

The general limitation is the concept of categorizing healthy versus poor erector spinae muscle density. The study uses the median Hounsfield unit score of the study population as the cutoff between a low or high classification for erector spinae muscle density. Because the study population was only 96 patients, this median may not apply to a broader population of patients. In addition, this approach turns a continuous variable into a dichotomous variable,

which is pragmatic for this early work but may oversimplify this objectively linear variable. In the future, treating it as a continuous variable may provide more granularity.

Admittedly, there are tools to help identify robustness versus frailty in thoracic surgery candidates. These tests are typically composite scoring assessments of strength, stamina, cognitive ability, and even psychiatric state in some cases.^{2,3} Although these tests are comprehensive, they can be somewhat cumbersome and complex to apply. The erector spinae muscle density test may prove to be an effective assessment used as a standalone marker of robustness or more likely in conjunction with the armamentarium of current assessments. I look forward to more work regarding its application to lung transplant candidates as well as other thoracic surgery candidates.

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