Exercise Testing in Idiopathic Pulmonary Fibrosis: Expanding Our Options

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One of the foremost consequences of idiopathic pulmonary fibrosis (IPF) is a striking compromise of the patient's exercise capacity, which severely affects the quality of life on an everyday basis [1]. IPF and fibrosing interstitial lung diseases (ILDs) in general are known to cause exchange and ventilatory impairments, increased dead space ventilation, insufficient increase in heart rate during exercise, peripheral muscle dysfunction, and increased elastic inspiratory load [2–5]. A complex interaction of these factors is likely at the bases of the exercise intolerance often seen in IPF.

Clinicians have long learned that this is not only important to recognize and address this deficiency with physiotherapy retraining, but measuring its severity has also a relevant impact on clinical monitoring and prognostication [6]. While cardiopulmonary exercise testing (CPET) remains the most physiologically comprehensive exercise test in patients with chronic lung disease, the 6-min walk test (6MWT) has become the most used tool to test exercise capacity in IPF and other fibrosing ILDs. The wide adoption of the 6MWT was justified by its reliability, reproducibility, safety, and reduced cost [7]. The observation that 6-min walk distance (6MWD) results correlated well with those of CPET [8] was particularly reassuring for clinicians.

Importantly, 6MWD has been recognized as an independent predictor of survival in IPF and as a feasible end-point in clinical trials [9]. Another fundamental finding was that 6MWD provides prognostic information that is complementary to that provided by pulmonary function tests (PFTs) [10, 11]. Some data have shown that 6MWD may be even superior to PFTs in terms of accuracy of survival prediction in IPF [12].

Being self-limited, the 6MWT is also an inherently safe test that can be applied even in advanced stages of the disease. Minimal clinically significant differences specific for IPF were identified [8, 13, 14].

Notwithstanding all these positive aspects, every pulmonary specialist managing patients with IPF and ILDs in general has probably experienced that it is challenging to obtain a 6MWT at every visit for every single patient, due to logistical difficulties and limitations in the pulmonary function laboratories. The 6MWT is in fact somewhat time-consuming, especially if coupled with a full set of PFTs, and requires a dedicated space. This problem can limit the clinical applicability of the 6MWT in most settings.

In this issue of respiration, Degano et al. [15] present their study on sit-to-stand tests (STSTs) in a cohort of 33 patients with IPF from 3 different French referral centers.

Both a 1-min STST and 3-min chair rise test were considered, together with the standard 6MWT. Patients performed the 3 tests sequentially. Based on the simple movement of standing up from a chair, STSTs are exercises designed to test leg strength, endurance as well as independence in adults [16]. STSTs were first introduced in 1985 [17] and have been already extensively studied in chronic obstructive pulmonary disease [18].

The main findings were that STSTs in IPF had very good reproducibility, when repeated at a 7–14 days distance, and their results showed a strong correlation with 6MWD. However, the extent of desaturation seen during the 6MWT was not fully captured by STSTs.

STSTs reproduce a key element of everyday activity [16] but received little attention in ILDs. In their elegant study, Degano et al. demonstrated the potential clinical applicability of short and simple tests of vertical displacement in patients with IPF. STSTs are well suit to capture the extent of sarcopenia, a common feature of patients with IPF that is now recognized to be a significant predictor of survival [19].

It is now ascertained that exercise capacity is a fundamental component of the prognostic assessment of patients with chronic lung disease, including IPF [9–11]. Although STSTs tests may not fully capture the depth of desaturation seen with the 6MWT in subjects with IPF, they may nevertheless expand our options of exercise testing in fibrosing ILDs. From this perspective, the study of Degano et al. [21] sets an interesting framework of re-

search: can STSTs represent a surrogate exercise test for 6MWT to monitor the clinical course of the disease? Can the present results be applied to a wider range of ILDs? Can STSTs capture the significant impact of associated pulmonary hypertension on exercise capacity in fibrosing ILDs [20] [21]?

We, therefore, look forward to further studies applied to a larger cohort of patients with IPF longitudinally followed to investigate the prognostic role of STSTs. Identifying a simple, inexpensive, and reproducible measure of exercise capacity that is prognostically complementary to the information provided by PFTs represents a research priority in IPF and fibrosing ILD in general.

Conflict of Interest Statement

The authors have no conflicts of interest to declare.

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Author Contributions

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