

Supplementary data

Patients and methods

Assessment of pulmonary and small airways function

Body plethysmography technique. The estimation of lung function by body plethysmography starts with breathing at rest, followed by the shutter maneuver which is used to deliberately block the airflow by transient occlusion. After opening of the shutter, an expiratory reserve volume (ERV) effort and an inspiratory vital capacity effort (IVC) were performed allowing the computation of RV and TLC. During measurement the box is closed with an airtight seal, except for a small controlled leak that is used to stabilise the internal pressure. One pressure transducer measures the pressure inside the Q-box relative to ambient pressure, while another one is placed close to the mouth for monitoring mouth pressure during the shutter manoeuvre.

Multiple breath nitrogen washout. The multiple breath nitrogen washout was performed using a mouthpiece connected to Q-Box. This mouthpiece, at the end of a relaxed tidal exhalation, was connected to an inspiratory source of 100% oxygen, while the subsequent exhaled gas was directed by one-way valves into a collection bag, previously flushed with oxygen so no nitrogen was included. The resident nitrogen was washed out of the respiratory system gradually and monitored with ongoing analysis at the mouthpiece. When the exhaled nitrogen concentration fell below 2%, the test was terminated, and the volume of nitrogen collected was measured.

Maximal inspiratory and expiratory pressure measurement. With noseclips in place, the patients performed three maximum inspiratory efforts from RV to produce the MIP, with each effort separated from the next TLC to produce the MEP. For the aforementioned measurements up to three trials were conducted and the average of two technically acceptable tests was recorded.

Interrupter technique. The interrupter technique is performed using a flowmeter, a pressure measurement device,

Results

Supplementary Table S1. Clinical and immunologic characteristics of IIM patients with and without ILD.

	IIM-ILD patients (n=13)*	IIM patients without ILD (n=13)*	p-value
DM related skin rash	9 (69)	8 (62)	>0.99
Heliotrope rash	6 (46)	6 (46)	-
Gottron papules	4 (31)	7 (54)	-
Mechanic hands	4 (31)	1 (8)	-
Facial erythema	2 (15)	3 (23)	-
V-neck erythema	2 (15)	1 (8)	-
“Shawl” sign	4 (31)	1 (8)	-
Holster sign	3 (23)	2 (15)	-
Myositis associated antibodies	10 (77)	5 (38)	0.11
Anti-PM-Scl	3 (23)	2 (15)	-
Anti-Ro/SSA	6 (46)	2 (15)	-
Anti-La/SSB	2 (15)	1 (8)	-
Anti-Ku	1 (8)	0 (0)	-
Anti-U1RNP	0 (0)	1 (8)	-
Myositis specific antibodies	11 (85)	9 (69)	0.65
Antisynthetase antibodies	9 (69)	1 (8)	0.004
Anti-Jo-1	5 (38)	1 (8)	-
Anti-PL-7	2 (15)	0 (0)	-
Anti-OJ	2 (15)	0 (0)	-
Anti-Mi-2	0 (0)	3 (23)	-
Anti-MDA5	1 (8)	1 (8)	-
Anti-TIF-1 γ	2 (15)	2 (15)	-
Anti-SAE	3 (23)	2 (15)	-
Anti-NXP-2	0 (0)	1 (8)	-
Anti-SRP	0 (0)	1 (8)	-

*Data are expressed as n (%).

DM: dermatomyositis; IIM: idiopathic inflammatory myopathies; ILD: interstitial lung disease.

Supplementary Table S2. Pulmonary and small airway function tests of IIM patients with and without ILD.

	IIM-ILD patients (n=13)*	IIM patients without ILD (n=13)*	p-value
VC (SVC) (%pred)	82.7 \pm 24.8	102.5 \pm 19.9	0.04
FRC (pleth) (%pred)	86.6 \pm 21.5	99.4 \pm 22.8	0.18
RV _{pleth} /TLC _{pleth} (%)	38.3 \pm 9.3	31.6 \pm 10.1	0.11
FRC _{N2WO} (%pred)	140.1 \pm 55	157.5 \pm 73.4	0.58
RV _{N2WO} /TLC _{N2WO} (%)	50.7 \pm 10.7	57.9 \pm 13.6	0.30
LCI	10.5 \pm 4.4	9.7 \pm 4	0.67
R20 (% pred)	99.4 \pm 31.9	123.4 \pm 30.2	0.09

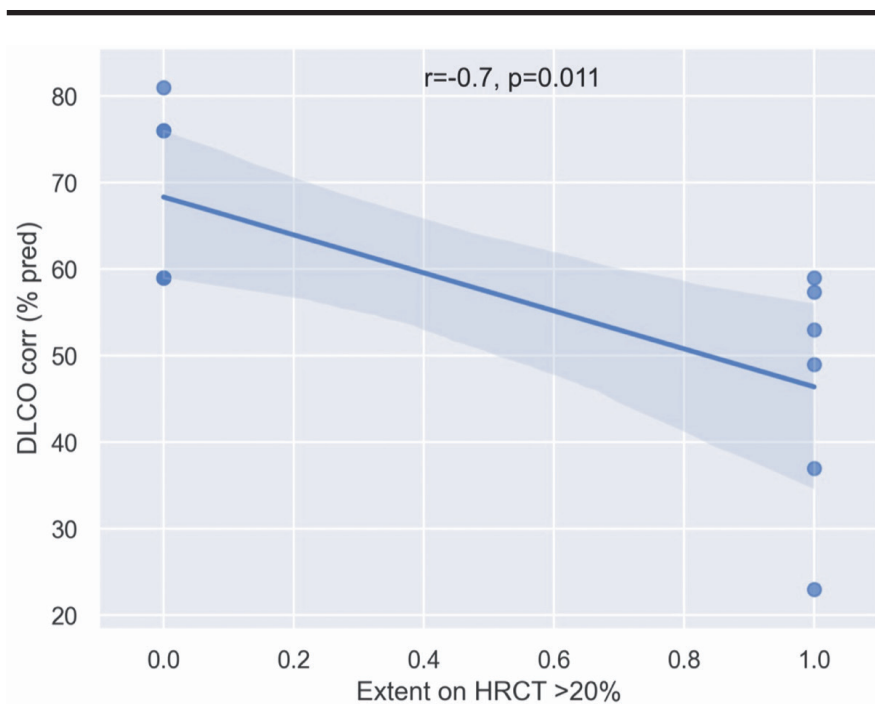
*Data are expressed as mean \pm standard deviation.

FRC: functional residual capacity; IIM: idiopathic inflammatory myopathies; ILD: interstitial lung disease; LCI: lung clearance index; N2WO: nitrogen washout; pleth: body plethysmography; R20: resistance at 20Hz; RV: residual volume; SVC: slow vital capacity; TLC: total lung capacity; VC: vital capacity.

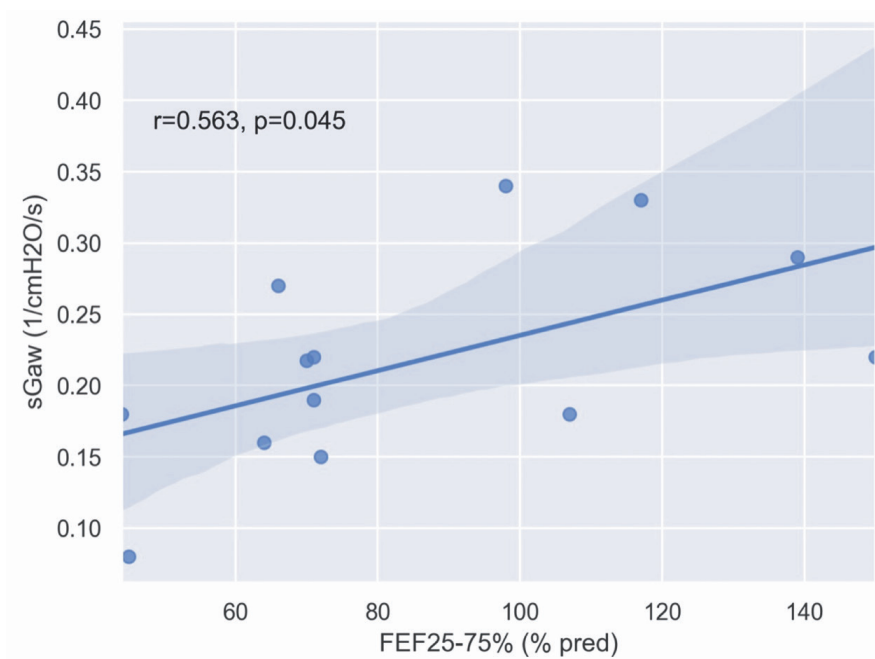
and a flow interruption system (valve). Interruptions were triggered at peak tidal flow. Mouth pressure was calculated using the two-point linear back extrapolation to 0 ms after the onset of interruption. The minimum number of technically acceptable tracings required were six.

Impulse oscillometry (IOS). Pressure oscillations generated by a loudspeaker were superimposed onto normal tidal

breathing through a mouthpiece for 30 to 45 s, which ranged from 5 to 35 Hz in frequency. Sitting upright, patients were asked to place the noseclip and exert manual compression on their faces to minimise the influence of cheek vibration and air leak. Three trials were conducted, and mean values of the following parameters were recorded: respiratory resistance at 6 Hz (R6) and 20 Hz (R20), R6-R20, X6 and Fres.



Supplementary Fig. S1. Negative correlation between the extent of ILD on HRCT (defined as high extent >20% of lung parenchyma and low extent <20%) and predicted DLCO corrected for haemoglobin ($p=0.011$, $r=-0.7$).



Supplementary Fig. S2. Positive correlation between predicted forced expiratory flow after an expiration of 25% to 75% of forced vital capacity (FEF_{25-75}) and special airway conductance (sGaw) ($p=0.045$, $r=0.562$).