APPENDIX SI. Supplementary Digital Content

METHODS

Body anthropometry

Weight was measured using BC-558 Ironman digital scale and height was measured using a wall-mounted stadiometer with the patients barefoot in an upright position. The body mass index (BMI) was calculated and thigh and arm circumferences were measured (1).

Pulmonary function testing

Lung function was tested using an Easy One spirometer, which calibration was checked before each evaluation. Spirometry was performed in accordance with ATS/ERS standards (2). The predicted values were calculated from the equations proposed by Pereira et al. (3).

Physical activity in daily life

Patients were monitored for 12 h over 2 consecutive days, starting immediately after awakening. All subjects were carefully instructed on how the device should be positioned and received a manual with clear instructions. In addition, patients were instructed to keep their daily activities completely unchanged while wearing the device (4).

Physiological response

The portable device consists of a face mask, heart rate chest strip, battery, portable transmitting unit (containing the cells analysers of O_2 and CO_2) and a receiving unit. The portable transmission unit is positioned in front of the chest and the battery in the back of patients using a specific harness (total weight: 800 g) (5). The turbine is positioned on a face mask to measure ventilation. The expired gas is led from the distal end of the turbine by a Nafion polymer (Permapure) and O_2 and CO_2 concentration are determined by rapid response analyserers (polarographic and infrared electrodes for O_2 and CO_2). The O_2 and CO_2 analysers have the temperature controlled by thermostat and are compensated according to the changes in barometric pressure and humidity (5). The device is calibrated according to the manufacturer's recommendations. Calibration was performed with the turbine using a 3-l syringe, and calibration of the gas analyser was performed using a gas mixture and room air. Corrections were made for the transport delay from the turbine to the sensor. These procedures were performed every day before assessments. For data analysis the mean of the final 15 s of each lap of Glittre activities of daily living-test (TGlittre) and each minute of the 6 minute walk test (6MWT) was considered.

RESULTS

Characteristics of functional assessment

Group characteristics divided by GOLD stages are shown in Table SI. No differences were found in the functional assessment evaluations between patients with moderate to very severe COPD.

Physiological responses during the 6-minute walk test

All variables showed significant changes at the end of the 6MWT compared with baseline values ($p < 0.05$), with the exception of RER. Table SII shows the baseline, final and change values from 6MWT. Baseline VO_2 ranged from 202.2 to 464.1 ml/min and final VO_2 from 844.7 to 1,917.1 ml/min. Patients reached 85.2 ± 36.2% of MVV. The individual and mean group VO_2 values are seen in Figs 1A and 1C. A linear increase in VO_2 was observed at the beginning of the test, which stabilizes during the third and fourth minutes (1232.6 ± 356.2 e 1261.3 ± 325.6 ml/min; $p > 0.05$, Fig. 1C). Although significant, variation in VO_2 in the fifth and sixth minutes was modest (1292.3 ± 352.6 and 1245.7 ± 324.1 ml/min, $p < 0.05$). The final 6MWT VO_2 was correlated with thigh circumference ($r = 0.54$, $p < 0.05$). The ventilatory efficiency (VE/VCO_2 slope) during the test was of 27.52 ± 4.59 (99.3 ± 16.4% of predicted value). VCO_2, VE, FC e SpO_2 profiles are summarized in Fig. 2.

Comparison between the Glittre activities of daily living-test (TGlittre) and the six minute walk test

All measured variables shown to be significantly correlated between both tests ($p < 0.05$): VO_2 ($r = 0.87$), VO_2/kg ($r = 0.84$),

Table SI. *Characteristics of the study group divided by Global Initiativ for Chronic Obstructive Lung Disease (GOLD) stages*

	GOLD 2 ($n=5$) Mean (SD)	GOLD 3 ($n=6$) Mean (SD)	GOLD 4 ($n=7$) Mean (SD)
TGlittre, min	4.04 (0.73)	5.02 (1.23)	5.18 (2.00)
6MWT, m	513.6 (67.3)	456.4 (92.2)	450.3 (45.4)
6MWT, %pred	93.9 (11.1)	82.3 (13.5)	81.7 (7.8)
Sitting, min	311.8 (65.2)	435.6 (95.3)	408.4 (122.2)
Lying, min	161.0 (50.6)	21.8 (95.9)	91.3 (102.0)
Standing, min	131.8 (30.2)	168.0 (31.1)	127.1 (45.4)
Walking, min	77.2 (31.8)	94.6 (66.5)	95.1 (40.5)
Steps	7,687.6 (3,794.7)	5,973.8 (4,406.2)	5,467.0 (2,447.6)
MI	0.18 (0.01)	0.15 (0.22)	0.15 (0.13)

TGlittre: Glittre activities of daily living-test; 6MWT: 6-minute walk test; %pred: %predicted; MI: walking movement intensity.

Table SII. *Rest, final and differences between the final and rest values in the 6-minute walk test (6MWT)*

	Rest Mean (SD)	Final[a] Mean (SD)	Δ Mean (SD)
SpO_2, %	96.7 (1.49)	90.2 (6.3)	–4.76 (3.65)
RR, bpm	19.1 (4.58)	28.5 (4.60)	9.45 (2.88)
VT, l	0.68 (0.18)	1.23 (0.34)	0.56 (0.27)
VE, l/min^{-1}	12.1 (2.41)	34.3 (7.26)	22.2 (7.12)
VO_2, ml/min	308.5 (65.7)	1,245.7 (324.1)	937.2 (310.1)
VO_2/kg, ml/min/kg	4.27 (1.01)	17.00 (3.86)	12.7 (3.57)
VCO_2, ml/min	250.4 (53.2)	1,019.8 (292.1)	769.4 (284.8)
VE/VO_2	36.9 (5.58)	26.7 (4.39)	–10.0 (5.39)
VE/VCO_2	45.9 (8.57)	32.9 (4.51)	–12.9 (7.17)
RER	0.81 (0.07)	0.82 (0.07)	0.00 (0.09)
HR, bpm	79.2 (14.8)	113.8 (15.8)	34.6 (10.8)
O_2 pulse, VO_2/HR	4.03 (1.19)	11.0 (2.35)	6.92 (2.03)
VE/MVV	0.32 (0.17)	0.85 (0.36)	0.53 (0.23)

[a]Final values refer to the average of the last 15 s of the last min of 6MWT (6^{th} min).

Δ: change (final – rest values); SpO_2: oxygen saturation pulse oximetry; RR: respiratory rate; VT: tidal volume; VE: minute ventilation; VO_2: oxygen uptake; VCO_2: carbon dioxide output; VE/VO_2: ventilatory equivalent for oxygen; VE/VCO_2: ventilatory equivalent for carbon dioxide; RER: respiratory exchange ratio; HR: heart rate in beats per min; MVV: maximal voluntary ventilation.

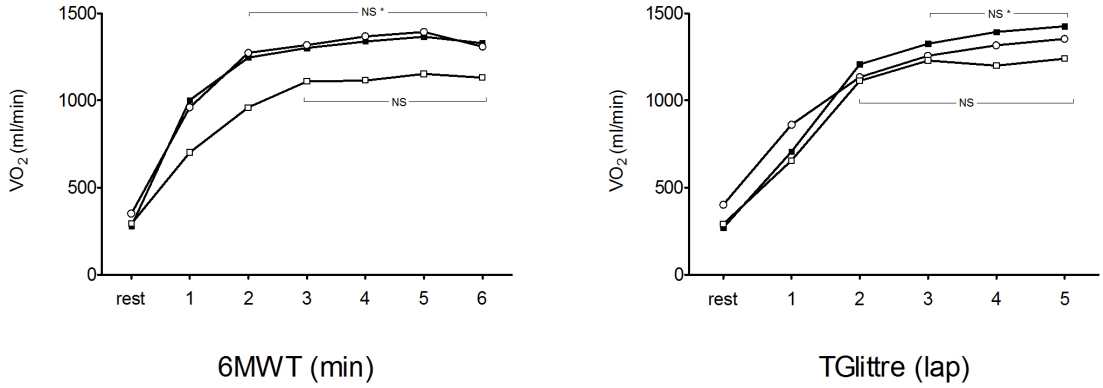

Fig. S1. Oxygen consumption (VO_2) during the 6-minute walk test (6MWT, *left*) and Glittre activities of daily living-test (TGlittre, *right*). NS*: not significant, Global Initiativ for Chronic Obstructive Lung Disease (GOLD) 2 and 3; NS: not significant, GOLD 4; *closed squares*: GOLD 2; *open circles*: GOLD 3; *open squares*: GOLD 4.

VCO_2 ($r=0.80$), VE ($r=0.79$); VE/VO_2 ($r=0.82$), VE/VCO_2 ($r=0.74$), RER ($r=0.70$), HR ($r=0.47$), VO_2/HR ($r=0.67$) and VE/MVV ($r=0.94$). In addition, VE/VCO_2 slopes were also closely correlated between tests ($r=0.86$).

No differences were found in all the physiological variables reached in the end of the 6MWT and TGlittre between patients with moderate to very severe COPD ($p>0.05$) (Fig. S1).

DISCUSSION

Some methodological considerations regarding this study are relevant: (*i*) all patients were previously familiarized with both tests. We chose to conduct familiarization with TGlittre even knowing the test is reliable when performed once. A decrease of 0.37 min was shown in the second test, suggesting a learning effect of ~7% (6). For the 6MWT, prior training is not necessary, but should be considered due to learning effect (7), also of ~7% (8). Since both tests have the same learning effect, we chose to perform only 1 test of each in order to avoid possible additive effects of factors, such as dynamic hyperinflation that would interfere in the physiological responses induced by the tests; (*ii*) it is believed that performance in both tests has not been influenced by the portable telemetry gas analyser. According to Troosters et al. (9), the used gas analyser allows the patient to move freely without discomfort. Previous studies have shown that these devices do not limit the performance on field walking tests (10–11), even in COPD (10). In all cases, the same equipment was used in both tests minimizing the possibility of measurement bias.

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