Body Composition and COPD — part of the CARE4COPD study

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Nutritional status and body composition are important determinants of health outcomes in patients with COPD. BMI alone does not reflect nutritional status. Fat-free mass index (FFMI) provides information on muscle depletion and may better reflect metabolic health. We aimed to investigate how BMI and FFMI are related to lung function and symptom burden in COPD.

Methods:

Baseline data were collected from 128 patients aged ≥40 years, referred to the COPD Center at Sahlgrenska after moderate exacerbations or exacerbation-related hospitalization (recruited 2022–2024). BMI was categorized into underweight (<21), normal weight (21-24.9), overweight (25 -29.9) and obesity (≥30 kg/m²). Body composition was measured by bioelectrical impedance. Low FFMI was defined as ≤16 kg/m² for men and ≤ 15 kg/m² for women.

Results:

BMI data were available for 126 patients. Most were women (67%), with a mean age of 75 ± 8 years. Mean BMI was 26.2 ± 6 kg/m². Underweight patients had lower FEV_1 (MD −0.3 L) than other BMI groups but this was not significant. Underweight was significantly associated with lower FEV_1% (MD −8.6%, 95% CI −16% to −1.2%) and lower DLCO% (MD −15%, 95% CI −20% to −9%). Similar reductions in FEV_1, FEV_1%, and DLCO % were observed in the low FFMI group.

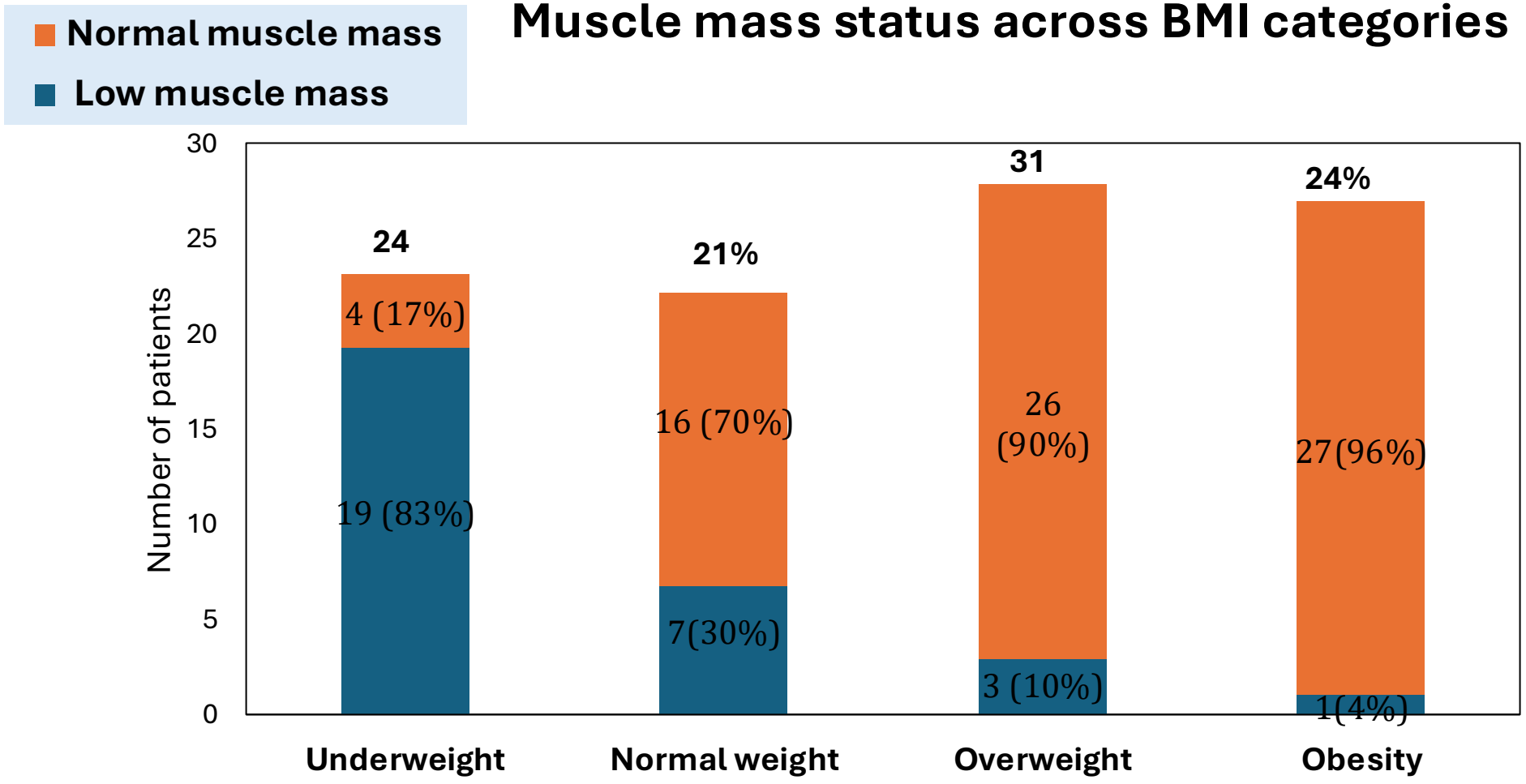
Higher BMI showed a non-significant trend toward higher COPD Assessment Test scores (CAT) (MD 2 points). Patients with higher dyspnea scores (mMRC) had higher mean BMI, 27 ± 6 kg/m², compared with 24 ± 6 kg/m² in the less symptomatic group (95% CI 0.4–5.5; P = 0.02).

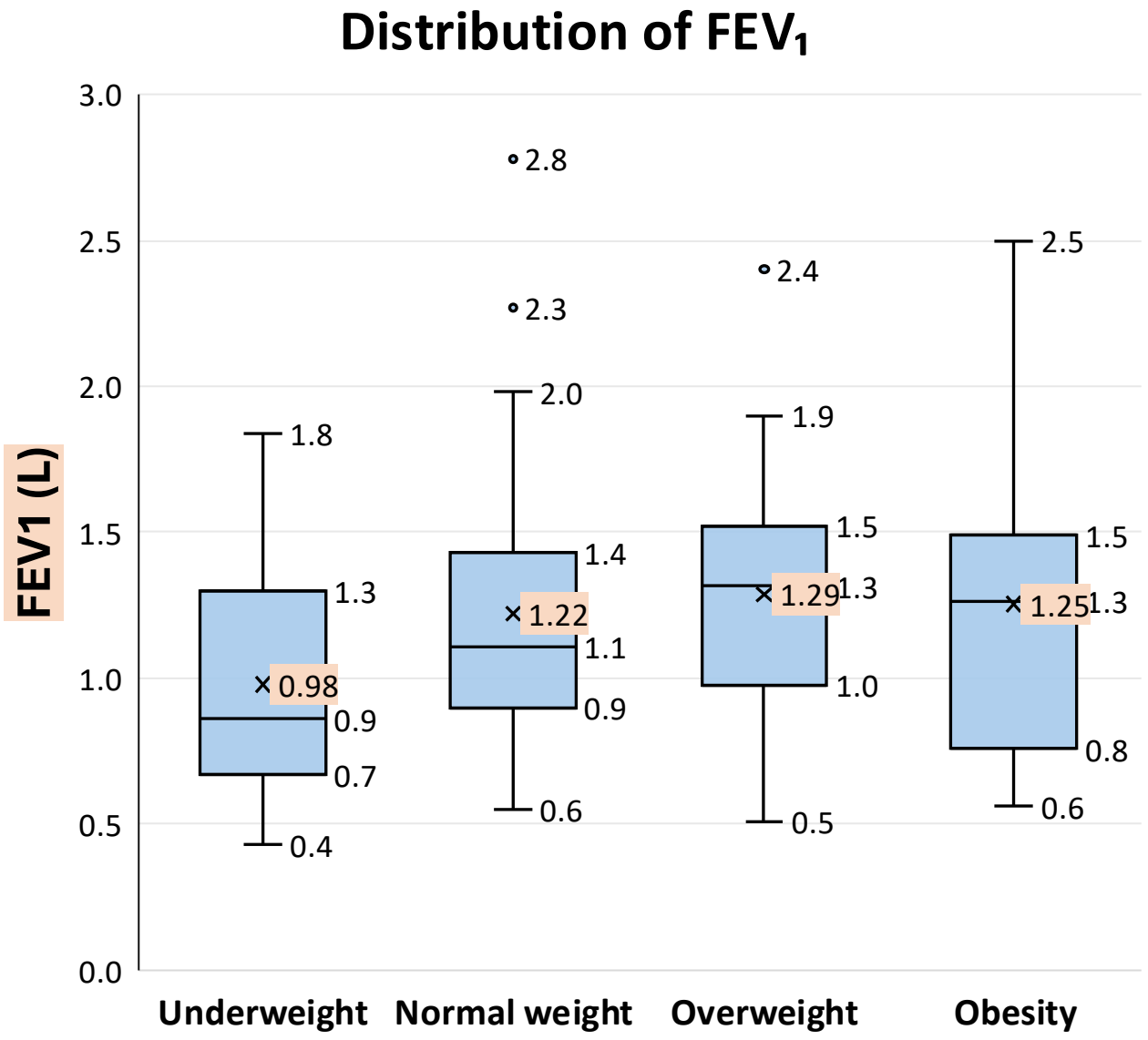
Conclusion:

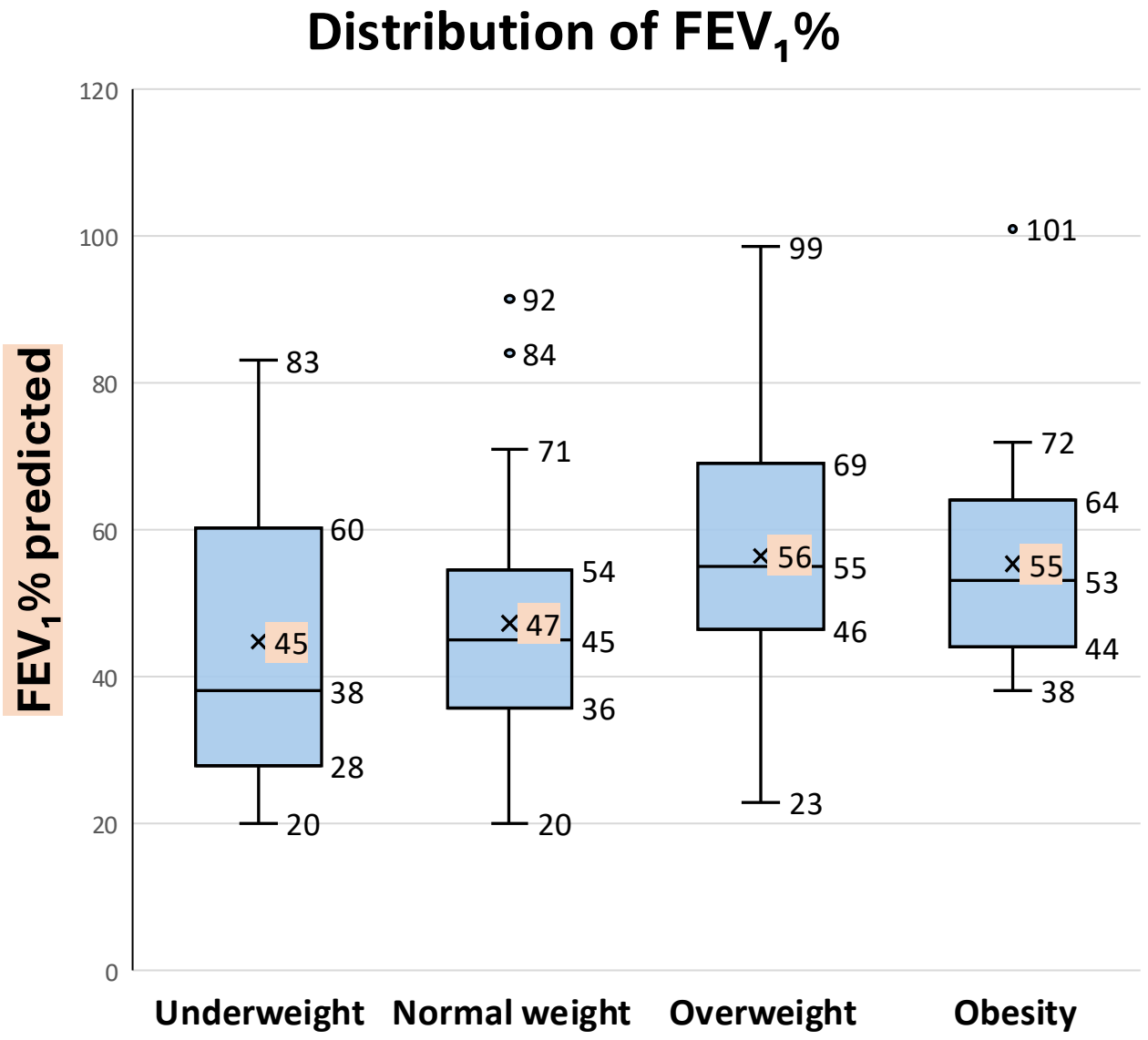
Underweight was associated with worse lung function, lower DLCO%, and often with low FFMI, suggesting advanced impairment. Elevated BMI was associated with greater symptom burden despite better lung function. Low FFMI was prevalent among normal and elevated BMI groups, supporting body composition assessment alongside BMI to identify patients at risk.

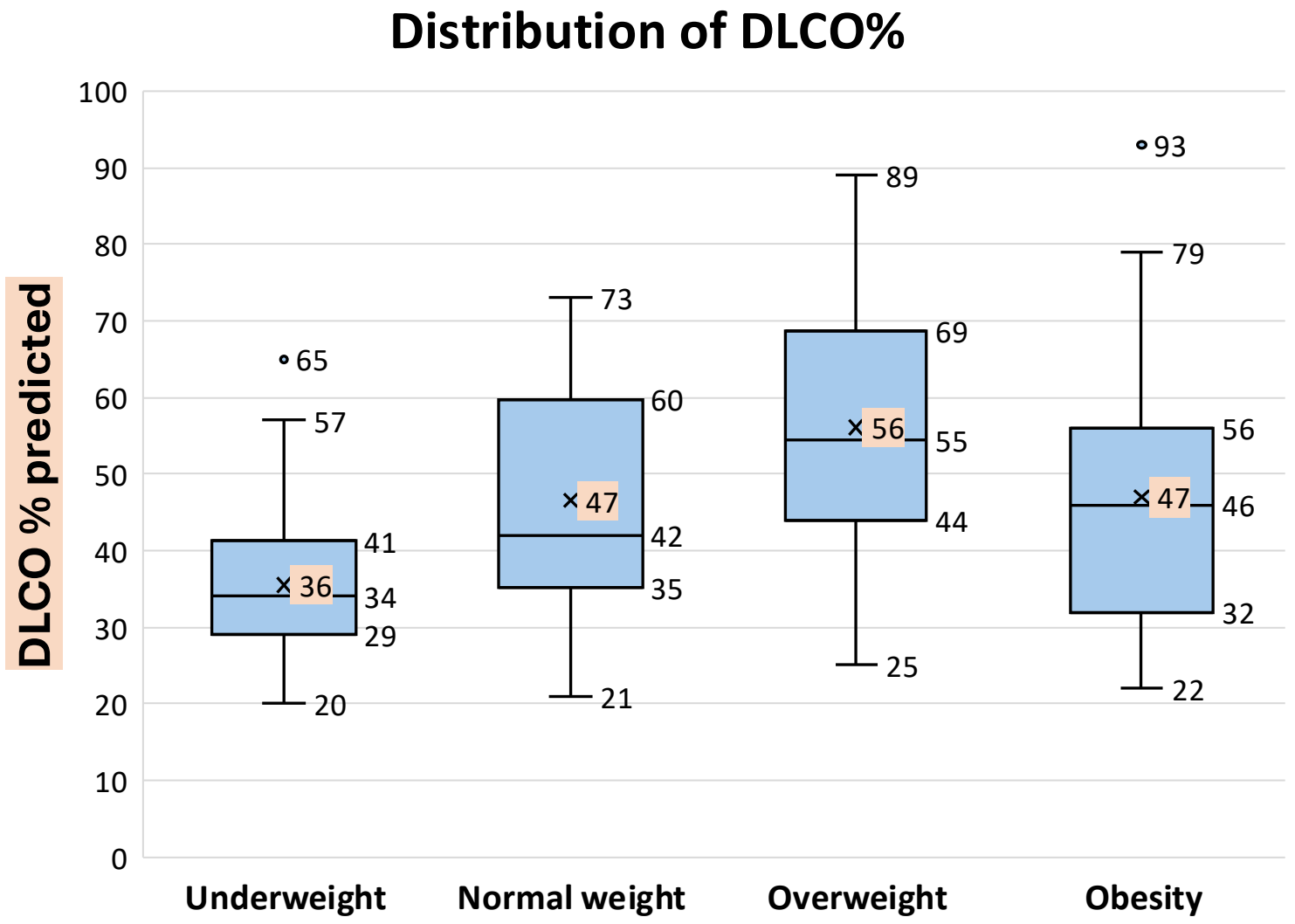
Body composition and COPD

Fördelningen av muskelmassan inom viktklasserna




Distribution of FEV1
FEV1 (L)
3.0
2.5
2.0
1.5
1.0
0.5
0.0
2.8
2.3
2.4
2.5
1.8
2.0
1.9
1.5
1.4
1.3
1.3
1.5
1.22
1.29
1.25
1.1
0.9
1.0
0.98
0.9
0.7
0.6
0.5
0.6
0.8
0.4
Underweight
Normal weight
Overweight
Obesity


Distribution of FEV1%
FEV1% predicted
120
100
80
60
40
20
0
101
92
84
99
83
72
71
69
64
60
56
55
55
54
53
47
45
46
45
44
38
36
28
20
20
23
38
Underweight
Normal weight
Overweight
Obesity


Distribution of DLCO%
DLCO % predicted
100
90
80
70
60
50
40
30
20
10
0
65
57
41
36
34
29
20
73
60
47
42
35
21
89
69
56
55
44
25
93
79
56
47
46
32
22
Underweight
Normal weight
Overweight
Obesity

	Total 1	BMI (medelvärde ±SD)	P-värde BMI* variabel	Undervikt BMI < 21	Normalvikt BMI 21-24,9	Övervikt BMI 25- 29,9	Obesitas BMI ≥ 30	P-värde Viktklass* variabel	Total 2	FFMI (medelvärde ±SD)	Låg muskelmassa	Normal muskelmassa	P-värde Muskelmassa* variabel
Antal inkluderade n (%)	128	126		30 (24%)	27 (21%)	39 (31%)	30 (24%)		105	105	32 (30,5%)	73 (69,5%)	
Ålder (år)	128			75,9 ± 7,6	73,3± 8,3	75,5± 7,1	75,4 ± 7,2	ANOVA 0,56			75,6 ± 8	75,8 ± 7	T-test 0,8
Män n (%)	42 (33%)	26,1 ±6	T-test 0,95	8 (19%)	10 (24%)	14 (33%)	9 (21%)	Chi-x² 0,79	38	18,5 ± 3	13 (34,2%)	25 (65,8%)	Chi-x² 0,5
Kvinnor n (%)	86 (67%)	26,2±6		22 (26%)	17 (20%)	25 (29%)	21 (25%)		67	17 ,1±3	19 (28,4%)	48 (71,6%)	
Rökare	41 (40%)	25,7±6,2	T-test 0,47	12 (29%)	8 (20%)	14 (34%)	7 (17%)	Chi-x² 0,4	30	17,5± 3	10 (33%)	20 (67%)	Chi-x² 0,5
Ex-rökare	61 (60%)	26,5 ± 5,7		11 (18%)	14 (23%)	19 (31%)	17 (28%)		52	17,7±3	14 (27%)	38 (73%)	
FEV1 (L)	116			0,9 ± 0,4	1,2 ± 0,5	1,3 ± 0,4	1,2 ± 0,5	ANOVA 0,05	96		1,05 ± 0,5	1,3 ± 0,5	T-test 0,03
FEV1% predicted	114			44 ± 19	47 ± 17	56 ± 17	55 ± 13,8	ANOVA 0,2	95		44,6 ± 17,6	53,9 ± 15,7	T-test 0,01
FVC (L)	115			2,6 ± 0,7	3 ± 0,9	2,7 ± 0,8	2,6 ± 0,9	ANOVA 0,33	96		2,6 ± 0,8	2,8 ± 0,9	T-test 0,4
FEV1/FVC	115			0,4 ±0,1	0,4 ± 0,1	0,5 ± 0,1	0,5 ± 0,1	ANOVA < 0,001	96		0,4 ± 0,1	0,45 ± 0,1	T-test 0,024
DLCO	114			2,3 ± 1	3,2 ± 1,6	3,7 ± 1,5	3,1 ± 2,1	ANOVA 0,0012	96		2,7 ± 1,3	3,4 ± 1,8	T-test 0,06
DLCO% predicted	115			35 ± 10	46 ± 15	56 ± 15	47 ± 17,8	ANOVA < 0,001	97		39 ± 12	51 ± 16	T-test < 0,001
CAT score	126			17,4 ± 8	18,7 ± 6	18,8 ± 7	20,7 ± 7	ANOVA 0,3			18,5± 6	18,7 ± 8	T-test 0,8
CAT 0-9	9 (7%)			4	2	3	0	Chi-x² 0,3	8		2	6	Chi-x² 0,6
CAT 10-19	56 (44%)			15	12	18	11		49		17	32	
CAT ≥ 20	61 (48%)			11	13	18	19		48		13	35	

Post hoc på de signifikanta resultat som redovisats i abstract + FFMI i relation till viktklasserna

		Mean difference	P-värde	95% CI				Mean difference	P-värde	95% CI	
				Lower	Upper					Lower	Upper
FEV1/FVC post hoc Tukey						**FFMI post hoc Tukey**					
Undervikt	**Normalvikt**	- 0,03	0,64	-0,11	0,04	**Undervikt**	**Normalvikt**	-2,3	0,004	-4	-0,6
	Övervikt	-0,10	0,0	-0,17	-0,04		**Övervikt**	-3,8	<0,001	-5,4	-2,1
	Obesitas	-0,10	0,0	-0,18	-0,03		**Obesitas**	-6,2	<0,001	-7,9	-4,6
Normalvikt	**Övervikt**	-0,07	0,06	-0,14	0,00	**Normalvikt**	**Övervikt**	-1,5	0,1	-3,1	0,2
	Obesitas	-0,07	0,08	-0,15	0,01		**Obesitas**	-3,9	<0,001	-5,6	-2,2
Övervikt	**Obesitas**	0,00	1	-0,07	0,07	**Övervikt**	**Obesitas**	-2,4	<0,001	-4	-0,9
DLCO% post hoc Tukey											
Undervikt	**Normalvikt**	-11	0,04	- 21,9	-0,1						
	Övervikt	-20	0,0	-30,7	-10,5						
	Obesitas	-11	0,03	-22,3	-0,7						
Normalvikt	**Övervikt**	-9,6	0,1	-19,7	0,5						
	Obesitas	-0,5	1	-11,3	-10,2						
Övervikt	**Obesitas**	9,1	0,1	-0,9	19						