**SUPPLEMENTARY INFORMATION**

**Sternocleidomastoid muscle thickness correlates with exercise tolerance in COPD patients**

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Table 1S: Multiple regression analysis performed with the peak VO2 as the dependent variable

Table 2S: SCM thickness and intra-class correlation coefficient

Figure 1S: Correlation between maximum sternocleidomastoid muscle thickness at end-expiration and IC in patients with chronic obstructive pulmonary disease (n = 44)

Figure 2S: Correlation between the maximum sternocleidomastoid muscle thickness at end-expiration and the predicted FEV1% in patients with chronic obstructive pulmonary disease (n = 44).

Figure 3S: Correlation between the maximum sternocleidomastoid muscle thickness at end-expiration and the MIP in patients with chronic obstructive pulmonary disease (n = 44).

Figure 4S: Correlation between the maximum sternocleidomastoid muscle thickness at end-expiration and BMI in patients with chronic obstructive pulmonary disease (n = 44).

Figure 5S: Correlation between the maximum sternocleidomastoid muscle thickness at end-expiration and SCM TF from end-expiration to resting inspiration in patients with chronic obstructive pulmonary disease (n = 44).

**Table 1S.**

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Model 1 | β  | B  | SE  | 95% CI  | R2  | t  | p |
| End-expiration　to　end-inspirationSCM thickness fraction, % | 0.712 | 0.083 | 0.015 | 0.054 to 0.113 | 0.470 | 5.719 | <0.001 |
|  |  |  |  |  |  |  |  |
| Model 2 | β  | B  | SE  | 95% CI  | R2  | t  | p |
| End-expiration　to　end-inspirationSCM thickness fraction, % | 0.627 | 0.054 | 0.017 | 0.019 to 0.089 | 0.572 | 3.105 | 0.003 |
| FEV1, % | 0.377 | 0.065 | 0.024 | 0.017 to 0.112 | 　 | 2.745 | 0.009 |
|  |  |  |  |  |  |  |  |
| Model 3 | β  | B  | SE  | 95% CI  | R2  | t  | p |
| End-expiration　to　end-inspirationSCM thickness fraction, % | 0.542 | 0.049 | 0.016 | 0.016 to 0.082 | 0.670 | 3.008 | 0.005 |
| FEV1, % predicted | 0.257 | 0.044 | 0.023 | -0.003 to 0.091 |  | 1.885 | 0.067 |
| IC, L | 0.303 | 2.135 | 0.811 | 0.012 to 0.495 | 　 | 2.631 | 0.012 |

Abbreviations: SCM = sternocleidomastoid muscle, FEV1 = forced expiratory volume in one second, IC = inspiratory capacity

**Table 2S.**

|  |  |  |  |
| --- | --- | --- | --- |
| 　 | IntraclassCorrelation | 95% Confidence Interval | F Test With True Value 0 |
| 　 | Lower Bound | Upper Boound | Vaiue | *df* 1 | *df* 2 | Sig |
| End-expiration | 0.94 | 0.463 | 0.986 | 128.056 | 19 | 38 | .000 |
| Resting inspiration | 0.88 | 0.654 | 0.956 | 14.001 | 20 | 40 | .000 |
| End-inspiration | 0.92 | 0.374 | 0.981 | 90.213 | 19 | 38 | .000 |

Figure 1S. Correlation between the maximum sternocleidomastoid muscle thickness at end-expiration and the IC in patients with chronic obstructive pulmonary disease (n = 44). IC = Inspiratory Capacity. The IC had a significantly positive correlation with the sternocleidomastoid muscle thickness in patients with chronic obstructive pulmonary disease (r = 0.51, p < 0.01).



Figure 2S. Correlation between the maximum sternocleidomastoid muscle thickness at end-expiration and the predicted FEV1% in patients with chronic obstructive pulmonary disease (n = 44). FEV1% = percent predicted Forced Expiratory Volume in one second. The predicted FEV1% had a significantly positive correlation with the sternocleidomastoid muscle thickness in patients with chronic obstructive pulmonary disease (r = 0.46, p < 0.05).



Figure 3S. Correlation between the maximum sternocleidomastoid muscle thickness at end-expiration and MIP in patients with chronic obstructive pulmonary disease (n = 44). MIP = maximum inspiratory pressure. The MIP had a significantly positive correlation with the sternocleidomastoid muscle thickness in patients with chronic obstructive pulmonary disease (r = 0.49, p < 0.05).



Figure 4S. Correlation between the maximum sternocleidomastoid muscle thickness at end-expiration and BMI in patients with chronic obstructive pulmonary disease (n = 44). BMI = Body Mass Index. BMI had a significantly positive correlation with the sternocleidomastoid muscle thickness in patients with chronic obstructive pulmonary disease (r = 0.39, p < 0.05).



Figure 5S. Correlation between the maximum sternocleidomastoid muscle thickness at end-expiration and sternocleidomastoid muscle thickening fraction in patients with chronic obstructive pulmonary disease (n = 44). Sternocleidomastoid muscle thickening fraction had a significantly negativity correlation with the sternocleidomastoid muscle thickness in patients with chronic obstructive pulmonary disease (r = -0.62, p < 0.01).

