**Supplementary materials**

**Table S1.** Results of the standard maximum test from Study A and new maximum test from Study A and Study B.

|  |  |  |  |
| --- | --- | --- | --- |
|  | **Standard maximum test in Study A (n=15)** | **New maximum test in Study A (n=15)** | **New maximum test in Study B (n=21)** |
| Workload at end, W | 107 ± 22 | 105 ± 23 | 110 ± 44 |
| Endurance time, min | 10.6 ± 2.4 | 12.3 ± 2.4a | 11.5 ± 2.9b |
| Work capacity, kWs | 36 ± 16 | 47 ± 17 | 38 ± 16 |
| Borg dyspnea score at end | 8.5 ± 2.0 | 8.7 ± 1.4 | 6.7 ± 2.0 |
| Borg leg discomfort score at end | 17.5 ± 1.8 | 17.6 ± 1.9 | 16.4 ± 2.3 |
| Reason for stopping exercise, n (%)c |  |  |  |
| Dyspnea | 7 (47) | 8 (53) | 8 (38) |
| Dyspnea plus leg discomfort | 5 (33) | 6 (40) | 6 (29) |
| Leg discomfort | 3 (20) | 1 (7) | 6 (29) |
| Other reason | - | - | 1 (5)d |
| Peak VO2, L/min | 1.50 ± 0.33 | 1.52 ± 0.33 | 1.39 ± 0.32 |
| Peak VCO2, L/min | 1.73 ± 0.40 | 1.72 ± 0.44 | 1.55 ± 0.45 |
| Peak VE, L/min | 69 ± 15 | 68 ± 16 | 61 ± 15 |
| Peak RR, min-1 | 44 ± 10 | 42 ± 8 | 41 ± 5 |

**Notes:** Values are mean ± standard deviation unless otherwise specified. a Including the initial 3 min bicycling at 40% of predicted WMAX. b Including the initial 3 min bicycling at 30% of predicted WMAX.. c Reported as dyspnea, leg discomfort, both of these or other reason. d One patient in Study B discontinued due to other reason (bad bikeseat).

**Abbreviations:** VE, minute ventilation; RR, Respiratory rate.

**Table S2.** Study A - Individual patient data from the standard endurance test.

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Patient no** | **Workload (W)a** | **Endurance time (min)** | **Work capacity (kWs)** | **Stop reason** | **Borg dyspnea score at end** | **Borg leg score at end** | **Peak VO2 (L/min)** | **Peak VCO2 (L/min)** | **Peak VE (L/min)** | **Peak RR (min-1)** |
| 1 | 83 | 4.5 | 22.2 | Dyspnea+Leg | 9 | 19 | 1.38 | 1.50 | 56 | 38 |
| 2 | 68 | 14.8 | 60.2 | Dyspnea | 10 | 14 | 1.27 | 1.35 | 93 | 57 |
| 3 | 68 | 5.7 | 23.4 | Dyspnea+Leg | 7 | 17 | 1.24 | 1.37 | 67 | 51 |
| 4 | 53 | 7.6 | 24.1 | Dyspnea+Leg | 10 | 20 | 1.15 | 1.28 | 62 | 44 |
| 5 | 75 | 5.8 | 25.9 | Dyspnea | 9 | 17 | 1.07 | 1.31 | 47 | 47 |
| 6 | 75 | 12.1 | 54.3 | Dyspnea+Leg | 10 | 20 | 1.39 | 1.56 | 70 | 44 |
| 8 | 75 | 5.9 | 26.3 | Dyspnea+Leg | 9 | 19 | 1.14 | 1.40 | 53 | 44 |
| 10 | 75 | 12.1 | 54.6 | Dyspnea | 10 | 18 | 1.47 | 1.44 | 69 | 35 |
| 11 | 60 | 3.3 | 12.0 | Dyspnea+Leg | 7 | 17 | 1.04 | 1.26 | 55 | 41 |
| 12 | 105 | 20.0 | 126.0 | Otherb | 8 | 17 | 1.76 | 1.94 | 78 | 56 |
| 14 | 98 | 13.7 | 80.7 | Leg | 7 | 17 | 1.78 | 1.77 | 66 | 32 |
| 16 | 113 | 20.9 | 141.8 | Dyspnea | 9 | 19 | 2.12 | 2.32 | 99 | 49 |
| 17 | 105 | 14.5 | 91.6 | Dyspnea | 10 | 17 | 1.97 | 2.03 | 76 | 42 |
| 18 | 75 | 8.2 | 36.9 | Dyspnea+Leg | 9 | 19 | 1.40 | 1.55 | 56 | 53 |
| 19 | 75 | 15.1 | 67.9 | Dyspnea | 9 | 17 | 1.73 | 1.71 | 62 | 50 |
| *Mean* | *80.2* | *10.9* | *56.5* |  | *8.9* | *17.8* | *1.46* | *1.59* | *67.3* | *45.5* |
| *St dev* | *16.8* | *5.4* | *38.0* |  | *1.1* | *1.5* | *0.33* | *0.30* | *14.5* | *7.3* |

**Notes:** a Workload: 75% of the final value obtained from the preceding standard WMAX test. b Other reason: after 20 min of cycling the personnel instructed the patient to stop cycling due to technical reasons. The patient was though still able to continue without stopping due to leg or dyspnea discomfort.

**Abbreviations:** VE, minute ventilation; RR, Respiratory rate.

**Table S3.** Study A - Individual patient data from the new endurance test.

|  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Patient no** | **Workload at start (W)a** | **Workload at 3 min (W)b** | **Workload at end (W)c** | **Endurance time (min)** | **Work capacity (kWs)** | **Stop reason** | **Borg dyspnea score at end** | **Borg leg score at end** | **Peak VO2 (L/min)** | **Peak VCO2 (L/min)** | **Peak VE (L/min)** | **Peak RR (min-1)** |
| 1 | 41 | 77 | 83 | 7.5 | 29.1 | Dyspnea+Leg | 10 | 20 | 1.38 | 1.50 | 55 | 42 |
| 2 | 45 | 83 | 83 | 8.9 | 35.9 | Dyspnea | 9 | 15 | 1.32 | 1.51 | 85 | 50 |
| 3 | 34 | 63 | 65 | 6.2 | 18.2 | Leg | 7 | 17 | 1.14 | 1.30 | 63 | 44 |
| 4 | 27 | 51 | 55 | 7.8 | 20.2 | Dyspnea+Leg | 10 | 20 | 1.03 | 1.14 | 56 | 40 |
| 5 | 37 | 69 | 78 | 9.4 | 34.7 | Dyspnea | 10 | 19 | 1.15 | 1.32 | 52 | 63 |
| 6 | 45 | 84 | 91 | 8.7 | 38.2 | Leg | 9 | 19 | 1.36 | 1.50 | 68 | 41 |
| 8 | 34 | 64 | 73 | 11.1 | 39.2 | Dyspnea+Leg | 10 | 20 | 1.23 | 1.43 | 53 | 43 |
| 10 | 40 | 75 | 84 | 10.7 | 44.0 | Dyspnea+Leg | 9 | 18 | 1.43 | 1.41 | 71 | 41 |
| 11 | 32 | 61 | 65 | 7.8 | 23.7 | Leg | 10 | 20 | 1.11 | 1.35 | 65 | 44 |
| 12 | 57 | 107 | 124 | 12.6 | 77.1 | Leg | 7 | 17 | 1.94 | 2.22 | 89 | 49 |
| 14 | 51 | 95 | 115 | 13.3 | 73.9 | Leg | 8 | 18 | 1.83 | 1.87 | 70 | 32 |
| 16 | 61 | 115 | 134 | 11.9 | 76.8 | Dyspnea | 10 | 18 | 2.14 | 2.51 | 104 | 51 |
| 17 | 52 | 97 | 122 | 14.7 | 86.0 | Dyspnea | 9 | 14 | 2.25 | 2.26 | 87 | 39 |
| 18 | 36 | 68 | 79 | 12.0 | 46.0 | Dyspnea | 9 | 19 | 1.44 | 1.53 | 59 | 62 |
| 19 | 38 | 71 | 82 | 11.7 | 46.2 | Dyspnea | 10 | 17 | 1.71 | 1.69 | 62 | 42 |
| *Mean* | *42* | *79* | 89 | *10.3* | *46.0* |  | *9.1* | *18.1* | *1.50* | *1.64* | *69.3* | *45.5* |
| *St dev* | *9.4* | *17* | 23 | *2.4* | *21.3* |  | *1.0* | *1.8* | *0.37* | *0.39* | *15.4* | *8.3* |

**Notes:** a 40% of the final value obtained from the preceding new WMAX test. b 75% of the final value obtained from the preceding new WMAX test. c Workload at end: Peak value reached after incremental increases every 2 min with 3% of the final value obtained from the preceding new WMAX test.

**Abbreviations:** VE, minute ventilation; RR, Respiratory rate.

**Table S4.** Study B - Individual patient data from the standard endurance test.

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Patient no** | **Workload (W)a** | **Endurance time (min)** | **Work capacity (kWs)** | **Stop reason** | **Borg dyspnea score at end** | **Borg leg score at end** | **Peak VO2 (L/min)** | **Peak VCO2 (L/min)** | **Peak VE (L/min)** | **Peak RR (min-1)** |
| 2 | 96 | 2.75 | 15.0 | Dyspnea | 7 | 16 | 1.43 | 1.42 | 50 | 27 |
| 4 | 75 | 20.03 | 90.1 | Otherb | 10 | 19 | 1.28 | 1.33 | 43 | 39 |
| 5 | 137 | 11.95 | 98.2 | Dyspnea+Leg | 9 | 19 | 2.18 | 2.23 | 73 | 40 |
| 7 | 85 | 5.13 | 26.1 | Dyspnea+Leg | 9 | 19 | 1.44 | 1.63 | 63 | 36 |
| 8 | 71 | 8.03 | 34.2 | Dyspnea | 10 | 20 | 1.22 | 1.43 | 62 | 41 |
| 10 | 56 | 6.33 | 21.2 | Leg | 10 | 19 | 1.16 | 1.23 | 45 | 45 |
| 11 | 110 | 21.72 | 143 | Dyspnea+Leg | 10 | 20 | 1.79 | 1.84 | 86 | 47 |
| 12 | 67 | 6.02 | 24.2 | Leg | 3 | 17 | 1.37 | 1.47 | 66 | 37 |
| 13 | 77 | 10.30 | 47.6 | Dyspnea+Leg | 9 | 19 | 1.55 | 1.68 | 69 | 45 |
| 14 | 98 | 7.75 | 45.6 | Leg | 3 | 12 | 1.82 | 2.20 | 99 | 54 |
| 18 | 55 | 15.02 | 49.5 | Dyspnea | 9 | 18 | 1.33 | 1.34 | 66 | 46 |
| 19 | 77 | 9.85 | 45.5 | Dyspnea | 9 | 13 | 1.50 | 1.57 | 64 | 35 |
| 22 | 33 | 4.45 | 8.8 | Dyspnea | 5 | 13 | 0.75 | 0.78 | 40 | 42 |
| 23 | 72 | 2.90 | 12.5 | Dyspnea | 4 | 11 | 1.20 | 1.26 | 56 | 34 |
| 26 | 63 | 12.93 | 48.9 | Leg | 9 | 21 | 1.44 | 1.41 | 55 | 36 |
| 28 | 45 | 7.65 | 20.7 | Dyspnea+Leg | 7 | 15 | 1.07 | 1.04 | 46 | 38 |
| 29 | 60 | 7.82 | 29.5 | Dyspnea+Leg | 7 | 17 | 1.32 | 1.36 | 53 | 32 |
| 32 | 78 | 17.13 | 64.8 | Dyspnea | 9 | 17 | 1.516 | 1.37 | 48 | 42 |
| *Mean* | *75.3* | *9.88* | *45.9* |  | *7.7* | *16.9* | *1.41* | *1.48* | *61.1* | *39.8* |
| *St dev* | *24.3* | *5.60* | *34.7* |  | *2.4* | *3.0* | *0.31* | *0.36* | *16.2* | *6.3* |

**Notes:** a Workload: 75% of the final value obtained from the preceding new WMAX test. b Other reason: after 20 min of cycling the personnel instructed the patient to stop cycling due to technical reasons. The patient was though still able to continue without stopping due to leg or dyspnea discomfort. **Abbreviations:** VE, minute ventilation; RR, Respiratory rate.

**Table S5**. Study B - Individual patient data from the new endurance test

|  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Patient no** | **Workload at start (W)a** | **Workload at 3 min (W)b** | **Workload at end (W)c** | **Endurance time (min)** | **Work capacity (kWs)** | **Stop reason** | **Borg dyspnea score**  **at end** | **Borg leg score at end** | **Peak VO2 (L/min)** | **Peak VCO2 (L/min)** | **Peak VE (L/min)** | **Peak RR (min-1)** |
| 2 | 38 | 90 | 96 | 7.75 | 33.3 | Dyspnea | 5 | 15 | 1.50 | 1.56 | 48 | 30 |
| 4 | 30 | 70 | 81 | 14.72 | 58.5 | Leg | 10 | 19 | 1.31 | 1.47 | 43 | 34 |
| 5 | 55 | 128 | 146 | 12.83 | 90.7 | Dyspnea+Leg | 8 | 17 | 2.12 | 2.44 | 76 | 39 |
| 7 | 34 | 80 | 88 | 10.05 | 41.7 | Dyspnea+Leg | 10 | 19 | 1.54 | 1.68 | 70 | 39 |
| 8 | 28 | 66 | 71 | 8.50 | 27.7 | Dyspnea+Leg | 10 | 19 | 1.16 | 1.39 | 59 | 41 |
| 10 | 24 | 55 | 59 | 8.03 | 21.5 | Dyspnea+Leg | 10 | 19 | 1.14 | 1.26 | 48 | 36 |
| 11 | 43 | 102 | 121 | 16.27 | 96.5 | Dyspnea+Leg | 10 | 20 | 1.89 | 2.11 | 92 | 44 |
| 12 | 27 | 62 | 67 | 8.57 | 26.4 | Leg | 4 | 15 | 1.24 | 1.60 | 65 | 37 |
| 13 | 31 | 71 | 77 | 9.35 | 33.8 | Leg | 9 | 19 | 1.34 | 1.70 | 69 | 41 |
| 14 | 39 | 92 | 105 | 13.40 | 68.5 | Leg | 4 | 15 | 1.91 | 2.45 | 104 | 59 |
| 18 | 22 | 51 | 55 | 9.47 | 24.5 | Otherd | 9 | 18 | 1.16 | 1.24 | 60 | 43 |
| 19 | 31 | 72 | 82 | 12.75 | 50.6 | Dyspnea | 9 | 13 | 1.37 | 1.59 | 60 | 37 |
| 22 | 13 | 31 | 33 | 8.13 | 12.2 | Dyspnea | 5 | 15 | 0.80 | 0.82 | 40 | 41 |
| 23 | 29 | 67 | 71 | 7.58 | 24.2 | Dyspnea | 4 | 13 | 1.29 | 1.73 | 67 | 36 |
| 26 | 25 | 59 | 68 | 13.63 | 45.0 | Leg | 9 | 20 | 1.30 | 1.26 | 55 | 37 |
| 28 | 18 | 42 | 45 | 7.40 | 14.9 | Dyspnea+Leg | 5 | 17 | 1.08 | 0.98 | 47 | 43 |
| 29 | 24 | 56 | 61 | 8.20 | 23.0 | Dyspnea+Leg | 7 | 17 | 1.20 | 1.34 | 59 | 37 |
| 32 | 31 | 73 | 85 | 15.53 | 59.8 | Dyspnea | 10 | 19 | 1.63 | 1.52 | 51 | 51 |
| *Mean* | *30.1* | *70.4* | *78.4* | *10.68* | *41.8* |  | *7.7* | *17.2* | *1.39* | *1.56* | *62.6* | *40.3* |
| *St dev* | *9.6* | *22.6* | *26.9* | *3.04* | *24.7* |  | *2.4* | *2.3* | *0.33* | *0.43* | *17.2* | *6.5* |

**Notes:** a 30% of the final value obtained from the preceding new WMAX test. b 70% of the final value obtained from the preceding new WMAX test. c Workload at end: Peak value reached after increases of 1%-unit/minute of the final value obtained from the preceding new WMAX test. d Other reason – The patient experienced strain on heart. Additional comment from personnel: “Poor fitness?” ECG at end of exercise was normal.

**Abbreviations:** VE, minute ventilation; RR, Respiratory rate.