

**Online Supplemental Table 1.** Changes in cardiac function and exercise parameters.

| Parameter                           | n  | Before CRT       | After 3 months   | $\Delta$ (%)           | P-value          |
|-------------------------------------|----|------------------|------------------|------------------------|------------------|
| EF (%)                              | 31 | 26.6 $\pm$ 8.1   | 34.9 $\pm$ 11.4  | 7 $\pm$ 7 <sup>a</sup> | <b>&lt;0.001</b> |
| ESV (ml)                            | 30 | 183.8 $\pm$ 81.7 | 146.8 $\pm$ 85.3 | -22 $\pm$ 19           | <b>&lt;0.001</b> |
| EDV (ml)                            | 29 | 244.7 $\pm$ 89.5 | 209.5 $\pm$ 90.9 | -15 $\pm$ 14           | <b>&lt;0.001</b> |
| P peak (W)                          | 30 | 103.4 $\pm$ 41.9 | 112.1 $\pm$ 44.5 | 10 $\pm$ 18            | <b>&lt;0.001</b> |
| VO <sub>2</sub> peak<br>(ml/kg/min) | 30 | 16.2 $\pm$ 5.3   | 18.4 $\pm$ 5.8   | 15 $\pm$ 23            | <b>&lt;0.001</b> |
| OUES                                | 30 | 1528 $\pm$ 496   | 1821 $\pm$ 577   | 22 $\pm$ 26            | <b>&lt;0.001</b> |
| VE/VCO <sub>2</sub> slope           | 30 | 36.6 $\pm$ 9.1   | 33.7 $\pm$ 7.1   | -7 $\pm$ 10            | <0.010           |
| $\tau$ VO <sub>2</sub> onset (s)    | 26 | 70.2 $\pm$ 38.4  | 70.9 $\pm$ 40.4  | 15 $\pm$ 65            | 0.930            |
| $\tau$ VO <sub>2</sub> recovery (s) | 26 | 76.7 $\pm$ 38.9  | 61.3 $\pm$ 18.3  | -11 $\pm$ 27           | <b>0.030</b>     |

Cardiac resynchronization therapy (CRT) induces significant improvement in cardiac function, peak performance, peak oxygen uptake (VO<sub>2</sub>) and VO<sub>2</sub> recovery kinetics in the total study population. *a* = absolute change.

On group level, CRT significantly improved tVO<sub>2</sub> recovery, but not tVO<sub>2</sub> onset kinetics. Because CRT primarily alters cardiac function, improved 'local' O<sub>2</sub> delivery at the skeletal muscle level, rather than improved O<sub>2</sub>-utilization, likely did not contribute to improved tVO<sub>2</sub> recovery further research is warranted.

**Online Supplemental Table 2.** Receiver operator curves for exercise-dependent variables for prediction of an echocardiographic response.

| <b>Parameter</b>                | <b>Minimum</b> | <b>Maximum</b> | <b>Chosen value</b> | <b>P-value AUC</b> |
|---------------------------------|----------------|----------------|---------------------|--------------------|
| $\tau$ VO <sub>2</sub> onset    | > 59.0000      | ≤ 60.5000      | 60                  | <b>0.029</b>       |
| $\tau$ VO <sub>2</sub> recovery | > 59.0000      | ≤ 62.3023      | 60                  | <b>0.025</b>       |
| VO <sub>2</sub> peak            | ≥ 17.7106      | < 18.0863      | 18                  | 0.199              |
| OUES                            | ≥ 1491.7186    | < 1500.1439    | 1500                | 0.371              |
| VE/VCO <sub>2</sub> slope       | > 39.8589      | ≤ 41.5227      | 40                  | 0.371              |

*Legend: time constant of oxygen uptake ( $\tau$ VO<sub>2</sub>); oxygen uptake (VO<sub>2</sub>); oxygen uptake efficiency slope (OUES); minute ventilation for CO<sub>2</sub> elimination (VE/VCO<sub>2</sub> slope).*

**Online Supplemental Table 3.** Differences in cardiac function based on exercise capacity.

| Parameter  | $\Delta$ LVESV (%)          |                              | $\Delta$ LVEF (%-<br>point) |                             | Echo Responder (%) |            |
|--|-----------------------------|------------------------------|-----------------------------|-----------------------------|--------------------|------------|
|  | No                          | Yes                          | No                          | Yes                         | No                 | Yes        |
| Exercise characteristics                                 |                             |                              |                             |                             |                    |            |
| $\tau$ VO <sub>2</sub> onset $\leq$ 60 s                 | 18 $\pm$ 21                 | 31 $\pm$ 14                  | 6 $\pm$ 8                   | 10 $\pm$ 6                  | <b>44</b>          | <b>92*</b> |
| $\tau$ VO <sub>2</sub> recovery $\leq$ 60 s <sup>a</sup> | <b>17<math>\pm</math>21</b> | <b>32<math>\pm</math>14*</b> | <b>4<math>\pm</math>8</b>   | <b>10<math>\pm</math>5*</b> | <b>40</b>          | <b>92*</b> |
| VO <sub>2</sub> peak $\geq$ 18 ml/kg/min <sup>a</sup>    | <b>17<math>\pm</math>20</b> | <b>31<math>\pm</math>16*</b> | 6 $\pm$ 7                   | 9 $\pm$ 7                   | 53                 | 83         |
| OUES > 1500 <sup>a</sup>                                 | 18 $\pm$ 19                 | 27 $\pm$ 19                  | 6 $\pm$ 7                   | 8 $\pm$ 7                   | 53                 | 79         |
| VE/VCO <sub>2</sub> < 40                                 | 13 $\pm$ 10                 | 26 $\pm$ 21                  | 2 $\pm$ 4                   | 9 $\pm$ 7                   | 44                 | 73         |

<sup>a</sup> age significantly different between groups; \* = statistically significant (p < 0.05).

**Online Supplemental Table 4.** Characteristics associated with oxygen uptake recovery.

| <b>Characteristic</b>            | <b>Slow VO<sub>2</sub> recovery<br/>(&gt; 60 seconds)</b> | <b>Fast VO<sub>2</sub> recovery<br/>(≤ 60 seconds)</b> | <b>P-value</b> |
|----------------------------------|---|--|----------------|
| Age (years)                      | 72±4  | 64±8   | <b>0.001</b>   |
| VO <sub>2</sub> Peak (ml/kg/min) | 14±3  | 20±6   | <b>0.002</b>   |
| Male – n (%)                     | 8 (54)  | 9 (69)   | 0.460          |
| HF-duration (months)             | 16 [7-55]   | 16 [8-72]  | 0.548          |
| NYHA III – n (%)                 | 13 (87)   | 7 (54)   | 0.096          |
| ICM – n (%)                      | 7 (47)  | 5 (39)   | 0.718          |
| LBBB – n (%)                     | 12 (86)   | 11 (92)  | 1.000          |
| QRS-duration (ms)                | 151±18  | 154±14   | 0.656          |
| EDV (ml)                         | 249±113   | 234±60   | 0.683          |
| ESV (ml)                         | 188±104   | 173±49   | 0.644          |
| EF (%)                           | 26±9  | 29±5   | 0.292          |

*Values presented as mean ± stand deviation or median with interquartile range. Abbreviations as in table 1.*