

## Physiological responses and energy expenditure during water cycling

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**OBJECTIVE** Equipment that was used to improve physical fitness on land are being adapted for water, such as the bicycle. The aim of this study was to compare the energy cost of submaximal cycling at different intensities, performed during cycling in an aquatic-specific bike (CW) and on land stationary bike (CL).

**METHODS** Fifteen trained male subjects (mean  $\pm$  SD: age  $21.73 \pm 2.84$  years; weight  $70.33 \pm 5.33$  kg; height  $175 \pm 06$  cm; fat mass percentage  $15.09 \pm 3.13$ ;  $VO_{2max}$   $50.96 \pm 5.51$  ml.kg<sup>-1</sup>.min<sup>-1</sup>; FC  $182.64 \pm 12.35$  bpm). Each subject completed in a randomized order a 6 min exercise bout at the cadence of 60, 80 and 100 bpm, either on a CL and a CW, with 48h separating each exercise bout. Oxygen uptake ( $VO_2$ ), energy expenditure (EE) and the heart rate (HR) were continuously collected, respectively, with a portable gas analyzer K4b2 (Cosmed, Rome, Italy) and by a transmitter unit attached to K4b2. Rest metabolic rate were measured before each trial. The ANOVA test was used for repeated measures and Bonferroni post-hoc test as well as the paired t-test ( $p < 0.05$ ).

**RESULTS** The  $VO_2$ , EE and HR increased with the cadences in both exercises conditions and were significantly higher ( $p < 0.05$ ) when during CW.

**DISCUSSION & CONCLUSION** The increased of  $VO_2$  and HR in the water exercise showed a direct relation with the speed of cycling at higher cadences. In conclusion, different intensities may be used in water exercises with the advantages of smaller joint overload.

**KEY WORDS** water cycling, oxygen uptake, heart rate

## Effects of different rest intervals during resistance training on growth hormone, testosterone and blood lactate

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**OBJECTIVE** Resistance training stimulates the release of different anabolic hormones, specially growth hormone (GH) and testosterone (TS) (1,2,4,5). The acute hormonal responses due to resistance training (RT), reinforces the access to muscle strength, following the chronic training (3). Aim of the present study was a comparison among three different rest intervals on growth hormone (GH), testosterone (TS) and blood lactate and training volume.

**METHODS** Therefore ten male athletes (Mean  $\pm$  SD, age= $20.37 \pm 2.24$  years, body mass= $65.5 \pm 26.70$  kg) voluntarily participated in four sessions with 48 h rest interval who were performing different resistance trainings (RT). At the first session, one repetition maximum (1RM) of participants evaluated. The subjects from the second session up to the fourth, each session, performed four sets of squat and bench press until exhausted with 85% of 1RM and one of rest intervals of 60s, 90s and 120s between the sets used randomly and then the number of repetitions in each set was recorded. Also, there were taken three blood samples from the subjects before (T0), immediately after (T1) and 30 min after (T3), to determine the GH, TS and blood lactate serum concentrations.

**RESULTS** Based of the results, there wouldn't observe a significant difference in GH, TS and blood lactate serum concentrations in T0. It was observed a significant increment of 64 percent in GH concentration through using the 60s rest intervals in comparison with 120s rest between sets in T1. Besides, there was observed a significant increment of 65 and 67 percent in TS concentration through using the rest intervals of 90s and 120s compared to the 60s rest interval in T1. It wasn't observed a significant difference among the three programs in lactate concentration. Although, the ability of keeping the repetition (training volume) by using 90s and 120s rest intervals has been more than that of 60s, but statistically it wasn't observed a significant difference in training volume.

**DISCUSSION & CONCLUSION** The results of the present study support rest period in RT sets as an important variable to increase the anabolic hormone concentrations and it should be mentioned that 60s rest interval has caused more increase in GH concentration compared with 120s rest. But TS response has been larger in the program with 120s rest interval between sets. In summary, the results of this investigation indicate that serum GH and TS concentrations were dependent to the length of the rest interval between sets in heavy RT program. The primary finding of this study was that the patterns of GH and TS responses were dramatically different to the length of rest interval between sets in heavy resistance training. Heavy resistance training with short (60 s) rest interval between sets resulted in greater acute GH responses than long (120 s) rest interval between sets. But acute TS responses after heavy resistance training with long rest (120 s) showed great increase than heavy resistance training with short (60 s) rest interval between sets

**KEY WORDS** Growth hormone, testosterone, resistance training, rest interval