PHYSIOLOGICAL RESPONSES TO PEDALING ON A WATER STATIONARY BIKE AT DIFFERENT IMMERSION HEIGHTS

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Only a few studies[1-4] have investigated oxygen consumption (V'O2) and heart rate (HR) responses to pedaling on a stationary bike in water (WSB), while literature is still lacking on the effects elicited by variations in immersion depth. 14 subjects (8 M, 6 F, age 30±6y, weight 67±14kg, BMI 22.8±2.3kg/m2, fat mass 21,4±3%) performed 2 testing sessions and 2 exercise sessions: i) dry-land incremental exercise test (cycle-ergometer) to age-predicted maximum HR (HR); ii) underwater (hip-height) incremental exercise test (on a WSB) to exhaustion; iii/iv) two 2-stage (18-minutes each) underwater pedaling exercises on a WSB (Aqquatix S.r.l., Italy) at 2 different immersion heights (armpit/hip). Breath-by-breath V'O2 and beat-by-beat HR were recorded continuously throughout dry-land sessions. The intensities of the exercise sessions were 45%-55% (stage#1) and 70%-80% (stage#2) of the underwater V'O2 peak (a metronome was set at the V'O2 peak pedaling rate). A repeated-measures (2 exercise intensities) 2-way (armpit/hip heights) ANOVA was performed on each variable and the Bonferroni test was used for post-hoc comparisons. Compared to the hip-height condition, pedaling immersed at the armpit level elicited significantly lower V'O2 and HR (significant solely at high-intensity for HR) responses, either exercising at high (25.5±4.6 vs. 29.1±4.8 mL·kg-1·min-1; 127±14 vs. 140±19 beats·min-1) or low (17.9±3.6 vs. 20.1±3.6 mL·kg-1·min-1; 105±16 vs. 110±15 beats·min-1) intensity. While peak V'O2 didn't differ significantly between dry-land and underwater tests (36.2±5.4 vs. 38.8±5.8 mL·kg-1·min-1), mean HRs at both intensities and both water heights were significantly lower when expressed as percentage of the HR resulting from the underwater test to exhaustion, rather than applying the 220-age prediction equation.