Title: Resistive respiratory muscle training improves and maintains endurance swimming performance in divers.

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Abstract: Respiratory work is increased during exercise under water and may lead to respiratory muscle fatigue, which in turn can compromise swimming endurance. Previous studies have shown that respiratory muscle training, conducted five days per week for four weeks, improved both respiratory and fin swimming endurance. This training (RRMT-5) consisted of intermittent vital capacity breaths (twice/minute) against spring loaded breathing valves imposing static and resistive loads generating average inspiratory pressures of approximately 40 cmH2O and expiratory pressures of approximately 47 cmH2O. The purpose of the present study (n = 20) was to determine if RRMT 3 days per week (RRMT-3) would give similar improvements, and if continuing RRMT 2 days per week (RRMT-M) would maintain the benefits of RRMT-3 in fit SCUBA divers. Pulmonary function, maximal inspiratory (P

(insp)) and expiratory pressures (P(exp)), respiratory endurance (RET), and surface and underwater (4 fsw) fin swimming endurance were determined prior to and after RRMT, and monthly for 3 months. Pulmonary function did not significantly improve after either RRMT-3 or RMMT-5; while P(insp) (20 and 15%) and P(exp) (25 and 11%), RET (73 and 217%), surface (50 and 33%) and underwater (88 and 66%) swim times improved. VO2, VE and breathing frequency decreased during the underwater endurance swims after both RRMT-3 and RRMT-5. During RRMT-M P(insp) and P(exp) and RET and swimming times were maintained at post RRMT-3 levels. RRMT 3 or 5 days per week can be recommended to divers to improve both respiratory and fin swimming endurance, effects which can be maintained with RRMT twice weekly.

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