Chronic Changes in Serum IL-6 and TNF-α Following 12 Weeks of Concurrent Resistance and Aerobic Exercise are Dependent on Exercise Mode and May Affect Adaptation

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ABSTRACT

PURPOSE: To examine physiological responses to concurrent resistance and land treadmill training (RT-LTM) compared to concurrent resistance and aquatic treadmill training (RT-ATM) and the chronic effect of each on serum TNF-α and IL-6 (cytokines associated with chronic inflammation, CVD, and skeletal muscle metabolism). **METHODS:** Twenty-six untrained subjects (M: n=13, 98.6±17.1kg, 182.2±6.2cm, 34±11yrs, F: n=13, 78.9±14.0kg, 165.1±5.1cm, 38±11yrs) were screened to assess VO_{2max}, body composition (DEXA), and strength (Lifts: leg press, chest press, leg curl, lat pull, leg ext, triceps push-down, biceps curl). Subjects were then randomized into 2 groups: RT-LTM (M=6, F=7), RT-ATM (M=7, F=6). Each performed progressive RT (2/wk, 3 x 8-12 @ 60%➔~80% 1RM) for 12 wks. Both groups also performed 12 wks of aerobic LTM or ATM (60➔85%VO_{2max}) respectively. ATM or LTM occurred immediately following RT sessions and in isolation on a 3rd day during the wk. Kcal/session: Wk 1-6 = 250➔500 kcal/session, Wk 6-12 = 500 kcal/session. Blood samples were obtained in the rested state (>72h after last exercise bout) before and after training. Serum TNF-α and IL-6 was analyzed using a multiplex assay kit (Luminex®, Millipore®). A 2x2 Mixed Model ANOVA w/ repeated measures was used to examine absolute and relative changes in the independent variables listed in the table. **RESULTS:**

INDEP. VAR.	Lean Mass (kg)	Fat Mass (kg)	%Body Fat (%)	VO_{2max} (ml/kg/min)	Total Strength (lbs)	IL-6 (pg/dl)	TNF-α (pg/dl)
BASELINE MEASUREMENTS							
RT-LTM	49.9 ± 3.7	35.9 ± 3.1	42.1 ± 2.5	29.9 ± 2.0	1457.4 ± 135.1	4.6 ± 1.6	7.1 ± 1.9
RT-ATM	53.1 ± 4.0	31.1 ± 2.8	37.0 ± 2.3	32.1 ± 1.6	1552.8 ± 145.9	4.6 ± 1.5	7.9 ± 1.5
POST TRAINING MEASUREMENTS							
RT-LTM	51.0 ± 4.7[†]	34.1 ± 2.7[†]	40.1 ± 3.6[†]	35.8 ± 2.9[†]	1843.4 ± 201.1[†]	7.1 ± 1.6[†]	6.8 ± 0.5
RT-ATM	55.8 ± 4.6[†]	30.3 ± 3.1	35.6 ± 2.4[†]	35.8 ± 2.3[†]	2193.6 ± 251.3[†]	5.1 ± 2.7	6.6 ± 1.0[†]
%Δ = Calculated From Each Individual Subjects Change From Baseline							

RT-LTM	2.6% ± 1.4^{†,a}	-6.5% ± 2.4^{†,a}	-5.8% ± 1.8^{†,a}	14.1% ± 2.3^{†,a}	21.3% ± 1.1^{†,a}	125.9% ± 36.6^{†,a}	-1.8% ± 6.0^{a}
RT-ATM	4.2% ± 0.9^{†,b}	-2.1% ± 1.6^{b}	-4.1% ± 1.5^{†,a}	4.5% ± 3.0^{†,b}	27.1% ± 1.7^{†,b}	28.1% ± 34.7^{b}	-13.0% ± 5.4^{†,b}

Values are means ± SE. %Δ = Individual change from baseline. Like letters = not significantly different between groups, †=Significant change from baseline within group (α ≤ 0.05).

CONCLUSION: Chronic RT-LTM and RT-ATM training elicit different effects on markers of chronic inflammation which may be related to differing health and fitness outcomes observed between our groups.