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Can Noninvasive Characteristics Predict The Adaptation to Short-term Resistance And Cardiovascular Training? A Preliminary Investigation

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A large heterogeneity exists in physiological adaptations following resistance and cardiovascular training. This heterogeneity has led to classifying individuals as slow and fast responders. Given the low exercise adherence rates, it possible that a slow adaption to exercise training may exacerbate low exercise adherence. Therefore, it may be beneficial to identify noninvasive characteristics that predict slow and fast responses to exercise training to better guide individuals starting an exercise routine. **PURPOSE:** To identify sets of noninvasive baseline characteristics that would predict whether an individual would be a slow or fast responder to a microcycle of resistance and cardiovascular training. **METHODS:** Eight untrained individuals (29.8±9.5 years, 170±10 height (cm), 80.2±8.4 weight (kg)) participated in a randomized crossover design which assigned subjects to 7-sessions of resistance or cardiovascular training (~60-minutes per session) over 14-days. Pre-and-post each exercise intervention subject's anthropometrics, blood pressure, cycling aerobic capacity (VO_2peak), leg extension and flexion peak torque, and leg extension and flexion fatigue index (F.I.) were assessed. Multiple linear regression analysis with a backward selection model was performed. **RESULTS:** The model of best fit found that baseline central diastolic blood pressure (cDBP) accounted for 49% of the variance in the percent change in VO_2peak following resistance training ($F (1,6) = 7.79$; $p = 0.032$; $R^2 = 0.49$). The model of best fit found that baseline body fat %, body mass index (BMI), and VO2peak accounted 98% of the change in peak leg extension torque following cardiovascular training ($F (3,4) = 113$; $p = 0.001$; adjusted $R^2 = 0.98$). The model of best fit found that baseline flexion F.I., cDBP, peripheral diastolic pressure, and flexion type 1 fiber % accounted for 85% of the variance in the change in leg extension F.I. following cardiovascular training ($F (4,3) = 11$; $p = 0.039$; adjusted $R^2 = 0.851$). **CONCLUSION:** Our data shows that a relationship exists between baseline characteristics and the percent change in VO_2peak following resistance training and peak leg extension torque and leg extension F.I. following cardiovascular training. Based on these findings, it might be possible to identify from baseline characteristics which type of training intervention an individual may see the greatest initial improvements. **SIGNIFICANCE/NOVELTY:** Previous work has identified that large heterogeneity exists following resistance and cardiovascular training; however, invasive and costly measures have been used to attempt to identify the physiological rationale for the heterogeneity. Our study uses non-invasive techniques that can be administered in laboratory and non-laboratory settings to help identify potential response rates to resistance and cardiovascular training.

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