Impact of Interval Training on VO$_2$ Peak: Diminishing Returns with Increasing Intensity
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PURPOSE: High intensity interval training (HIIT) is a potent stimulus for increases in VO$_2$ peak, however, whether an optimal intensity for inducing adaptation exists is unknown. Therefore we examined the impact of multiple intensities of work-matched interval training on improvements in VO$_2$ peak and examined the individual variability in the adaptive response. METHODS: 36 healthy men and women completed 3 weeks of interval training on a cycle ergometer, consisting of 1 minute intervals at either 73% (age, 20.0 ± 0.9 yrs; VO$_2$ peak, 40.8 ± 7.0 ml/min/kg), 103% (age, 20.0 ± 0.8 yrs; VO$_2$ peak, 41.6 ± 7.1 ml/min/kg) or 133% (age, 20.2 ± 1.1 yrs; VO$_2$ peak, 41.2 ± 7.3 ml/min/kg) of peak aerobic power. Training occurred 4 days per week. Intervals were separated by 1 minute of loadless cycling and total work performed per training session was matched across groups. All participants completed 3 VO$_2$ peak tests in the week preceding (pre) and in the week following (post) training. RESULTS: Training improved VO$_2$ peak in all groups with the increase following training at 103% VO$_2$ peak (5.8 ± 5.7 ml/min/kg), but not 133% (VO$_2$ peak, 4.2 ± 1.0 ml/min/kg) being greater than that following training at 73% (VO$_2$ peak, 2.7 ± 0.7 ml/min/kg). When the proportion of responders within each group was evaluated using a cut-point for a responder at 1 x the technical error of the mean, the greatest proportion of responders was observed in the 103% group (73%, 5/12; 103%, 12/13; 133%, 8/11). CONCLUSION: These data suggest that intervals performed at or near peak aerobic power may be optimal for inducing increases in VO$_2$ peak.