ABSTRACT

A positive genetic relationship between aerobic capacity and voluntary exercise activity levels has been suggested from earlier studies of mice selected for increased wheel-running activity. To further investigate the proposed relationship between aerobic capacity and exercise behavior in another animal model, wheel running activity was studied in rats bidirectionally selected for differences in intrinsic aerobic capacity (high capacity runners – HCR; low capacity runners – LCR). Each rat was housed individually with access to a running wheel and wheel-running activity was recorded for 6 weeks to determine differences in voluntary activity levels. HCR animals exhibited 37% greater total wheel-running distance per day than the LCR (LCR- 11.7km/day vs. HCR- 15.7km/day) due to a 15% increase in wheel-running speed (36.5m/min versus 41.0m/min) combined with a 22% increase in running duration (1968.6min/day versus 2386.1min/day). Total wheel running was significantly different between LCR and HCR (t_{55} = -11.09; P<0.001). Differences in the intermittency of wheel-running were also observed. HCR animals engaged in 10% more bouts of running per day (31.1 vs 34.2 meters), ran 19% faster during episodes of running (36.0 vs. 41.3 meters/minute), and 21% longer distances than LCR animals (342.8 vs 421.5 meters/bout). These results are consistent with earlier work that suggests a phylogenetically conserved relationship between physiological capacity and behavioral activity for aerobic performance.