Economy during exercise can be presented as either an endurance measure considered more economical than a person with a higher EMG amplitude. Speed on a treadmill. A person with a lower EMG amplitude for this load is isokinetic machine, the resistance (in wattage) on a cycle ergometer, or the cyclist/runner would rely more on type I motor units, which have a lower workload, resulting in a lower EMG signal. Also, the more economical cyclist/runner may be recruiting fewer motor units to perform the set.

The purpose of this investigation was to analyze the relationship between measures of economy (neuromuscular and running) and cardiorespiratory fitness during treadmill running in endurance trained men.

Seven endurance-trained men (23.5 ± 3.7y) completed an isometric leg extension maximal voluntary contraction test (MVC), a 5-minute steady-state treadmill running test at 214.5 m·min⁻¹ (SS) and a maximal graded exercise test (GXT). Participants were outfitted with surface electrodes over the vastus lateralis (VL) muscle to record electromyographic amplitude (EMG) throughout each test. The MVC was conducted to determine maximal EMG of the vastus lateralis (EMGmax). During the SS test, the EMG (as a percentage of EMGmax), and VO2 over the final minute were established and considered neuromuscular economy (NE) and running economy (RE), respectively. Following a rest period of 8 to 10 minutes, participants performed the GXT which consisted of 1-minute stages of increasing speed on a treadmill until the participant could no longer continue to determine VO2peak. Pearson product moment correlations were used to determine the relationships between VO2peak and measures of RE and NE.

RESULTS: Mean (± SD) VO2peak during the GXT was 58.4 ± 5.8 ml·kg⁻¹·min⁻¹ and RE was 43.7 ± 1.0 ml·kg⁻¹·min⁻¹. (74.8% of VO2peak). There was a significant relationship between VO2peak and RE (r = 0.790, r² = 0.62; p = 0.035). Mean NE was 33.1 ± 6.7% of EMGmax. VO2peak was significantly inversely related to NE (r = -0.911, r² = 0.83 p = 0.004). Further, the strong inverse relationship between VO2peak and NE suggest that more aerobically fit participants in the current study used a lower percentage of muscular activation of the VL when running at submaximal speeds.

CONCLUSIONS: Unexpectedly, the shared variance between NE and VO2peak (83%) was larger than the variance accounted for by RE (62%). The results of this investigation revealed that the shared variance between NE and VO2peak (83%) was larger than the variance accounted for by RE (62%).

The positive relationship may be indicative of the more aerobically fit runners being uncomfortable or less economical at the slower running speed (214.5 m·min⁻¹).

The significant inverse correlation between VO2peak and NE (r = -0.911; r² = 0.83; p = 0.004) indicates that the more aerobically fit runners utilize a smaller percentage of muscle activation percentage running at 214.5 m·min⁻¹. This relationship continued to VO2peak speed, where there was a significant inverse correlation between VO2peak and the percent of EMGmax utilized at VO2peak.

The results of this investigation revealed that the shared variance between NE and VO2peak (83%) was larger than the variance accounted for by RE (62%). These results suggest that more aerobically fit runners utilize a lower percentage of muscle activation of VL at submaximal and maximal speeds.