During the running, the lower extremities are compared to a spring due to their ability to store and release energy. Recent evidence suggests a relationship between increased lower extremity stiffness and enhanced athletic performance, specifically in distance running. Current literature lacks information on the influence of fatigue on leg stiffness across multiple days in response to competition.

**PURPOSE:** To determine how leg stiffness in runners was influenced in the 24- and 48-hour period following a cross country race.

**METHODS:** Twenty-three collegiate cross-country runners (13 M, 10 F, 19 ± 1.4 yo) were recruited and participated. Leg stiffness was assessed 24h before a race and 24h and 48h post-race. Participants performed three static jumps (SJ) and three counter-movement jumps (CMJ) on two force plates (AMTI Optima OPT-464506, Watertown, MA, 1000 Hz). During each jump, participants held a dowel across the shoulders to prevent arm swing. Participants then performed a hop test (HT) where they completed 10s of straight leg maximal hopping in sync with a metronome (2.2Hz). Leg stiffness was calculated, in agreement with previously reported methods, from the vertical ground reaction force of the 5th-7th hop of the HT. Repeated measures ANOVA and post-hoc analysis were used to assess significance (p ≤ 0.05).

**RESULTS:** A significant main effect was found for SJ height, CMJ height and leg stiffness. Leg stiffness was significantly reduced 24h post-race (pre-race 36.84 ± 4.96 kN · m⁻¹, 24h post 33.11 ± 8.05 kN · m⁻¹, p = 0.05) and then increased significantly from 24h post-race to 48h post-race (36.84 ± 6.88 kN · m⁻¹ p = 0.015). No significant differences were found in post-hoc analysis for CMJ height (pre-race 30.81 ± 5.79 cm, 24h post-race 29.89 ± 6.06 cm, 48h post-race 31.44 ± 6.47 cm, p > 0.05) and eccentric utilization ratio (pre-race 1.24 ± 0.10, 24h post-race 1.20 ± 0.10, 48h post-race 1.22 ± 0.10, p > 0.05). SJ height increased significantly from 24h to 48h post-race (24h post-race 25.99 ± 5.65 cm, 48h post-race 27.19 ± 5.63 cm, p > 0.05).

**CONCLUSION:** Following a cross country race leg stiffness significantly declined in a group of collegiate runners 24 hours post-race but returned to baseline 48 hours post-race. Sport scientists and coaches may be able to monitor leg stiffness as a metric to properly prescribe training regimens.

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**Board #22**  
**May 29 2:00 PM - 3:30 PM**  
**Physiological Correlates With 300 And 1000 M Performance In U14 Athletes**  
Prokopios Chatzakis, National And Kapodistrian University Of Athens, Athens, Greece.

(No relationships reported)

**Physiological correlates with 300 and 1000 m performance in U14 athletes.**  
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**Abstract**

**PURPOSE:** To determine the contribution of selected field tests physiological parameters with running performance in U14 track athletes.

**METHODS:** Fifteen trained U14 young track and field athletes (12 girls and 3 boys, 12-13 years old) participated in the study. During the first and second visit after anthropometry the athletes performed a 20 m Shuttle Run Test, a RAST (Running Anaerobic Speed Test), a vertical squat jump and a 40 m maximal effort to determine aerobic, anaerobic capabilities and leg explosive strength. The 300 and 1000 m time trial followed. All maximal tests were performed at least three days apart. Pearson’s r and Stepwise Multiple Linear Regression were used for the correlation between maximal O2 uptake (VO2max), velocity at VO2max (vVO2max), maximal heart rate (HRmax), minimal, maximal and mean relative power output values (Pmin, Pmean and Pmax, respectively), squat jump (SJ), maximal running speed (Vmax), body mass (BM), body height (BH), % body fat (%BF) and the time trials 300 (300m) and 1000 m (1000m).

**RESULTS:** Univariate relationships showed significant correlations between 1000m and VO2max (r=0.866, p<0.01), vVO2max (r=0.899, p<0.01), Pmin (r=0.519, p<0.05), Pmean (r=0.568, p<0.05), SJ (r=0.606, p<0.05), BM (r=0.770, p<0.01) and %BF (r=0.698, p<0.01). Furthermore, 1000m significantly correlated with Pmax (r=0.553, p<0.05), Pmean (r=0.579, p<0.05) and Pmean (r=0.670, p<0.01). Stepwise Multiple Linear Regression showed that the best predictor variables for 1000m in U14 were vVO2max, Pmean, BM and Pmax (r=0.444, 229-15.857*xVO2max-37.105*xPmean+1.270*BM+23.042*xPmax, Adjusted R²=0.948, p<0.001, SEE=8.68 s), while the single predictor variable for 300m was Pmean (r=0.810-5.276*xPmean, Adjusted R²=0.406, p=0.006, SEE=3.97 s).

**CONCLUSIONS:** The moderate to high correlations shown in the present study between 1000m and 300m and the selected parameters can predict with acceptable accuracy 1000 m and 300 m in young runners and can be used to estimate performance.

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**Board #23**  
**May 29 2:00 PM - 3:30 PM**  
**Effects of Pulsed Electromagnetic Field Application on Aerobic Performance in Runners During Short-Term Altitude Training**  
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(No relationships reported)

**Pulsed Electromagnetic Field (PEMF) application increases microcirculation throughout the body and has been shown to be beneficial in clinical populations. In athletic populations, PEMF is used to improve recovery. Altitude training has long been used by endurance athletes to improve sea-level performance.**

**PURPOSE:** To determine if recovery with PEMF during altitude performance leads to greater improvements in VO2peak and ventilatory threshold (VT) in cross-country runners.

**METHODS:** Fourteen male NCAA cross-country runners (age: 19.07±0.92 y.o.) with initial VO2peak of 73.13 ± 5.65 ml/kg/min participated in the study. Subjects were randomly assigned either to the PEMF intervention (INT) (n=8) or to a control group (CON) (n=6). VO2peak and VT were evaluated using a metabolic cart at sea-level, pre- and post-training. Runners from sea level traveled to high altitude where they lived at 1322m above sea-level for 6 days. Six training sessions were performed at altitudes ranging from 881.25±148.87m to 1047.70±237.29m above sea-level with training sessions averaging a duration of 75.25±7.04 mins, speed of 13.02±1.60 kmh and distance of 16.42±2.95 km. Subjects in INT received PEMF application prior to and after training, while subjects in CON did not.

**RESULTS:** There was no significant difference in either absolute or relative VO2peak. A main-effect of time was found for absolute VT (p=0.01), which changed from 3.35±0.52 L/min to 3.89±0.55 L/min, and VT relative to VO2peak (p=0.01), which changed from 73.10±1.60% of VO2peak to 87.08±1.82% of VO2peak. There was no significant difference between groups for absolute VT (p=0.24) however, the INT group displayed a positive trend for VT relative to VO2peak (INT: 18.28%; CON: 9.68%; group*time p=0.07). Consequently, there was a main effect of time for heart rate at VT (p=0.02), which changed from 168.10±3.25 bpm to 175.34±5.49 bpm, with no difference between groups (group*time p=0.11).

**CONCLUSION:** While altitude training showed some positive adaptations in cross-country runners, the addition of PEMF did not improve these adaptations significantly. This can be attributed to the short duration of application, since a positive trend was found for VT relative to VO2peak. PEMF could have beneficial effects when combined with a longer duration of altitude training.