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The acute impact of a high altitude ultra-trail race on arrhythmias

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Background.Ultra-endurance competitions are becoming increasingly popular but the consequences of ultra-endurance sports activity on the heart rhythm is still a debated issue. Some authors demonstrated that athletes engaging in ultra-endurance sports show a transient rise in cardiac biomarkers and right ventricular dysfunction after a competition, suggesting the possibility of an adverse arrhythmic remodeling and an increased risk of sudden cardiac death. The aim of our study was to evaluate the effects on heart rhythm of an ultraendurance high-altitude race.

Methods.The study was performed during the 2018 North Face® Lavaredo Ultra Trail mountain run (Cortina D’Ampezzo, BL, Italy). We recorded the ECG with the FDA-approved MyDiagnostick device. Recordings were performed at baseline the day before the run and immediately after the run in the available athletes. The ECG was analyzed for heart rate, QRS duration, QT interval duration corrected according to the Bazett formula and presence of at least one beat of presumed ventricular origin (PVB).

Results. A total of 545 athletes (83% males, mean age: 40±9 years), 241 running the 120 Km race and 304 running the 50 Km race, were included in the study. At baseline, athletes showed a mean heart rate of 64±14 bpm and a mean QRS duration of 92±18 ms. Three (0.5%) showed at least one PVB. Analysis of QTc interval duration showed a mean value of 412±25 ms. After the race, athletes showed a higher heart rate (91±13 bpm, p<0.001), a similar QRS duration (94±16 ms, p=0.32) and a longer QTc interval duration (447±25 ms, p<0.001), as compared to baseline data. The number of athletes showing at least 1 PVB significantly increased to 18 (3.3%, p=0.004) as compared to pre-race evaluation. Athletes engaged in the 120 Km run showed a slightly longer post-run QTc interval (450±24 versus 444±25 ms, p=0.009) while the post-run QRS duration was similar between the two groups. The presence of PVBs after the race was not correlated with the duration of QTc interval.

Conclusions.In this study we found an increased number of PVBs and a prolonged QTc duration after an ultra-endurance competition. Increased ventricular ectopic activity and QT prolongation recorded shortly after an intense and prolonged exercise could contribute to the increased risk of arrhythmias occurring after the finish line.