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Acute Effects of Prolonged Endurance Exercise on Circulating Microparticles

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Annexin-V+ microparticles and their subpopulations are extracellular vesicles released by cells in response to various stimuli including apoptosis, cellular damage, and exercise. Microparticles are thought to be mechanisms of cell-to-cell communication between parent cells and spread phenotypic changes dependent on their stimulus of release. Short bouts of aerobic exercise are known to reduce circulating endothelial microparticles (EMPs) in healthy individuals. However, little is known about the response of microparticles to prolonged endurance exercise. **PURPOSE:** Determine the effects of prolonged endurance exercise on total circulating microparticles (TMPs), EMPs, and platelet microparticles (PMPs). **METHODS:** Eight healthy, recreational runners (41 ± 8 yrs) completed a 50-km ultramarathon trail race and underwent blood draws at baseline, 10km, 50km, and 24hrs post-race. Following isolation from plasma collected in acid citrate dextrose tubes via sequential centrifugation, microparticles were stained with fluorescent conjugated antibodies for flow cytometry to quantify annexin-V^+ TMPs, $CD31^+42b^-$ (apoptosis) and $CD62E^+$ (endothelial cell activation) EMPs, and $CD42b^+$ PMPs. T-tests were used to compare means among time points within each microparticle population. **RESULTS:** Compared with baseline, TMPs, EMPs, and PMPs were numerically lower at 10km and 50km; however, these did not reach statistical significance. There was a significant increase in TMPs (74 ± 23 vs. 180 ± 36 TMPs μL^{-1}, P = 0.03, apoptotic EMPs (7 ± 2 vs. 19 ± 5 EMPs μL^{-1}, P = 0.04), and PMPs (62 ± 14.54 vs. 121 ± 20 PMPs μL^{-1}, P = 0.04) from 10km to 24hr post-race. There was also a significant increase in TMPs (79 ± 21 vs. 180 ± 36 TMPs μL^{-1}, P = 0.03) from 50km to 24hr post-race. There were no statistically significant differences between other timepoints among the microparticle subpopulations. **CONCLUSION:** Circulating TMPs, apoptotic EMPs, and PMPs may decrease during prolonged endurance exercise possibly due to continued shear stress signaling enhanced clearance. This is followed by an increase at 24hrs post-race. Indeed, prolonged endurance exercise may accelerate uptake of circulating microparticles, with a subsequent increase in the recovery period.