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The impact of acute aerobic exercise on microRNAs associated with cardiovascular health: a pilot study

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INTRODUCTION:

MicroRNAs (miRNAs) are non-coding RNAs that have an important role in regulating gene expression. Although circulating miRNAs are considered good markers of response to acute aerobic exercise (1) change in expression according to workload has yet to be investigated. The aim of this study was therefore to determine the impact of maximal vs. sub-maximal intensity aerobic exercise on plasma concentrations of circulating miRNAs associated with inflammation, vascular adaptation and cardio-protection (miRNA 146a, miRNA 222, miRNA 21) (2).

METHODS:

Following local research ethics approval and written informed consent, ten healthy recreationally active males (Age=24±3 years; BMI =25.5±2.8kg/m²) were enrolled into the study. Participants attended the laboratory on two occasions separated by a period of 3-7 days. During visit 1, maximal aerobic capacity (VO₂peak) was assessed via a cardio-pulmonary exercise test (CPET) on a cycle ergometer. During visit 2, participants completed a sub-maximal cycling protocol at a workload equivalent to 70% VO₂peak (isocaloric to CPET). Venous blood samples were obtained pre- and immediately post- exercise. Acute changes in miRNA expression were investigated using Qiagen real-time quantitative polymerase chain reaction (RT-qPCR) kits and protocols. Log2fold expression for each miRNA was calculated from the RT-PCR data.

RESULTS:

VO₂peak (47.8±7.0 ml/kg/min) did not correlate with miRNA expression and no difference was observed between visits (P>0.05) (miRNA 146a P=0.160; miRNA 222 P=0.268; miRNA 21 P=0.118). Both exercise protocols resulted in only a minor change in miRNA expression. Specifically, following the CPET, miRNA

146a decreased (-0.706 ± 1.86), whereas an increase was observed following sub-maximal cycling (0.150 ± 0.162). On the contrary, miRNA-222 and 21 increased following the CPET (0.110 ± 1.05 and 0.077 ± 1.59 , respectively) and decreased following sub-maximal cycling (-0.106 ± 0.247 and -0.033 ± 0.521).

CONCLUSION:

Our findings indicate that the intensity and type of aerobic exercise used in this study have a minimal impact on expression of the selected miRNAs. Small sample size and/or timing of blood sampling may have affected our results. Further research is required to determine how exercise-induced miRNA expression and associated target protein interaction relate to cardiovascular function and adaptation.

REFERENCES

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