MicroRNA responses to acute resistance exercise protocols: 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 resistance training (RT) (1), change in expression according to the applied stimulus (e.g. high-intensity low-volume vs. low-intensity high-volume) has yet to be investigated. The aim of this study was therefore to evaluate the impact of RT protocols on circulating miRNA levels. We selected miRNA 29a, 128a, 486 as they have been previously shown to be implicated in skeletal muscle regeneration and structural adaptation (i.e. hypertrophy) (2).

METHODS:

Following local research ethics approval and written informed consent ten healthy recreationally active males (accustomed to resistance exercise) (age = 24 ± 3 years; BMI = 25.5 ± 2.8) were enrolled into the study. Participants attended the laboratory on three occasions separated by a period of 3-7 days. During visit 1, baseline maximal strength (1-RM) was determined via a 10 sub-maximal repetition protocol (3). Subsequently, in randomised order (i.e. visit 2 and 3) participants completed 3 sets of seated leg-press to volitional exhaustion at a workload equivalent to 30% or 70% 1-RM. Venous blood samples were obtained pre and 10-min post exercise. Real-time polymerase chain reactions (RT-PCR), using Qiagen RT-PCR kits and protocols were conducted to quantify the change in selected miRNA (29a, 128a, 486) levels between RT protocols. Log2 fold expression for each miRNA was calculated from the RT-PCR data.

RESULTS:

Baseline 1-RM did not correlate with changes to miRNA levels (70%: 29a R=-0.207, 128a R=-0.006, 486 R=0.311, 30%: 29a R=-0.268, 128a R=0.092, 486 R=0.384) and no significant difference was observed in miRNA expression between RT protocols ($P<0.05$) (miRNA 29a P=0.230; 128a P=0.178; 486 P=0.379). Importantly, however, a trend in data was observed to suggest circulating levels of all miRNAs were lower following high-intensity low-volume RT (29a $\bar{x}$=-1.843, 128a $\bar{x}$=-1.508, 486 $\bar{x}$=-2.231) in comparison to low-intensity high-volume RT (29a $\bar{x}$=0.148, 128a $\bar{x}$=0.296, 486 $\bar{x}$=-0.433).

CONCLUSION:

For the first time, our findings indicate that high-intensity low-volume RT induces a greater reduction in miRNA levels in comparison to low-intensity high-volume RT. The absence of statistical significance between protocols may be related to the low sample size of our population and/or acute study design. Further research is required to confirm our findings, determine if other miRNAs may be affected by RT and what the longer-term adaptations to different RT protocols may be.

REFERENCES:

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