**INTRODUCTION**

Increased exercise and high fat diets are known to affect muscle metabolism. Among muscle biotypes, skeletal muscle is important for energy homeostasis. miR133a is a miRNA that is abundant in skeletal muscle, and it plays a role in myogenesis and myotubes differentiation. It is upregulated in response to exercise and is associated with skeletal muscle repair and regeneration. Studies have shown that high-fat diets can affect miR133a expression, but the role of voluntary exercise in modulating miR133a expression is not well understood. The aim of this study was to investigate the effect of a high-fat diet and voluntary exercise on miR133a expression in skeletal muscle.

**METHODS**

- **Methods**
  - Four groups of 6 Harlan Sprague Dawley (Envigo) male rats were placed on diet and exercise plans for 10 days: normal chow (Control), normal chow + exercise, high-fat diet and high-fat diet + exercise.
  - Rats were euthanized via CO2 inhalation during the morning of Day 11, and tissues were harvested and stored.
  - RNA was extracted from the right soleus of each rat using the miRNA isolation kit.
  - Reverse transcription and real-time PCR were performed as previously described.

- **Data Analysis**
  - Using the Excel equations, data was analyzed using the Mann-Whitney U test.
  - Control group did not affect the relationship between voluntary wheel distance run and miR133a expression in the rats housed with a cage wheel.

**RESULTS**

- None of the rats on the high-fat diet had an effect on the expression of miR133a.

**DISCUSSION AND CONCLUSION**

The expression of miR133a was variable in the young adult rats housed without cage wheels (range in fold changes 4 to 2.7). However, a novel design element of this study is that the rats allowed access to cage wheels self-selected their exercise volume, which resulted in a 5-fold range in total distance run over the 10-day period. This allowed us to examine the relationship between voluntary wheel distance run and miR133a expression in skeletal muscle. Cumulative distance run accounted for 1/3 of the variability in miR133a expression in the group of rats allowed access to a cage wheel. Thus, the degree of daily activity volume and intensity factors are likely to affect miR133a expression in recruited skeletal muscle fibers during the adaptation phase to chronically increased levels of physical activity. Pathways that miR133a is thought to directly or indirectly regulate that are relevant to exercise adaptations include muscle regeneration (Ulmke, 2018), mitochondrial biogenesis and function (Nieu, 2016 and Wüst, 2018) and insulin sensitivity (Steffes, 2017).

In conclusion, miR133a expression in oxidative (solos) rat hindlimb muscle was unaffected by short-term exposure to a high-fat diet and/or exercise. However, the amount of exercise (cumulative distance) was a factor that partly accounted for the variability in miR133a expression in exercised muscle.

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