

POSTER PRESENTATION

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# The anabolic skeletal muscle response to acute resistance exercise is not impaired in rats fed a ketogenic diet

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## Background

Many individuals that resistance train consume a typical Western diet (WD) comprised of protein, carbohydrates (many of which are sugar), and fat. Recent enthusiasm has surrounded the use of a ketogenic diet for weight loss and muscle sparing, although it is uncertain as to whether low carbohydrate diets can optimize the anabolic response to resistance training.

## Methods

This study examined the effects of KD versus WD on the anabolic response to resistance exercise using a rodent leg-kicking resistance exercise model. Male Sprague-Dawley rats (~9-10 weeks of age) were provided isocaloric amounts of either a KD (5.2 kcal/g, 20.2% protein, 10.3% carbohydrate, 69.5% fat; n = 30) or WD (4.5 kcal/g, 15.2% protein, 42.7% carbohydrate, 42.0% fat; n = 32) for 6 weeks. During week 7, the right-leg plantarflexor muscles of each rat were acutely exercised under isoflurane anesthesia using high-frequency electrical stimulations (4 sets of 8 repetitions with 2 min recovery between sets). Rats were then sacrificed at 90 min (n = 8 per group), 180 min (n = 8 per group), or 270 min (n = 8 per group) following exercise and intraperitoneal puromycin injections were provided 30 min prior to each sacrifice as a tracer for muscle protein synthesis (MPS). A subset of unexercised limbs from WD (n = 8) and KD (n = 8) were used as a non-exercise (non-EX) control comparison.

## Results

There was a main time effect for MPS, as it was significantly greater at 90, 180 and 270 min in both groups versus the non-EX condition ( $p < 0.001$ ), although there was no between group effect ( $p = 0.59$ ) or group\*time interaction ( $p = 0.87$ ). There was a main time effect for phosphorylated (p)-4E-BP1 (Thr37/46), as it was significantly greater at 90, 180 and 270 min in both groups versus the non-EX condition ( $p = 0.001$ ), although there was no between group effect ( $p = 0.85$ ) or group\*time interaction ( $p = 0.93$ ). There was a main time effect for p-rps6 (Ser235/236), as it was significantly greater at 90, 180 and 270 min in both groups versus the non-EX condition ( $p = 0.002$ ), although there was no between group effect ( $p = 0.99$ ) or group\*time interaction ( $p = 0.79$ ). There was no time effect ( $p = 0.31$ ), between group effect ( $p = 0.42$ ) or group\*time interaction ( $p = 0.22$ ) for p-AMPK $\alpha$  (Thr172).

## Conclusions

These data demonstrate that rats fed a ketogenic diet present a similar anabolic response to resistance exercise compared to rats fed a Western diet.

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