RESULTS

Subjects, Experimental Design, and Assays

Results were expressed as mean ± SD. A 2-way Analysis of Variance (ANOVA) was performed to determine the effect of race (African-American; Caucasian) and training status (untrained; trained) on enzyme activities. Data were considered statistically significant if the p-value was less than 0.05.

INTRODUCTION & HYPOTHESIS

The prevalence of obesity is greater among African-American (AAW) than Caucasian (CW) women in the United States. This racial metabolic disparity is important as the presence of obesity impairs skeletal muscle mitochondrial fatty acid oxidation capacities, which may contribute to obesity in obesity-prone individuals. We hypothesized that AAW have higher rates of fatty acid oxidation in skeletal muscle than CW.

EXPERIMENTAL MODEL

Techniques for measuring mitochondrial fatty acid oxidation are limited. In vivo measurements such as positron emission tomography (PET) are expensive and can only be carried out on select patient groups. In vitro measurements are limited due to the loss of mitochondrial function. We have previously shown that the response of mitochondrial fatty acid oxidation to exercise training is correlated with the ability to oxidize fatty acids in skeletal muscle.

CONCLUSIONS

Obesity is associated with reduced rates of skeletal muscle (SKM) fatty acid oxidation. This metabolic impairment is greater in obese African American women (AAW).

RESULTS

Total ACS Activity

- Lean CW: 0.01 ± 0.00
- Lean AAW: 0.00 ± 0.00
- Obese CW: 0.03 ± 0.00
- Obese AAW: 0.02 ± 0.00

Total ACS Activity response to exercise in human vastus lateralis homogeneous. ACS enzyme activities are expressed as umole activity/gram tissue/min. Rectus homogenate was prepared from 100 mg of tissue from either untrained biopsy or total abdominal sympathetic patients. (BMI: Lean CW=27, Lean AAW=26, Obese CW=36, Obese AAW=36).

Acyl-CoA synthetase (ACS) activity in human rectus abdominus homogenate. ACS enzyme activities are expressed as umole activity/gram tissue/min. Rectus homogenate was prepared from 100 mg of tissue from either untrained biopsy or total abdominal sympathetic patients. (BMI: Lean CW=27, Lean AAW=26, Obese CW=36, Obese AAW=36).

Acyl-CoA Synthetase Gene Expression in vastus lateralis muscle from obese Caucasian (CW) and obese African Americans (AAW) women before and after acute exercise in the untrained and trained state. Fourteen subjects (7 CW; 7 AAW) were recruited and assessed for body composition and aerobic capacity. Following a 3-day diet recall, subjects reported to the laboratory in the fasted state and underwent the first training protocol. A second biopsy was obtained after 6 hours of cycle ergometry at 75% V02peak. Subjects then underwent exercise training for 10 days on a cycle ergometer at a workload equal to 75% VO2 peak. Real time RT-PCR was used to assess human ACSL isoform gene expression.

CONCLUSIONS

- Endurance exercise can restore SKM rates of fatty acid oxidation in both AAW and CW as little as 8 weeks of training.
- The increase in AAW can not be explained by ACSL isoform gene expression.