

Effect of Pre-Exercise Nutrition on Human Skeletal Muscle UCP3 Expression

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ABSTRACT

BACKGROUND: Increased UCP3 expression in skeletal muscle after exercise may be attributed to elevated free fatty acids (FFA) that are known to directly activate UCP3 expression. Pre-exercise glucose consumption has shown to blunt UCP3 expression in response to exercise. Since glucose ingestion before and during exercise is typically not a common practice, the goal of the present study was to assess the effect of a multi-macronutrient meal (drinkable shake) in the pre-exercise period towards human skeletal muscle UCP3 expression. **METHODS:** Using a crossover design, untrained participants performed an endurance exercise session (350 kcal at 70% of their $VO_2\max$) after two experimental conditions 1) consumption of a multi-macronutrient meal and 2) a fasting period of 8 h. Blood samples were taken at baseline, pre-exercise, post-exercise, 1h, and 4h post-exercise, while muscle biopsies were taken at the last four time points. **RESULTS:** A significant increase in FFA was observed in the fasting condition ($p= 0.046$) as well as a significant increase in UCP3 mRNA and protein expression at post-exercise ($p= 0.042$) and 4 h post-exercise ($p= 0.036$) respectively, in the multi-macronutrient meal condition. **DISCUSSION:** Variables showed a total opposite response to what has been reported after the consumption of pure glucose before an exercise session. Instead of observing a decrease in UCP3 expression in the non-fasting condition, we observed a significant increase in UCP3 mRNA and protein concentration in the multi-macronutrient condition. According to previous research, variables such as the protein and fat content from the multi-macronutrient meal, as well as the insulin levels, could have played key roles in altering UCP3 mRNA and protein expression in the multi-macronutrient condition; however, further research is needed to confirm this hypothesis. **CONCLUSION:** The expression of UCP3 mRNA and protein expression as a result of exercise might be controlled by factors other than FFA.