ABSTRACT# 29

Name of Trainee: Brittany Galuppo (brittany.galuppo@yale.edu)
Mentors: Nicola Santoro (Nicola.santoro@yale.edu)
Type of Trainee: Post grad student

Title: Rates of acetate appearance after intestinal fermentation of lactulose in lean and obese youth
B. Galuppo1, G. Cline1, M. Van Name1, V. Shabanova1, D. Wagner2, C. L. Kien3, N. Santoro1
1Yale University School of Medicine, New Haven, CT, USA; 2Metabolic Solutions Inc., Nashua, NH, USA; 3University of Vermont, Larner College of Medicine, Burlington, VT, USA

Background: Pediatric obesity is an epidemic with growing concern, affecting approximately 20% of children in the United States. While energy dense food supplies a chronic positive energy balance, recent studies have suggested an additional factor promoting energy surplus in the body. Animal studies, in fact, have shown that the gut microbiota may play a role in energy harvest through the production and colonic absorption of short-chain fatty acids, particularly acetate, but a direct evidence of this mechanism in humans is lacking. In this study, we aimed to assess the ability of gut microbiome to ferment carbohydrates and produce acetate in lean and obese youth.

Methods: We enrolled 44 participants (19 male, 25 female), of which 24 are obese (age: 17.6 years old (2.0); BMI: 36.1 kg/m² (7.0)) and 20 are lean (age: 16.9 years old (1.7); BMI: 21.8 kg/m² (2.2)). All participants underwent a 10-hour sodium d3-acetate intravenous infusion study to determine the rate of acetate appearance in peripheral circulation before and after an oral dose of 20g of lactulose. We also measured breath H₂ and CH₄ hourly to assess bacterial fermentation.

Results: To date, we have completed studies in 17 obese and 13 lean subjects. Interestingly, lean youth showed an increase in acetate rate of appearance after colonic fermentation of lactulose, while obese youth did not show any changes (Figure 1A). Moreover, the groups seemed to show different patterns of H₂ and CH₄ fermentation, with obese showing a trend toward lower H₂ (Figure 1B) and higher CH₄ production (Figure 1C) compared to lean.

Conclusions: These preliminary observations suggest that obese youth either ferment carbohydrates to a lesser degree, or perhaps experience a higher first pass hepatic metabolism, due to a higher utilization of acetate as a substrate for other metabolic reactions, such as hepatic lipogenesis. Our continued patient recruitment and data analyses may further strengthen our findings.