Alexander W. Nguyen
Undergraduate
LSU Health Sciences Center, New Orleans, LA

Dr. Lauri O. Byerley
LSUHSC, Department of Physiology

"Identifying Dietary Protein Intake Using Fecal Nitrogen Quantification"

INTRODUCTION

Individuals who aim to gain muscle mass often consume more dietary protein, but little is known about its effect on gut microbial metabolic pathways. A previous cross-sectional study from our lab discovered that higher protein intake correlated with increased colonic nitrogen and purine and pyrimidine metabolites. Nitrogen that reaches the colon comes from dietary protein and purines (nucleotide portion of DNA/RNA). The majority of dietary nitrogen comes from dietary protein. The relationship between protein intake and its effects on colonic nitrogen and nucleotide metabolism warrants further investigation. To explore this correlation, our lab is studying the nitrogen content of stool samples collected from healthy individuals before and after increased protein intake. However, fecal matter's complexity and its various components, such as fibers and lipids, make it difficult for nitrogen to be quantified. There are no available methods for quantifying fecal nitrogen content, so we developed a method to ultimately use as a biomarker of nitrogen intake.

PURPOSE

This project aims to develop a biomarker for detecting the nitrogen content in participants' stool samples.

METHODS

The following method was developed and tested. A fecal sample was collected, and a 5g aliquot mixed with 10 ml of distilled water. The sample was quickly frozen in liquid nitrogen and stored in a -80°C freezer until freeze drying. In batches, samples were freeze-dried on a lyophilizer (Labconco FreeZone 6 7753022 Kansas City, MO) for 48 hours. Once dried, the sample was transferred to a stainless-steel milling vial and ground on a Bead Ruptor 96 Cryo (Omni International, Kennesaw, GA). The sample was sent to LSU Agricultural Center (Baton Rouge, LA) for nitrogen analysis using the Dumas method (J AOAC Int. 2007 Jan-Feb;90(1):6-20).

RESULTS

The newly developed method successfully detected nitrogen in fecal matter (39,370 ± 63.68 mg/kg).

CONCLUSION

This newly developed method demonstrates that nitrogen can be successfully detected in fecal matter, suggesting it can be used as a biomarker for dietary protein intake.