# Journal Club Presentation

NFS 430 | Intro to Nutrition Research | Fall 2022

Presented by: Amy Buchanan

# Introduction

Senior at Buffalo State College in the DPND

Upon graduating, I plan to pursue a dietetic internship to become an RDN.

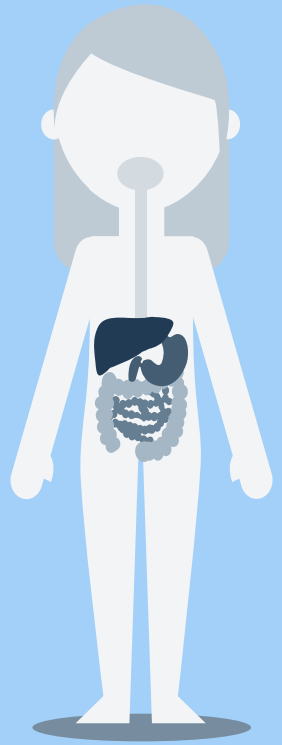
My area of interest is in community nutrition with a specialization in integrative functional nutrition with focus areas on diabetes and obesity.

**"Along with nutrition, my children are my passion, and I love creating dishes with a healthy twist!"**

# Randomized Clinical Control Trial[1]

**Title of Journal Article:**

## A High Protein Calorie Restriction Diet Alters the Gut Microbiome in Obesity[1]



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# Background Information[1]

## Key Words

**Calorie restriction**

**Microbiome**

**High Protein Diet**

**Obesity**

This randomized control trial studied how high protein-calorie restriction diets show clinical efficacy for obesity, but the mechanisms are not fully known. Preclinical data support the effect of HPD on the gut microbiome of obesity, but there are few studies in humans.

# High Protein Diets[5]

**HPDs have shown significant results in weight loss as well as:**

Help decrease hunger
Increase satiety
Greater weight and fat loss
Decrease in insulin
Lower triglycerides
Boost metabolic rate
Preserve muscle mass

**Although when done long term, there may be negative effects such as:**

Low fiber
High-fat (saturated)
Lack of Carbohydrates/nutrients
Kidney function (in some individuals)

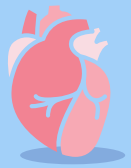
# Microbiome[4]

Considerable evidence in several clinical trials shows that the intestinal microbiome plays an important role in the pathogenesis of obesity.

**Individuals with a low bacterial richness were characterized by:**

Insulin Resistance

Proinflammatory phenotype



Dyslipidemia

Increased Adiposity

**Obese individuals differed by the number of gut microbial genes and gut bacterial richness than nonobese individuals.**

# Obesity[1,2,3]

- The WHO defines obesity as a condition in which excess or abnormal fat accumulation increases health risks.
- Obesity is recognized as a distinct disease, with a BMI ≥ 30. The condition is described as a global epidemic and is now being phrased as “globesity”.
- Obesity has rapidly increased in prevalence in recent decades and now affects approximately one-third of the population of the United States.

# Hypothesis[1]

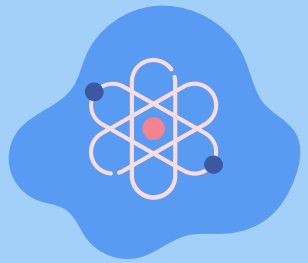
If HPDs modulate the microbiome associated with human obesity, it may contribute to their clinical efficacy.

# Purpose of Study[1]

The purpose of this study was to compare the effects of calorie-restricted high and normal protein diets on the intestinal microbiome of 80 overweight and obese subjects during the course of 8 weeks.

## Primary Outcome

**Microbiome**



## Secondary Outcome

**Obesity**

How the study was designed and conducted did not reveal any bias and the authors declare no conflict of interest.

# Research Methods[1]

**Patient recruitment and eligibility included the following:**

- Occurred at the West Los Angeles VA Medical Center
- Between the ages of 20-75, with a BMI between 27 to 40
- Non-smoker or stable smoking for at least 6 months before screening
- No significant weight change or calorie restriction diet prior to the study
- Consume no more than one alcoholic beverage per day
- Baseline laboratory numbers were within the study parameters
- Could not pregnant

# Research Methods, cont.[1]

- Sex, race, DOB, medical history, and current medications were obtained
- Baseline dietary intake patterns were assessed by a Diet History Questionnaire III
- Basal metabolic rate (BMR) was calculated, adjusting for routine daily activity by multiplying their BMR by 1.2
- Longitudinal fecal sampling was performed at baseline, weeks 1, 2, 4, 6, and 8 (Participants were provided with kits for home sampling)
- Subjects received dietary counseling for weeks 3-8
- All patients, study coordinators, and medical doctors involved were blinded to the patient's assignment.

# Research Methods, cont.[1]

**Patients were randomized to one of two diet groups using a random number generator:**

- Group 1: HPD (30% protein, 40% carbohydrates, 30% fat)
- Group 2: NPD (15% protein, 55% carbohydrates, 30% fat)

**The diet was implemented in two phases:**

- Phase 1: Initial macronutrient standardized diet without calorie restriction for 2 weeks
- Phase 2: Same macronutrient standardized diet with a 500-calorie restriction for 6 weeks

Nutrasumma, Inc. donated pea-based protein supplements that were provided to the HPD group, and a supplement containing dextrose was given to the NPD group.

The research was funded by a grant from the Department of Veterans Affairs.

# Research Methods, cont.[1]

**Table showing meal plan between the study arms and supplement characteristics per serving.**

- Used the USDA guidelines for RDA of 0.8 g/kg of protein
- They calculated the total dietary intake needed for males and females over/under 50.
- Pea-based protein supplements were provided to the HPD group to achieve the target of 30% calories.
- A control supplement containing dextrose that matched the calories of the protein supplement was given to the NPD group.

| | NPD | HPD |
|---|---|---|
| Meal Plans (% of Total Calories/Day) Including Supplement | | |
| Grains/Starch | 20 | 10 |
| Vegetables | 15 | 15 |
| Protein | **15** | **30** |
| Fruit | 20 | 15 |
| Fats and Oils | 30 | 30 |
| Supplement Characteristics per Serving | | |
| Calories | 100 | 100 |
| Total Fat | 0 g | 1 g |
| Total Carbohydrate | **22 g** | 1 g |
| Protein | 0 g | **20 g** |
| Sodium | 160 mg | 290 mg |
| Potassium | 45 mg | 35 mg |

# Results[1]

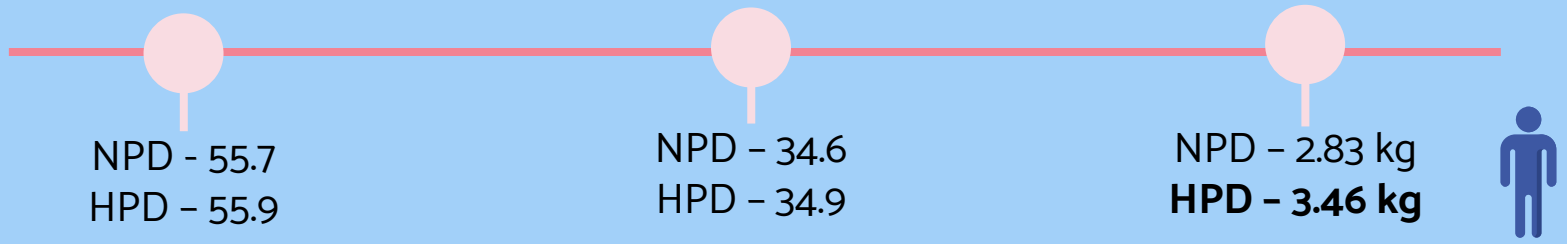
**The Sample**

| Screening | Excluded | Enrolled | Completed |
|---|---|---|---|
| Participants | 48 declined/3 did not meet criteria | Divided into 2 groups | 29 NPD/31 HPD |
| 131 | 51 | 80 | 60 |

The most common reason for dropout was time constraints.

# Results, cont.[1]

- The participants involved were between the ages of 20 and 75. The mean age for both groups was 55, with a BMI average of around 34.
- Since this study was conducted at a VA medical center, participants were ≥ 75% male.
- The participants in the HPD group had a slight increase in weight loss compared to the NPD group. The difference was 1 ½ lb. This shows that the results were not statistically significant.



# Results, cont.[1]

- Microbiome data was analyzed for alpha diversity and beta diversity showing statistical significance.
    - Alpha diversity was the measure of microbiome diversity applicable to a single sample. Whereas beta diversity measures were estimates of similarity or dissimilarity between populations.
- The study found that race was significantly associated with microbial outcomes at baseline. All analysis was adjusted for race.
- Beta diversity analysis demonstrated that there was a statistically significant difference in microbial composition specifically due to higher protein intake.

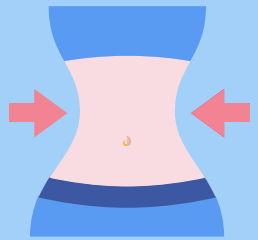
# Results, cont.[1]

- The HPD and NPD groups did not differ by the presence of diabetes or metabolic syndrome.
- With calorie restriction, significant changes in microbial diversity and composition were observed in the NPD and HPD groups.
- Patients on the HPD had a significantly higher index than those on the NPD.
- The increase in microbial diversity was apparent in the white and African-American subjects but not the Hispanic subjects. The Hispanic group started with higher diversity than the other ethnic groups.

# Implications for Clinical Practice[1,6]

**The findings provide evidence that:**

Weight loss diets significantly alter the gut microbiome of obese adults in a manner that depends on dietary protein intake, which may influence the clinical response to HPD.



**One recommendation from the EAL:**

Consumption of one or more single-serving portion-sized meals per day is a tool that may be used as a part of a weight management program to assist with weight loss in adults.

# Diversity, Equity, and Inclusivity[1]

**Diversity:** Participants were ≥ 75% male, and 43% white

White (n = 34)
African American (n = 26)
Hispanic (n = 17)
Asian (n = 2)
Other (n = 1)

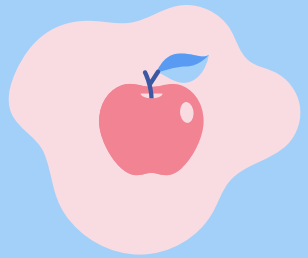
**Equity:** Recruited from the same health center

**Inclusion:** Only available for individuals that went to the VA

# Value of this Study[1]

**Weaknesses:**

- It was limited to the VA population
- The cohort was male-predominant
- Possible Long-term effects on the body are unknown
- Larger cohort size and longer duration needed to determine clinical outcomes of HPDs on the microbiome and obesity
- Lack of meal replacement can introduce variations, incomplete adherence, and heterogeneity of participant dietary choices



**Strengths:**

- Large number of subjects
- Greater racial/ethnic diversity
- Frequent fecal sampling
- RD was involved with dietary counseling

# Value of this Study, cont.[1]

**Final Thoughts:**

- These findings support the hypothesis that microbial changes influence the outcomes of HP dietary interventions.
- Additional future directions could include a comparison of different protein sources.
- Further understanding of the link between the microbiome and the beneficial effects of an HPD may spur the development of therapies for obesity.

# References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# Thanks!

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