



The University of Texas at Austin

Department of Nutritional Sciences

College of Natural Sciences | School of Human Ecology

2016

Nutritional Sciences Research Retreat

Abstract Booklet

Judging Assignments

Graduate Students

| Judge | Poster # | | | |
|-----------------|----------|----|----|----|
| Bray | 1 | 4 | 7 | 10 |
| Briley | 2 | 8 | 11 | 20 |
| Davis | 9 | 11 | 13 | 19 |
| deGraffenried | 18 | 23 | 25 | 26 |
| Finnell | 21 | 22 | 25 | 30 |
| Freeland-Graves | 1 | 5 | 16 | 18 |
| Jolly | 21 | 23 | 25 | 36 |
| Tiziani | 21 | 22 | 24 | 35 |
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| Hays | 4 | 8 | 11 | 17 |
| Hernandez | 2 | 4 | 10 | 17 |
| Herzele | 1 | 3 | 7 | 17 |
| Lashinger | 12 | 22 | 23 | 24 |
| Lodi | 2 | 3 | 8 | 19 |
| Meadows | 14 | 15 | 18 | 19 |
| Milonovich | 3 | 12 | 15 | 20 |
| Papillion | 6 | 9 | 13 | 20 |
| Poulos | 5 | 7 | 10 | 16 |
| Steinman | 6 | 9 | 14 | 27 |
| Sweitzer | 5 | 6 | 13 | 15 |
| Wlodarczyk | 12 | 16 | 28 | 29 |

Undergraduate Students

| Judge | Poster # | | | |
|---------|----------|----|----|----|
| Asigbee | 31 | 32 | 33 | 34 |
| Bhatia | 30 | 31 | 32 | 33 |
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ABSTRACT #1

The Link between Dietary Intake and Adiposity and Metabolic Parameters in Hispanic College Students

Kiona Pilles, Benjamin T. House, Grace E. Shearrer, Annie Markowitz, Fiona M. Asigbee, Jaimie N. Davis

Background:

The transition to college is a critical period contributing to dietary behavioral choices that likely affect students' adult chronic disease risk. Hispanics are the fastest growing ethnic population enrolling in college today. However, Hispanics are disproportionately affected by type 2 diabetes, obesity, and non-alcoholic fatty liver disease.

Objective/Hypothesis:

The purpose of this study is to examine the relationship between dietary intake, adiposity depots, and metabolic parameters in college Hispanic freshmen.

Experimental Approach:

A cross-sectional study of 99 Hispanic college freshmen (18-19 y) collected the following measures: height, weight, waist circumference, body mass index via BodPod, hepatic fat (HF), visceral adipose tissue (VAT), subcutaneous adipose tissue (SAT) via MRI, glucose, insulin, insulin resistance (HOMA-IR) and lipids via fasting blood draw, and dietary intake via multiple 24-hour dietary recalls. MANCOVA analyses were performed using adiposity and metabolic measures as dependent variables and dietary intake as independent variables, controlling for total energy intake and sex.

Results:

Total dietary saturated fat was positively related to HF, SAT, total body fat, insulin, HOMA-IR, leptin, and total cholesterol. Added sugar was positively related to VAT. Total dietary fiber and soluble fiber were negatively related to HF, glucose, HOMA-IR, and leptin. Total dietary insoluble fiber was negatively related to HF, insulin, HOMA-IR, leptin. The odds of having non-alcoholic fatty liver disease increased by 36% with every 1% increase in dietary saturated fat.

Conclusions:

Our findings support previous findings that diets high in saturated fat contribute to increased adiposity, specifically NAFLD risk and metabolic disease risk; while fiber contributes to healthier outcomes in Hispanic college students. This data will be useful to guide future interventions in this population.

ABSTRACT #2

Association Between Cooking and Gardening Behaviors with Dietary Intake in a Hispanic Youth Population

Markowitz AK, Landry MJ, Pilles KN, Khazaee E, Ghaddar R, Davis JN

Background: School-based gardening interventions typically include both cooking and gardening (CG) components and have demonstrated effectiveness in improving dietary intake; however few studies have examined the associations between specific CG behaviors and dietary intake.

Objective/Hypothesis: This study assessed whether changes in CG behaviors were associated with changes in dietary intake (specifically dietary fiber (DF) and vegetable (V) intake) in children participating in an after-school, 12-week randomized controlled CG and nutrition intervention (“LA Sprouts”). The hypothesis is that CG behaviors are positively associated with DF and V intake.

Experimental Approach: Data included 168 3rd-5th-grade students who completed the LA Sprouts intervention, which was conducted in low-income, primarily Hispanic schools in Los Angeles during 2010-2012. CG behaviors were assessed via validated questionnaire and dietary intake was assessed via the Block Screener, which has been validated in this population. Main outcomes of LA Sprouts showed significantly greater increases in DF and V intake in the intervention group compared with controls. Partial correlations were used to determine the relationship between changes in CG behaviors (specifically CG attitudes, self-efficacy, and motivation) with DF and V intake in the intervention group only. *A priori* covariates included: age, sex, language spoken at home, change in energy intake, and baseline values for CG behaviors and DF or V intake.

Results: Complete CG behavior data was obtained from 168 students (88% Hispanic and 52% overweight or obese). Changes in DF intake were positively related to changes in cooking attitudes ($r=0.19$; $p=0.02$), cooking self-efficacy ($r=0.18$; $p=0.03$), motivation to cook ($r=0.16$; $p=0.04$), gardening attitudes ($r=0.22$; $p=0.01$), and motivation to garden ($r=0.20$; $p=0.01$). There were no significant associations between other CG behaviors and DF or V intake.

Conclusions: Interventions that target improving CG behaviors as a means to improve dietary intake are warranted, especially in high-risk, minority children.

ABSTRACT #3

The Association Between Breakfast Consumption and Composition with Adiposity and Metabolic Measures in Hispanic College Freshmen

Khazae E, Landry MJ, Markowitz AK, Ghaddar R, Davis JN

Background: Studies have demonstrated an inverse association between breakfast consumption and adiposity measures; however, what constitutes a healthy breakfast remains unclear. While some studies show support that high-protein/high-fat breakfast is linked to reduced obesity and metabolic benefits, others show support for high-carbohydrate breakfast. Therefore, this study examined the association of breakfast consumption and macronutrient composition with adiposity and metabolic measures in Hispanic college freshmen.

Methods: Cross-sectional data with 99 Hispanic college freshmen (18-19 years) were used with the following measures: height, weight, body composition (BOD POD), visceral adipose tissue (VAT), subcutaneous adipose tissue, hepatic fat fraction (MRI), sleep/wake up times (questionnaire), and dietary intakes (minimum of three 24-hour diet recalls). Breakfast was defined as foods that constituted $\geq 15\%$ of total daily energy consumed within three hours of waking. Multivariate analyses were used to assess the relationship between breakfast and macronutrient composition with adiposity and metabolic measures. Macronutrient intake was assessed as percent of energy at breakfast and percent of energy at breakfast including the entire day. A priori covariates included: sex and energy intake.

Results: Always breakfast eaters ($n=19$) and intermittent breakfast eaters ($n=59$) compared to never breakfast eaters ($n=21$) had 28.6% lower VAT values ($p=0.03$). Protein intake (percent of energy at breakfast) was related to lower VAT ($B=-0.19$, 95% CI [-0.38, -0.001]; $p=0.05$), SAT ($B=-0.40$, 95% CI [-0.69, -0.12]; $p=0.01$), BMI ($B=-0.48$, 95% CI [-0.94, -0.03]; $p=0.04$), hepatic fat ($B=-0.04$, 95% CI [-0.01, -0.07]; $p=0.01$), triglyceride ($B=-0.27$, 95% CI [-0.49, 0.04]; $p=0.02$), and leptin ($B=-0.52$, 95% CI [-1.01, -0.04]; $p=0.03$), while fat intake (percent of energy at breakfast) was related to higher SAT ($B=0.01$, 95% CI [0.003, 0.002]; $p=0.01$), BMI ($B=0.16$, 95% CI [0.001, 0.031]; $p=0.04$), hepatic fat ($B<0.01$, 95% CI [0.003, 0.001]; $p<0.01$), and leptin ($B=0.02$, 95% CI [0.003, 0.04]; $p=0.02$).

Conclusion: This study suggests that breakfast consumption is linked to lower visceral adiposity, which can lead to increases in metabolic risk factors. These findings indicate that a breakfast high in protein and low in fat is linked to lower adiposity and better metabolic outcomes. Longitudinal and intervention studies focusing on breakfast consumption and type of breakfast are warranted to understand the mechanism driving these findings.

ABSTRACT #4

Food Security and Glycemic Control Among Low-Income Hispanic Children in Los Angeles, California

Landry MJ, Markowitz AK, Khazaee E, Ghaddar R, Davis JN

Objective: Prior research has shown that food insecurity is associated with suboptimal glycemic control in adults, however this relationship is unclear in children. The present study assessed the relationship between food insecurity and glycemic control among Hispanic children.

Design, Setting, Subjects: This was a cross-sectional analyses using baseline data from 237 3rd-5th grade students, 83% Hispanic, 53% male, participating in the LA Sprouts program, which was an intervention delivered to four inner city low-income Los Angeles schools during 2012-2014. The following data were collected: height, weight, body fat, waist circumference, blood glucose and insulin levels via fasting blood draw, blood pressure, dietary intakes via food frequency questionnaire, and a 5-item food security scale. HOMA-Insulin Resistance (HOMA-IR) was calculated from baseline glucose and insulin levels. Based on responses to the food security scale, participants were categorized as either food secure (n=150) or food insecure (n=87). Multivariate analysis was used to assess the relationship between food security categories and adiposity, blood lipids, diet, and metabolic measures. A priori covariates included: age, sex, school, ethnicity, and baseline BMI percentile.

Results: MANCOVA results found that food secure children compared to food insecure children had 21.2% lower insulin values (9.0 ± 7.2 vs. $11.5 \pm 10.4 \mu\text{U/mL}$; $p=0.02$) and 21.5% lower HOMA-IR values (2.0 ± 1.7 vs. 2.6 ± 2.4 ; $p=0.02$). Food secure children also had 15.1% lower triglyceride levels (67.8 ± 28.4 vs. 79.9 ± 35.5 mg/dL; $p=0.03$) and 25.0% lower intakes of potatoes (0.3 ± 0.3 vs. 0.4 ± 0.4 cups equivalent). Food security was not associated with any adiposity measures or any other blood lipid or dietary intake variables.

Conclusion: Food insecure children had decreased glycemic control and circulating lipids, which are associated with increased risk for development of metabolic disorders. Further studies and interventions are needed to determine effective ways of improving food security, which could reduce metabolic disease risk in minority children.

ABSTRACT #5

Physical Activity and Inflammation Markers in Overweight/Obese Hispanic Adolescents

Reem Ghaddar; Fiona M. Asigbee; Ph.D., MPH; Jaimie N. Davis, Ph.D.

Background: Childhood obesity has become increasingly prevalent in recent years, while physical activity (PA) has been declining. Hispanics are disproportionately affected by this paradigm.

Objective: To examine how baseline and changes in PA impact baseline and changes in inflammation markers in an overweight/obese Hispanic adolescent population.

Hypothesis: Increased PA in overweight/obese Hispanic adolescents will decrease overall inflammation.

Methods and planned analysis: This is secondary analysis using data from two PA intervention studies with similar measures collected between 2008 and 2012 on 114 overweight/obese Hispanic adolescents 13-18 years of age. The following measures were collected at baseline and at post-intervention (16 weeks): anthropometrics (height, weight, BMI); body composition as measured by DEXA; PA as measured by accelerometry; and inflammation markers (interleukin 6, monocyte chemoattractant protein, hepatocyte growth factor, plasminogen activator inhibitor 1, resistin, C-reactive protein) as measured by fasting blood draw. Accelerometry data was considered valid and complete when available for a minimum of four days with 10 or more hours per day. The intervention was 16 weeks long and included two days per week of physical activity training. Previous results have already reported on intervention effects, and this study will analyze how changes in free-living physical activity impacts changes in inflammation markers, independent of intervention group. Data will be examined for normality and appropriate transformations will be made. Partial correlations and regression analysis will be used to examine the baseline and changes in PA outcomes with baseline and changes in inflammation markers. PA outcomes will be measured by analyzing minutes spent in sedentary, light, and moderate-to-vigorous PA. The following a priori covariates will be used in the models: sex, age, and intervention group. SPSS (version 24) will be used for analysis with a p-value of .05 denoting significance. This analysis will be performed throughout the Fall 2016 semester and results will be submitted to a scientific conference in spring 2017.

Implications: These results will help inform how PA impacts inflammation markers and will provide valuable data to be used in future obesity treatment and prevention programs, especially in overweight/obese Hispanic youth and adolescents.

ABSTRACT #6

Gardening Programs at Schools of Austin: Barriers and Success Strategies

Sarvenaz Vandyousefi, MS, RD Mentor: Jaimie Davis, PhD, RD Collaborator: Edwin Marty, Food Policy Manager of the City of Austin

Background: School programs incorporating gardening activities have become popular worldwide. According to the Austin Office of Sustainability, 73% of Austin Independent School Districts (AISD) have gardens. However, degree of success in their gardening programs varies. Unlike the success stories of school gardening, the barriers and factors of unsuccessful school gardening programs are not studied thoroughly.

Objective: This study aims to evaluate barriers and relevant success strategies for school gardening programs at schools around central Texas. We hypothesized that the following factors will be relevant in determining success of school gardening programs: paid educators/staff positions, available funding sources, degree of support from administrative and parents, amount and quality of relevant resources for curriculum, and the location and accessibility of garden.

Methods: In collaboration with the Office of Sustainability of the City of Austin, a two-page questionnaire will be developed and used throughout the study in order to identify barriers and factors linked to successful school garden programs. A panel of nutrition and garden experts including Registered Dietitians and Master Gardeners were consulted and a 25-item survey was developed, including both quantitative and qualitative responses. With the help from the Coordinated Program in Dietetics (CPD) students, the survey will be administered to 20 schools with varying degrees of success in their school garden programs. Data collection will occur throughout the fall semester 2016 and will be entered into the REDCap (Research Electronic Data Capture) subsequently. Descriptive analysis will be performed and the results will be published in a report generated by the City of Austin's Office of Sustainability.

Future Implication: This will be one of the first studies to describe effective and ineffective strategies and needed resources to sustain successful school garden programs. These data will help inform potential policy changes in Austin, possibly Texas, around implementation of school garden programs.

ABSTRACT #7

Ethnic Differences in Exposure to Episodes of Food Insecurity and Risk of Childhood Asthma

Mangini LD¹; Dong YQ¹; Hayward MD²; Forman MR¹

¹Nutritional Sciences, The University of Texas at Austin, United States and ²Population Research Center, The University of Texas at Austin, United States.

Background & Objectives: Prevalence rates of asthma have steadily risen in the U.S. and are higher in non-Hispanic black (NHB) than in non-Hispanic white (NHW) or Hispanic children. Likewise, NHBs are at higher risk for food insecurity than the other 2 ethnic groups. Little is known about the relationship between cumulative exposure to household food insecurity and childhood asthma. The objective was to determine the relationship between exposure to food insecurity and asthma in NHW, NHB and Hispanic school-aged children.

Methods: Data from 4 waves of the Early Childhood Longitudinal Study-Kindergarten cohort (ECLS-K) were analyzed beginning in kindergarten through 8th grade (N=6,031). Food insecurity was measured with the 18-item USDA module and at each wave of data collection, an episode is defined as household food insecurity during the prior year. Ever-diagnosis of asthma and sociodemographic characteristics were parent-reported; anthropometric data were collected in person. Multivariate logistic regression models were stratified by race to test the association between cumulative exposure to food insecurity and ever being diagnosed with asthma, controlling for covariates.

Results: Among NHWs, odds of asthma were highest in children in households that had two episodes of food insecurity and were ever poor (OR 2.80, 95% CI 2.69-2.92). Among NHBs, one episode of food insecurity and ever being poor were associated with the highest odds of asthma (OR 2.05, 95% CI 1.97-2.14). Among Hispanics, one episode of food insecurity alone was associated with the highest odds of asthma (OR 1.63, 95% CI 1.58-1.69). Contrasting results appeared by ethnic group for parental depression, with odds for NHWs (OR 1.74, 95% CI 1.72-1.75) higher than Hispanics (OR 1.06, 95% CI 1.05-1.08) and NHBs (OR 0.98, 95% CI 0.96-0.99). Results were adjusted for child sex, birth weight, health insurance status, overweight or obesity, and maternal nativity and education.

Conclusion: In 2014, 19% of U.S. households with children experienced food insecurity, which we have previously demonstrated is associated with asthma. These results demonstrate that asthma is associated with strong ethnic differences in life course exposure to food insecurity and poverty. Thus, recent pediatric healthcare policy urging screening for food insecurity at pediatric visits may potentially reduce interethnic health disparities in asthma outcomes.

ABSTRACT #8

The Associations of Height-for-Age, Weight-for-Age and Weight-for-Height with Acute Lymphoblastic Leukemia

Schraw JM, Scheurer ME, Forman MR

Background: Greater exposure to insulin-like growth factor 1 (IGF-1) is a putative risk factor for pediatric acute lymphoblastic leukemia (ALL). Increased IGF-1 levels are believed to increase proliferation of immune cells and confer survival advantage to cells carrying leukemogenic mutations. One marker of IGF-1 exposure which has been studied in connection with ALL is height at time of diagnosis. Some studies report greater height among cases at time of diagnosis whereas others do not. However, persistent issues with control selection complicate interpretation of results.

Objective/Hypothesis: Our objective was to determine whether there is an association between height-for-age Z score (HAZ) at time of diagnosis and the OR of ALL using a contemporaneous population of controls. We hypothesized that ALL cases would be taller than controls (greater mean HAZ) at time of diagnosis/interview and that increases in HAZ would be associated with the OR of ALL. We also tested whether weight-for-age Z score (WAZ) and weight-for-height Z score (WHZ) were associated with the OR of ALL.

Experimental Approach: A case-control study of 249 ALL cases and 249 controls (N=498) who were matched on sex, age and ethnicity.

Results: There was no association of HAZ with ALL. For each one unit increase in WAZ the OR of ALL was 0.83 (95% CI 0.68 – 0.99). The OR of ALL was increased among children with either a WAZ \leq -2 (OR 5.10, 95% CI 1.85 – 16.75) or WHZ of \leq -2 (OR 5.27, 95% CI 1.65 – 23.61).

Conclusions: Using contemporaneous controls, we find no association of HAZ with the OR of ALL. Previous findings of greater height among ALL cases may arise from the choice of control populations. Children with low WAZ or WHZ were at increased odds of ALL; these findings may reflect the disease process already evident in newly diagnosed cases.

ABSTRACT #9

Self-Management of Dietary Intake for Chronic Kidney Disease

Tahir MJ, Forman MR, Timmerman GM

Background: Chronic Kidney Disease (CKD) currently affects 1 in 10 Americans. Despite advances in health care, patients experience detrimental complications that lead to reduced length and quality of life. Self-management of Dietary Intake using Mindful Eating (SM-DIME) is designed to help address the complex dietary recommendations and lifestyle changes associated with CKD by helping patients make daily decisions that are tailored to their lifestyle.

Aims: To assess the impact of the SM-DIME intervention in patients with mild to moderate CKD.

Experimental approach: Participants aged 45-78 years with stage 1-3 CKD (n=19) were recruited from three Austin locations and enrolled in a six-week pretest-posttest pilot study. The intervention consisted of 2 hour weekly classes which focused on a) behavioral change strategies such as food-label reading and goal setting; b) practicing mindful eating meditations; and c) CKD dietary recommendations. Weight, body mass index (BMI), health literacy (Newest Vital Sign Tool), quality of life (Kidney Disease Quality of Life – KDQOL-36), dietary intake (kcal, fat, protein, carbohydrates, sodium, potassium, phosphorus) and blood samples (lipid panel, carotenoid panel, serum albumin, serum creatinine and serum eGFR) were assessed at baseline and post-intervention.

Results: Participants showed significant improvements in weight (203.21 ± 42.98 vs 199.91 ± 40.36 lbs; $p = 0.03$), BMI (32.02 ± 5.22 vs 31.57 ± 5.27 kg/m²; $p = 0.04$), health literacy (4.37 ± 1.61 vs 5.21 ± 1.13 , $p=0.001$), quality of life (73.81 ± 14.30 vs 82.96 ± 8.60 , $p=0.002$), self-efficacy (232.16 ± 32.15 vs 252.37 ± 29.02 , $p=0.003$) and Cis-Beta-Carotene levels (0.020 ± 0.012 vs 0.026 ± 0.012 mcg/mL; $p = 0.008$). No other significant changes were evident.

Conclusion: Participants experienced improvements in a range of health outcomes. Further large-scale interventions are needed to support these conclusions.

ABSTRACT #10

Food Security: Impact of Food Rescue Nutrition

Tamara Y. Mousa, M.S.

This study documented the extent of involvement and motivations of volunteers who participate in food rescue nutrition. Food rescue nutrition is the process of redistribution of surplus food to the impoverished in order to reduce food insecurity. A total of 300 participants were recruited from organizations and agencies involved in donating food and meals to those in need. Subjects were administered a demographic questionnaire and a survey to assess motivations to volunteer. The survey was validated for internal consistency (Cronbach's $\alpha=0.73$) and test-retest reliability (ICC=0.9) in a preliminary population of 40 subjects. Mean age and body mass index of the 300 participants were 28.94 years and 25.95 kg/m², respectively. Of these, 73.3% were non-Hispanic White, 14% Black, 12.3% Hispanic, and 0.4% Asian. The subjects were 65.3% females and 49% were employed. The motivations to volunteer survey consisted of 21 items, with a score ranging from 0 to 21; a higher number reflected greater involvement. Each item consisted of a statement that described if the participant agreed or disagreed with the reason underlying the motivation of this behavior. Volunteers had a mean score for motivations of 9.15±0.17. In conclusion, participants were motivated and they found it self-rewarding to be part of food rescue nutrition. The degree of motivations of participants to volunteer was related to their lifestyle, and to the environment of the organization such as its type.

ABSTRACT #11

Food Purchasing Patterns of Supplemental Nutrition Assistance Program (SNAP) Participants

Namrata Sanjeevi

Participants of the Supplemental Nutrition Assistance Program (SNAP) have been reported to have a lower diet quality as compared to income-eligible nonparticipants. Since grocery purchases have a major impact on type of foods consumed, food purchasing patterns of SNAP clients were investigated via analysis of grocery receipts. A total of 110 subjects enrolled in SNAP were recruited and were asked to collect grocery receipts from household purchases for 1 month. The household percentage expenditure for 29 food categories was calculated and compared to The Thrifty Food Plan (TFP) 2006 recommendations. A Wilcoxon rank t-test was conducted to determine differences between the actual household expenditure and recommendations for 29 food categories. The SNAP benefits accounted for 84% of the household grocery expenditures for the entire month, while cash and WIC benefits represented 15% and 1% of the grocery expenditures, respectively. The household percentage expenditure was significantly lower than the TFP recommendation for the following food categories: whole fruits, dark green and orange vegetables, and whole grains. In contrast, expenditures were significantly higher than recommendations for refined grains, red meat, bacon, sausage and lunch meats, frozen entrees, sugar and candies, and sodas and fruit drinks. The food categories with the highest expenditures were refined grains (15.45%), red meat (10.82%), frozen entrees (6.19%), and soda and fruit drinks (5.85%). The type of foods purchased by SNAP participants does not meet the recommendations stipulated by the TFP. Thus, it is vital to provide nutrition education to SNAP participants to enhance their food purchasing choices.

Abstract #12

Quantifying the Association between Serum Ferritin and Obesity in Adults

Sangyoung Kim

Background

Ferritin plays an important role in the human body of storing iron. This iron-containing protein is transported and deposited into the liver, heart, lung, spleen and pancreas. When needed, the body will signal cells to release ferritin to be transported by transferrin to make iron available. However, ferritin has been suggested to be increased in obesity. Elevated levels in obese individuals could be a result of inflammation and/or related comorbidities.

Objective/Hypothesis

The objective is to analyze existing research via meta-analysis to determine if obese individuals have a higher concentration of serum ferritin than those of normal weight. Also, it is hypothesized that there are differences in the level of serum ferritin according to age and sex.

Experimental Approach

Research papers will be collected to conduct a comprehensive meta-analysis of studies that reported ferritin levels as related to the Body Mass Index (BMI) of adults, ages greater than or equal to 18 years. The time period will be from 1980 to 2016. Information will be recorded on ferritin levels, age, sex, and BMI. The raw data will be transformed to effect size delta to attain a common metric. In order to obtain the effect size, Hedges' g will be used to standardize the raw data. All data will be analyzed using the Statistical Package for the Social Sciences (version 19, SPSS Inc., Chicago, Illinois).

Results

It is believed that the meta-analysis will show higher levels in serum ferritin levels in the obese. In addition, values will be increased with advancing age, and greater in men as compared to women.

Conclusions

Findings of this study are expected to confirm that ferritin concentrations tend to be higher among obese individuals. Differences also are expected in regards to age and sex.

Abstract #13

The Obesity Paradox: Role of Grandparent's in Obesity Risk

Authors: Prageet Kaang and Dr. Freeland-Graves

Background:

Childhood obesity is one of the most serious public health problems globally. Several factors have contributed to this problem, yet one consideration that remains relatively unexplored is the influence of the grandparent on the weight status of the grandchild. Studies indicate that grandparent engagement has been associated with increased risk of child overweight in preschoolers, but the evidence in ages 0-2 years is lacking. Recent investigations have suggested that relative weight-for-length BMI trajectory over the first 2 years is an important predictor of subsequent obesity. It is important to discern the influence of grandparents on early childhood feeding practices and subsequent weight gain trajectories from 0 to 2 years.

Hypothesis:

- 1) To identify successful grandparent characteristics that promotes healthy eating, with subsequent reductions in grandchild obesity risk.
- 2) To determine tri-directional effects of child temperament and weight on grandparent and parent feeding practices and subsequent obesity risk.

Approach:

Participants will visit the Child and Family Laboratory at 3, 6, 12, 18, 24 months.

Anthropometrics will be measured and the Infant/Toddler Feeding Record and Food Frequency questionnaires will be administered.

At 3,6,18 and 24 months, grandparent/parent will complete a Nutrition Knowledge Test, Attitudes and Beliefs Scale.

At 3 months, Infant Behavior Questionnaire will be administered.

Expected Outcomes:

1) High dietary quality and appropriate nutrition knowledge, attitudes and beliefs of grandparents will be reflected in better dietary quality of parents, and positively impact child feeding practices.

2) Child characteristics (temperament and weight) will display a tri-directional effect on grandparent/parent feeding practices and subsequent weight gain trajectories.

Conclusions

The study will be the first to systematically identify modifiable grandparent/parent characteristics that affect child feeding practices and subsequent weight gain trajectories across the critical time points during first two years.

Abstract #14

Abstract #15

Zinc and arsenic interactions in the development of diabetes

Mahsa Babaei

Background:

Exposure to elevated level of arsenic (As) is a global public health concern which over one hundred million people are exposed to it, particularly through ingestion of contaminated food and water. Although nutritional status may be a major factor of individual predisposition to arsenic, the impact of relevant nutrient levels in determining toxicological risks is rarely considered. Zinc deficiency is reported to co-exist in many area of the world that are contaminated by As. Zinc is a fundamental micronutrient, which is important in growth and development. It has been estimated over 80% of pregnant women worldwide have inadequate zinc intake. Zinc deficiency and As exposures target similar mechanisms and both impact key developmental processes. As zinc ions can bind to insulin receptors and activate insulin signaling pathways and arsenic interfered with transcription factors involved in insulin-related gene expression, in utero exposures to zinc deficiency and arsenic are associated with type 2 diabetes.

Objective/Hypothesis:

Increasing consumption of food high in zinc in individuals exposed to a wide range of As concentrations in drinking water can decrease the risk of diabetes mellitus.

Experimental Approach:

A cross-sectional study will be conducted to investigate the effect dietary zinc and risk of diabetes. Dietary intakes will be assessed using data food frequency questionnaire (FFQ) and nutrient biomarkers in plasma.

Results:

Results from other laboratories suggest that increasing consumption of food rich in Zinc may decrease the risk of diabetes mellitus in As polluted regions

Conclusions:

While there is increasing evidence that zinc impacts arsenic metabolism, further research is needed to establish mechanisms by which parental nutrient deficits and early life exposure to toxicants affect the developing embryo and alters susceptibility to diabetes later in life. This will eventually help define nutritional strategies to improve health outcomes arsenic susceptible populations.

Abstract #16

The Houston Texans TwEAT Healthy Program: Professional athletes' influence on adolescent health behaviors and weight status

McInnis KA, Anding RA, Wiemann C, Talley A, Morowitz C, Ranjit N, Briley M

Background: In response to the rise in adolescent obesity, professional sports organizations have created programs to address the epidemic. However, most contain substantial limitations, most notably lack of theoretical basis and continued contact with the athletes. The Houston Texans TwEAT Healthy program was developed to address these limitations of previous programs and improve health and weight status of overweight/obese adolescents.

Objective/Hypothesis: The objective was to determine if athletes (intervention group) were more effective in improving eating/exercise behaviors and decreased weight status over a control group of traditional healthcare professionals. The hypothesis of this study was professional athletes would be more effective at improving eating/exercise behaviors and weight status of overweight/obese adolescents than traditional healthcare professionals.

Experimental Approach: The intervention component consisted of 12-weeks of Twitter messages either sent by registered dietitians (RD) or professional athletes to enrolled overweight/obese adolescents. Anthropometrics, body fat percentage and diet/exercise behaviors were collected pre-/post-intervention to assess program success, and effect of different role models.

Results: The body mass index (BMI) z-score for the registered dietitian group significantly decreased from baseline to week 12 measurements and decreased in the athlete group as well, but not significantly. Body fat increased in both groups with a slightly smaller increase in the athlete group. Dietary intake decreased in both groups but exercise habits increased more in the RD group.

Conclusions: Favorable changes in BMI z-score and dietary intake indicate overall success of the program, with slightly greater success for the version delivered by RD's. Future studies should include larger sample sizes to be able to detect small changes as significant.

Abstract #17

Impact of Main Entrée Packed on Micronutrient Content of Sack Lunches

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Background: Diets of preschool aged children fail to meet dietary recommendations. Understanding the nutrient adequacy of sack lunches can provide opportunities to improve the diet quality in this population.

Objective: The objective of this study was to evaluate the adequacy of main entrée in preschoolers' sack lunches based on DRIs

Experimental Approach: Baseline data from "Lunch is in the Bag," a cluster randomized controlled study, included observations for 1,195 lunches for two non-consecutive days packed by parents and consumed by their preschool child at Early Care and Education (ECE) centers in Central Texas. Estimations for 11 micronutrients were analyzed based on DRI using a three-level regression model with controls for central level clustering and repeated measures by child adjusted for gender, age, and BMI. A Registered Dietitian coded the main entrée as a categorical variable that represented distinct protein lunch sources. Any meal that had more than one distinct protein source were coded as ">1 entrée".

Results: Percent of DRI for 11 micronutrients in lunches were significantly different ($P < 0.0001$) between entrées. The most popular entrées were nut and, ham cheese sandwiches, nuggets, cheese or yogurt, and pasta. Lunches containing ham cheese sandwich or > 1 entrée provided the highest % DRIs for micronutrients ($p < 0.001$). None of the lunches provided 33% of the DRI for dietary fiber and potassium. Sodium exceeded recommendations with a range of 58.12% to 128.35% with ham and cheese sandwich providing 109.81%.

Conclusions: Choice of main entrée packed by parents can have a significant impact on nutrient quality of children's lunches. This study provides data for future parent education on improvement of the nutrient content of preschooler's sack lunches.

Abstract #18

Effects of time-of-day dependent macronutrient intake on the intestinal epithelium, gut microbiota and peripheral circadian clocks.

Diana Gutierrez Lopez

Feeding behavior plays an important role in an organism's nutritional status. Evidence accumulated during recent years suggests that the time of day at which food is consumed can affect a wide variety of physiological processes and biomarkers including insulin sensitivity, triglyceride levels, oral glucose sensitivity, and energy balance. The timing of feeding does not occur at random over a 24-hr period; instead, it follows a predictable pattern of daily rhythmicity for a given species. Biological rhythms, like fasting/feeding cycles, are an integral component of virtually all aspects of life. These rhythms allow nutrient metabolism to be tightly regulated, balancing fuel storage and expenditure in alternating cycles. Humans as well as other mammals have adapted to external cues from their environment (e.g. availability of food, light/dark cycles, etc.) through a highly specialized hierarchical network of transcriptional pacemakers known as the circadian clock (CC). Intracellular CCs generate rhythmic 24-hr expression of themselves and other targets through positive and negative transcriptional feedback loops, augmenting appropriate and rapid metabolic anticipation and response to biological inputs like food intake. Many functions of the gastrointestinal (GI) tract display circadian rhythmicity. For example, intestinal epithelium renewal, gastric acid secretion, pancreatic amylase secretion, and GI motility all show feeding time-dependent activities. The transporters involved in the absorption of macronutrients show time-dependent variations in their expression, which can be altered by food entrainment, suggesting that food signals have an important role in their function. Rhythmic expression of CC genes has been robustly demonstrated in virtually every cell type within the gut. Research evidence supports the hypothesis that food digestion and nutrient absorption within the GI tract are influenced by CC gene expression, driven by both light and food cues.

Rhythmic patterns in lipid metabolism in multiple tissues have been reported in numerous studies, such that factors that promote lipid utilization are highest upon waking, and factors that promote lipid storage are highest immediately prior to sleeping. Additionally, timing of macronutrient intake has been shown to influence metabolic health, with the ingestion of a high fat meal upon waking combined with a low fat meal prior to sleep resulting in greater metabolic flexibility and lower body weight and body fat compared to a low fat waking meal combined with a high fat meal prior to sleep. While it is known that the gut microbiota (GM) influence adiposity and weight gain in the host, the mechanisms by which gut microorganisms coordinate host physiological processes are currently unclear. We hypothesize that the poor metabolic outcomes associated with late fat meal patterns described above are the result of asynchronous feeding signals, out of coordination with the light-entrained circadian clock-driven anticipatory mechanisms regulating nutrient absorption and utilization. Moreover, advances in our understanding of the GM have suggested a far more dynamic gut environment than previously thought. Findings from the Human Microbiome Project regarding intestinal bacterial communities, have established an influential interaction between GM and host metabolism with respect to the development of weight gain and metabolic disease. Furthermore, others have found that changes in the composition of the GM are influenced not only by the host's dietary nutrient load, but also by disruptions in host circadian rhythmicity and fasting/feeding cycles. Additionally, intestinal microbes affect energy balance through metabolites produced by fermentation, which can regulate host gene expression and metabolism in the gut. These studies will aim to explore the hypothesis that circadian rhythms and feeding signals together coordinate anticipatory states for nutrient absorption and metabolism. Further, we hypothesize that CC regulation may influence and be influenced by the response of the gut microbiome to nutrient availability. Three specific aims are proposed to test this hypothesis:

Aim 1: Determine how timed macronutrient intake influences the timing of nutrient absorption, the timing of circadian clock and metabolic gene expression in the small intestine, and luminal nutrient content.

Aim 2: Examine the role of timed feeding in influencing caecal and colonic microbial abundance, secondary metabolites, and microbial function and gene expression.

AIM 3. Determine the influence of timed-feeding induced microbial activity changes on host metabolism and energy balance.

Abstract #19

Jaehyun Joo

Considerable individual differences exist in dietary intake, and genes may, in part, explain this variation. Family studies have provided evidence of familial aggregation in estimated daily caloric intake as well as macronutrient intake. In addition, twin studies have demonstrated a genetic basis for caloric intake and preference for specific nutrients. Most genetic studies have focused on the intake of single foods/nutrients; however, people typically consume mixed diets. Single nutrient/food-based studies may not fully account for the genetic influence on dietary intake because they do not represent the additive or synergistic contributions of multiple dietary factors. Accordingly, there is a need for complementary research on overall dietary intake in order to identify both genetic and non-genetic factors that influence eating patterns. Recent studies have shown that health behaviors, such as physical activity, are also associated with dietary patterns. Physically active individuals are more likely to eat a “healthy” diet, but the mechanisms linking these behaviors are not clear. One potential mechanism linking exercise and diet may be through epigenetic modification of DNA sequence variation, which may alter gene expression and, in the process, potentially influence or be influenced by dietary intake patterns. Exercise-induced epigenetic alterations that affect the expressions of metabolic genes (e.g., peroxisome proliferator-activated receptor gamma coactivator 1- α [*PGC-1 α*], mitochondrial transcription factor A [*MTFA*], peroxisome proliferator-activated receptor δ [*PPAR- δ*], pyruvate dehydrogenase lipoamide kinase isozyme 4 [*PDK4*], citrate synthase [*CS*]) have been reported in multiple studies. In addition, an emerging body of evidence suggests that exercise alters the expression of brain-derived neurotrophic factor (*BDNF*), which is a key molecule in the regulation of food intake. While exercise and physical activity are associated with habitual dietary intake, there is currently insufficient evidence to establish a mechanistic link between dietary intake preference and exercise-induced alterations in metabolism and satiety signaling.

In studying the genetics of overall dietary intake, a challenge is the selection of phenotypes that can evaluate interaction effects of nutrients and foods. A dietary pattern is defined in terms of foods that are frequently consumed together, and has been embraced in the USDA’s dietary guidelines as well as other clinical settings. Due to the lack of robust methods that can be applied consistently across studies and populations, there is still a concern whether the dietary patterns identified in one study can be replicated in different studies in similar settings. Many statistical and epidemiologic challenges have been recognized in dietary pattern analysis, but these remain understudied.

The Training Intervention and Genetics of Exercise Response (TIGER) study is a prospective cohort study with the goals of introducing sedentary college-aged individuals to regular exercise and identifying genetic factors that influence exercise response and adherence. The transition from home to university life is associated with students having more independence over their dietary choices. When making food choices, students may not consider the risk of developing chronic disease. Indeed, evidence suggests that considerable weight gain occurs during the college years. Understanding the complex interplay between exercise behavior and dietary intake at both the behavioral and molecular levels may help in designing personalized health management strategies for young adults.

The purpose of this study is to investigate the heritability of overall dietary intake and mechanisms linking physical exercise and dietary intake to energy balance in college-aged students. The specific aims of this proposal are:

Aim 1: To identify generalized dietary patterns using robust Bayesian approaches and data derived from the TIGER study.

Aim 2: To examine the association between genetic variation and dietary patterns at baseline, both at individual loci and over multiple genes collectively.

Aim 3: To investigate whether exercise influences habitual dietary intake.

3.1 Evaluate whether variation in habitual physical activity is associated with dietary patterns.

3.2 Evaluate whether chronic exercise training leads to changes in dietary patterns.

3.3 Evaluate the interaction between genetic variation and exercise dose in influencing dietary patterns.

ABSTRACT #20

Abstract #21

Rapamycin Selectively Targets Obesity-Polarized Macrophages

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Background: Obesity is associated with prostate cancer progression and mortality. Previous studies in our laboratory suggest that obesity drives prostate cancer progression in part by increasing macrophage recruitment and by polarizing macrophages in the tumor microenvironment into a tumor promoting M2/TAM phenotype. Rapamycin, a mammalian target of rapamycin (mTOR) inhibitor, has been used for several decades in transplant patients, and in the last several years has been shown to be an effective disease suppressor in certain cancer types. Intriguingly, mTOR has been shown to be especially important for M2 polarization and stabilization.

Hypothesis: Based upon published data and our preliminary studies, we hypothesize that rapamycin will selectively target obesity-polarized macrophages and will provide a survival benefit to the obese prostate cancer patient.

Approach: To address this hypothesis, we used our *in vitro* model of obesity-induced macrophage polarization that includes two different prostate cancer cell lines, macrophages, and sera from obese and non-obese men. qPCR was used to measure expression levels of markers associated with an M2/TAM phenotype. MTT assays were conducted to measure cell viability, and flow cytometry and Western blot analyses were used to determine cell cycle status and apoptosis.

Results: Obese conditions increased expression of M2/TAM markers in macrophages and rapamycin selectively decreased viability of obesity-activated M2/TAMs compared to M1 macrophages.

Conclusions: Our *in vitro* study suggests that obesity promotes a tumor-associated phenotype in macrophages and that the mTOR pathway is involved in the survival of M2/TAM macrophages. This study offers a novel mechanistic approach to treat obese patients with prostate cancer.

ABSTRACT #22

Cell-Type Specific PGE2 Production Induced by Varying Omega-6:Omega-3 Fatty Acid Ratios

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Background: In 2014 an estimated 38.3% of American women were obese, which is especially alarming since obesity is associated with an increased occurrence of and mortality from breast cancer, as well as increased production of the pro-inflammatory series-2 prostaglandins (PGE2). In previous studies, omega-6 (n-6) fatty acids have been shown to increase PGE2 production, while omega-3 (n-3) fatty acids interfere with PGE2 synthesis. However, in a previous clinical study, our laboratory found that only 53% of subjects taking n-3 fatty acid supplements demonstrated a decrease in circulating PGE2 levels. We hypothesized that compliance to this intervention was low, preventing subjects from reaching an ideal n-6:n-3 ratio. Because scientific studies have yet to determine how the n-6:n-3 ratio modulates PGE2 production within different cells of the tumor microenvironment, we conducted an *in vitro* study in which two breast tumor cell types—preadipocytes and MCF-7 breast cancer cells—were exposed to varying n-6:n-3 fatty acid ratios and analyzed for PGE2 levels.

Materials and Methods: After being seeded on 6-well plates in complete media, preadipocytes and MCF-7 cells underwent a 24-hour treatment with four n-6:n-3 fatty acid ratios in charcoal-stripped media: 46:1, 20:1, 10:1, and 1.3:1. Arachidonic acid was used as the n-6 fatty acid, while EPA and DHA were administered in a 5:3 ratio as the n-3 fatty acids. After another 24 hours in serum-free media, conditioned media were collected and analyzed in duplicate with a PGE2 enzyme-linked immunosorbent assay.

Results: In both the preadipocytes and cancer cells, PGE2 production generally decreased as the ratio of n-3 to n-6 increased, although this trend appeared stronger in the preadipocytes. Moreover, the preadipocytes produced a greater total amount of PGE2 than the MCF-7 cells. Additional trials are underway to confirm these results in other ER α -positive breast cancer cell lines, including T47D.

Conclusions: These findings support our hypothesis, suggesting that there is a directional relationship between n-6:n-3 fatty acid ratios and PGE2 production. As pre-clinical results, these data will aid in revealing the mechanism by which fatty acids modulate PGE2 levels and thus inflammatory processes in breast cancer.

ABSTRACT #23

Disruption of Mitochondrial Folate Transporter Gene (Slc25A32) Induces Embryonic Lethality and Neural Tube Defects in Mice

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Background: Neural tube defects (NTDs) are the second most common structural congenital malformations of the brain and spine resulting from failed neural tube closure (NTC). The causes of NTDs are thought to be multifactorial, including genetic, environmental, and nutritional factors. Multiple studies have shown that periconceptional supplementation with folic acid can reduce the incidence of NTDs. Despite more than 40 years of intensive effort, we still do not understand the mechanisms that underlie these folate-dependent processes. Recent studies by the Appling and the Greene Laboratories have demonstrated the importance of mitochondrial folate metabolic pathways as well as the glycine cleavage system. Having a long-standing interest in transport systems involved with one carbon (1C) metabolism, we developed a new mouse NTD model by knocking out the mitochondrial folate transporter MFT (Slc25A32) gene. The MFT protein is one of the inner mitochondrial membrane transport carriers in mitochondrial carrier family. The molecular dynamic simulations of the MFT protein suggests that this protein recognizes THF residues in the walls and base of the transport cavity.

Hypothesis: Impaired mitochondrial folate transport is deleterious to embryonic development. Maternal 1C supplementation with other sources of 1C units such as methionine, S-adenosylmethionine, purines, thymidylate and formate can protect against NTDs in MFT nullizygous (Slc25A32^{-/-}) embryos.

Results: Initial breeding of heterozygous MFT mice failed to produce any MFT nullizygote pups suggesting that absence of a functional MFT gene is a lethal mutation. In order to determine when the nullizygous MFT embryos die *in utero*, a timed mated heterozygous MFT dams (bred to heterozygous MFT males) were euthanized between E10.5-E12.5 and their uterine content analyzed. Of the 10 pregnant dams, we collected 74 embryos and noted 5 resorptions. Genotyping revealed that among all the embryos there were 27 MFT^{+/+}, 29 MFT^{+/-} and 18 MFT^{-/-} embryos. The 18 MFT nullizygotes exhibited a 100% penetrant NTDs that were confined mostly to the head region and sometimes extending to the cervical region. When 8 MFT heterozygous dams were supplemented with 0.1M (2500mg) calcium formate, we collected 65 embryos and 2 resorptions between E10.5-13.5. Genotyping showed that there were 19 MFT^{+/+}, 33 MFT^{+/-} and 13 MFT^{-/-} embryos. Nine of the MFT^{-/-} embryos appeared to have a normal phenotype and 4 MFT^{-/-} embryos had NTDs. The preliminary data suggests that 0.1M calcium formate rescues the normal phenotype in 69% of MFT nullizygotes.

Conclusions: In this novel mouse model, loss of a specific folate-dependent transport protein (mitochondrial folate transporter) leads to NTDs. Maternal supplementation with calcium formate (0.1M) partially rescues the neural tube and growth defects in MFT nullizygotes embryos. Our studies offers hope for developing new effective intervention for the thousands of non-folate responsive NTDs, by illuminating new mechanisms involved in NTD formation.

ABSTRACT #24

Pancreatic Cancer and Cachexia: Effects of Leucine and HMB Supplementation

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Background: Pancreatic cancer patients have an average 5-year survival rate of less than 5%, and over 80% of them have a condition known as cancer cachexia. Cachexia is characterized by significant involuntary weight loss and extreme muscle wasting, which decreases the patient's quality of life, response to chemotherapy, and survival rate. There are several options for cachexia treatment, including the branched-chain amino acid, leucine, and its downstream metabolite, β -hydroxy- β -methylbutyrate (HMB). Within muscle tissue, both leucine and HMB upregulate mTOR, a protein central to muscle growth. However, mTOR also enhances pancreatic cancer growth both *in vitro* and *in vivo*. Mice on high fat, diet-induced obesity (DIO) regimens display higher mTOR activation and larger tumors than mice on control (CON) diets. Using a murine transplant model, we have shown dietary supplementation with leucine enhances mTOR signaling and pancreatic tumor growth. On the other hand, HMB supplementation *in vitro* inhibits pancreatic cancer cell proliferation and decreases mTOR activation; therefore, **we hypothesize dietary HMB supplementation will inhibit pancreatic tumor growth in the context of both a DIO diet (high mTOR) and a CON diet (low mTOR) in a murine transplant model of pancreatic cancer.**

Methods: To determine the effects of dietary HMB supplementation on pancreatic tumor growth, C57BL/6 male mice (n=60/group) consumed either the DIO diet (60% kcal from fat) or the Control diet (10% kcal from fat) ad libitum. Energy intake and body weight were recorded weekly until week 10 when serum was collected for subsequent hormone analysis. Panc02 murine pancreatic cancer cells were subcutaneously injected at week 11, and then the mice (n=30/group) were randomized to consume their respective diets with or without HMB supplementation (1% w/w). At week 15, all the mice were anesthetized and killed, and skeletal muscle and tumors were collected and either snap-frozen or formalin-fixed and embedded in paraffin. Tumor volume was calculated using the formula $\frac{4}{3}\pi r_1 r_2$. Then, H&E was performed on muscle tissue, while IHC for Ki-67 and p-S6 and a microarray was performed on tumor tissue. ANOVAs with post-hoc analysis were conducted to compare hormone levels, relative tumor size, proliferation of tumor cells, and mTOR activation in tumor and skeletal muscle. The microarray data was analyzed using the t-tests and the Benjamini-Hochberg False Discovery Rate (FDR) correction in R.

Results and Conclusions: Dietary leucine supplementation increased pancreatic tumor growth in association with increased mTOR signaling, while dietary HMB supplementation decreased pancreatic tumor growth and inhibited muscle breakdown. These findings show that caution should be used when suggesting the clinical use of leucine supplementation for the purposes of skeletal muscle enhancement in cachectic pancreatic cancer patients due to its cancer-enhancing effects. On the other hand, HMB supplementation may be useful as a treatment for cachectic muscle loss due to its ability to inhibit tumor growth and protect against muscle atrophy.

ABSTRACT #25

Metabolome response of adipose tissue during short term cold exposure in mice

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Background: Regulation of body temperature is an essential element of mammalian life which requires activated metabolism in brown (BAT) and white (WAT) adipose tissues. Characterized by its accumulated mitochondria and uncoupling protein 1 (UCP1) expression, BAT possess thermogenic function and specialized metabolic profile. Recently discovered beige adipocytes, with the capacity to induce UCP1 and uncoupled respiration, are more abundant in subcutaneous fat (SWAT) compared to visceral fat (VWAT) upon cold exposure. Comprehensive studies have demonstrated distinct transcriptional responses in BAT, SWAT and VWAT during activated thermogenesis, but the knowledge on the downstream cooperative metabolic mechanisms is missing.

Objective: The study is to decipher the initial metabolic response among multiple tissues (BAT, SWAT, and VWAT) under short term cold exposure.

Experimental Approach: We characterized the metabolome within the adipose tissue depots at thermoneutrality (30°C) and during a time course (2-6 hours) of acute cold exposure combining high-resolution magnetic resonance spectroscopy (MRS) and ultrahigh pressure liquid chromatography/mass spectrometry (UPLC-MS) analytical platforms.

Results: Increased levels of glucose and pyruvate indicate elevated glycolysis activity in BAT. The data suggests an increased flux through serine biosynthesis in BAT with a decrease in phosphoserine and an accumulation in serine over the course of cold exposure, while SWAT serine levels only had an initial increase after 4 hours cold exposure. The glutathione reduction in BAT and VWAT, and taurine depletion in BAT and SWAT supports a generation of reactive oxygen species (ROS) and its critical role in thermogenesis regulation. Increased acetyl CoA, butyryl CoA and malonyl CoA levels can be attributed to an increased beta oxidation of BAT, whereas WAT shows less extent of the changes. The significant increase of glycerol and ketone body (beta-hydroxybutyric acid) in BAT further validated the enhanced catabolism.

Conclusions: Our data demonstrates distinct metabolic profiles among BAT, SWAT and VWAT, including modulation of glycolysis activity, amino acid metabolism, mitochondrial ROS signaling and lipid catabolism.

Abstract #26

Determining the Limit of Detection and Identification of Key Metabolites in Acute Myeloid Leukemia (AML) using High-Resolution Mass Spectrometry

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Acute myeloid leukemia (AML) is the fifth second most common form of pediatric leukemiacancer. Despite recent advances in pediatric AML treatment, nearly one third of survivors still relapse, contributing to a significant number of devastating childhood deaths. Pediatric AML research is hindered by the limited amount of bone marrow aspirates and blood that can be collected for identification of diagnostic and prognostic analysisbiomarkers. In this study, pediatric AML cells (THP-1) were cultured and harvested at various concentrations, ranging from one thousand to one million cells/mL to determine the minimum sample required for the most accurate and consistent detection of metabolites. Polar metabolites were extracted and analyzed with a Thermo Scientific Q Exactive Hybrid Quadrupole Orbitrap high-resolution mass spectrometer coupled to an ultrahigh pressure liquid chromatography (UPLC) system with an electrospray ionization source (ESI). To evaluate the most robust method for identifying key metabolites, identification was done in both the commercially available Thermo Scientific SIEVE software program and the open source XCMS package in the R programming environment. Comparing results from both methods of identification, metabolites were more consistently and accurately represented with SIEVE software, especially at higher concentrations. On the contrary, results from XCMS were inconsistent with expected outcomes. These data suggest that XCMS should be used with caution when minimal sample is available. If XCMS is the method of choice, caution should be exercised when setting XCMS parameters to ensure the most accurate results. This study validates SIEVE as a viable method of metabolite identification and quantification and supports reasonable expectations in detecting metabolites at low concentrations.

Abstract #27

Influence of Habitual Dietary Intake on Hispanic Children's Food Choices

Ciara Espinoza

Some studies touch on the effect of carbohydrates on satiety and ghrelin, but none have been conducted to determine if habitual carbohydrate and fat consumption can influence future dietary choices and satiety in overweight Hispanic children. In this cross sectional study, 46 overweight Hispanic 7-10 year olds from the Austin area were evaluated on their eating habits with dietary recalls and questionnaires. During the in person visit, subjects were observed to see what food choices they would make ad libitum and satiety was evaluated. Statistical analysis will include correlation coefficients to determine a link between habitual intake and food choice.

Abstract #28

The Effect of Free-Living Dietary Intake on Satiety Responses during an Ad Libitum Meal Challenge

Isabel Wees

Background: The first year of college is associated with a shift to unhealthy dietary patterns, such as more junk food, sugar and alcohol, and less dietary fiber, fruit and vegetables, which correlates to the rapid weight gain observed. Diets high in fiber intake and low in added sugar have been shown to be more satiating. However, few studies have examined how dietary intake impacts satiety response in young adults during this critical transition period in to college where lifetime eating habits are established.

Objectives: The goal of this study is to examine the impact of free-living dietary intake on satiety measures during an ad libitum meal challenge in Hispanic college freshmen. The hypothesis is that participants with diets high in fiber intake and low in sugar intake will be more satiated and less hungry during the ad libitum meal challenge.

Methods: This is a cross-sectional analysis of 100 UT Hispanic freshmen (18-19 y) with the following measures collected: height, weight, anthropometrics, body composition via Bod Pod, dietary intake via three 24-hour multiple pass dietary recalls, glucose and insulin indices via a fasting blood draw, and a standard ad libitum meal where satiety and hunger visual analogue scales were completed every 10 minutes. Data will be analyzed using SPSS (version 21). Data will first be examined for normality and transformations will be made. Partial correlations and regressions will be performed to examine the relationships between dietary intake variables (macronutrients, fiber and sugar) and satiety and hunger scores. A priori covariates will include sex, age, and BMI.

Implications: These findings will shed light on how dietary intake impacts satiety measures in a college population and this information can be used to guide future obesity prevention and treatment programs.

ABSTRACT #29

Ellen Mei

Background: The National Institute of Health recommends between 7 to 8 hours of sleep per night for adults¹. There has been a documented decline in the amount of sleep that college students are getting^{2,3}. Inadequate sleep has been associated with a host of negative health outcomes, including increased body mass index (BMI), fat mass index, waist circumference, and body fat percentage^{4,5,6}. Hispanic populations have the second highest rates of obesity in the US population⁷. Little is known about how sleep affects Hispanic college students.

Objective: To examine the relationships between amount and quality of sleep and adiposity and physical activity measures in a Hispanic college freshman population.

Methods: Data were gathered from 100 Hispanic freshmen aged 18-19. The following data were gathered during in-person visits: height, weight, waist circumference (WC), body mass index (BMI) visceral adipose tissue (VAT), subcutaneous adipose tissue (SAT) and hepatic fat via magnetic resonance imaging, and total body fat and lean mass percent via BodPod. Sleep data were collected using the Pittsburgh Sleep Quality Index (PSQI).

Statistical Analyses: Statistical analyses will include an assessment of variable normality looking at descriptives, boxplots, etc. ANCOVAs will be conducted between sleep, adiposity measures, and physical activity measures, while controlling for sex.

ABSTRACT #30

Investigating the Use of Omega-3 Fatty Acids to Improve Therapeutic Response in Obesity-Related Ovarian Cancer Resistance

Heba Ahmad, Shruti Apte, Linda deGraffenried

Background: Ovarian cancer is an aggressive gynecologic cancer that is the fifth leading cause of cancer-related death in American women between the ages of 35 and 74. Due to its nonspecific symptoms—such as fatigue, abdominal swelling, and shortness of breath—and the unavailability of early detection methods, ovarian cancer typically remains undiscovered until it reaches late stages. Chemotherapy, including the use of the agents cisplatin and doxorubicin, is a common treatment for ovarian cancer; however obesity is associated with decreased sensitivity to all forms of treatment, including chemotherapy. Some studies have suggested that omega-3 fatty acids are able to suppress ovarian cancer growth, but any potential role in modulating obesity-induced resistance is as yet unexplored.

Objective/Hypothesis: Based upon obesity studies in our laboratory in other cancer types, we hypothesize that omega-3 fatty acids, through their modulation of key inflammatory pathways, may improve response to chemotherapy agents in ovarian cancer.

Experimental Approach: We will use *in vitro* approaches to assess the relationship between obesity, ovarian cancer chemotherapy response, and omega-3 fatty acids. Proliferation of the SKOV3 ovarian cancer cell line in response to cisplatin and doxorubicin was assessed using the MTT assay. Inhibition was compared to the MDA-MB-231 breast cancer cell line, which was used as a control. Upcoming studies include evaluating proliferation using serum from obese women, and determining if co-treatment with the omega-3 fatty acids EPA and DHA will improve sensitivity.

Results: There was a significant decrease in the proliferation of MDA-MB-231 cells as the concentration of doxorubicin was increased. However, there was no significant change in the proliferation of SKOV 3 cells.

Conclusions: Our preliminary studies suggest that SKOV 3 is resistant to doxorubicin.

ABSTRACT #31

Activation of the Androgen Receptor by CREB1/FoxA1 Activity Contributes to Obesity-Induced Prostate Cancer Progression

Alejandro Casco, Gloria Galvan, Linda deGraffenried

Background: Androgen deprivation therapy (ADT) is the most common treatment for advanced prostate cancer. However, androgen receptor (AR) activity begins to increase over time and patients enter a castration-resistant prostate cancer (CRPC) stage. Several studies have found that obese men tend to progress into CRPC stages at higher and faster rates than non-obese men. Studies show that IGF-1, which is elevated in obese men, can lead to the phosphorylation of the AR and can stabilize the DNA binding of the forkhead box protein A1 (FoxA1), a pioneer factor shown to increase AR activity. Additionally, the cAMP responsive element binding protein 1 (CREB1) has also shown to facilitate FoxA1 binding to DNA. This proposed mechanism of CREB1/FoxA1 inducing AR activation could provide better insight of how CRPC works and why the rate of recurrence is much higher in obese men.

Hypothesis: Obesity promotes greater CREB1/FoxA1 activity, contributing to increased rates of castration-resistant prostate cancer, and faster times to progression.

Experimental Approach: Two specific aims using *in vitro* molecular approaches in prostate cancer cell lines will be used to address our hypothesis: 1) Elucidate the mechanisms by which obese conditions might promote FoxA1 and AR activity; and 2) Determine the role of FoxA1/AR in obesity-induced CRPC. UBE2C, which is a transcriptional target of the FoxA1/AR complex, and shown to be elevated in CRPC tumor samples, will be used as our biomarker for assessing FoxA1/AR complex activity.

Results: We found that IGF-1 exposure induces UBE2C expression. Importantly, we also found that exposure to sera from obese men induces higher levels of UBE2C compared to sera from non-obese men.

Conclusions: Obese conditions induce FoxA1/AR activity, potentially through IGF-1. Further studies will determine whether DNA binding of FoxA1 and CREB1 to the androgen response element is increased under obese conditions by using chromatin-immunoprecipitation (ChIP) sequencing assay.

ABSTRACT #32

Targeting the Fatty Acid Synthase Enzyme to Improve Outcomes in the Obese Breast Cancer Patient

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Background: Obesity is known to result in a worse breast cancer prognosis through metabolic changes and leads to rapid proliferation in cancer cells. Changes in metabolism associated with fatty acid utilization have been noted in several cancer types. This includes changes to both expression and activity of the Fatty Acid Synthase enzyme (FASN), which is responsible for production of long chain fatty acids (LCFA). These changes in LCFA production can modulate tumor behavior through modulation of energy utilization such as a beta-oxidation, and plasma membrane modulation with phospholipids. Importantly, there are FASN inhibitors in clinical development, which may provide benefit to the obese patient.

Objective/Hypothesis: Upregulation of FASN contributes to obesity-induced breast cancer progression.

Approach: Three specific aims will be used to address this hypothesis. In **Aim 1** we use quantitative polymerase chain reaction (qPCR) to determine if exposure to obese conditions induces upregulation of FASN expression levels in breast cancer and human pre-adipocytes cells. In **Aim 2** we will use the MTT growth assay to determine the effect of a FASN inhibitor on cell proliferation in breast cancer cells under obese conditions. Finally, since several studies have shown that components of the tumor microenvironment may impact the cancer cell, in **Aim 3** we will use qPCR and MTT assays to determine the effect of a FASN inhibitor on pre-adipocyte conditioned media-induced modulation of breast cancer cell lines.

Results: Exposure to obese sera resulted in increased expression of FASN in breast cancer and human pre-adipocyte cells. Additionally, breast cancer cells exposed to obese sera demonstrated greater inhibition by the FASN inhibitor than those exposed to the control sera.

Conclusions: It appears that obesity induces upregulation of FASN in the tumor microenvironment. Ongoing studies will investigate if this is a potential target for novel therapeutics in addressing obesity induced cancer progression.

ABSTRACT #33

Obesity confers chemotherapy resistance in triple negative breast cancer cells.

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Background: Triple Negative Breast Cancer (TNBC) is an aggressive form of Breast Cancer that does not express the genes for estrogen receptor (ER), progesterone receptor (PR) or Her2/neu, thus necessitating the use of chemotherapy regimens as opposed to less toxic targeted therapies. Recently there has been a higher understanding of the deviant signal transduction pathways regulating growth and survival and the development of chemo resistance in TNBC. Numerous studies have demonstrated that obese breast cancer patients have a poorer response to chemotherapy and shorter disease-free and overall survival. In our preliminary *in vitro* studies, exposure to sera from obese patients has shown to confer chemotherapy resistance in basal-like triple negative breast cancer cells. Intriguingly, co-treatment with rapamycin, an mTOR inhibitor, increased chemotherapy sensitivity. The mammalian Target of Rapamycin (mTOR) is a serine/threonine protein kinase that regulates cell growth, cell proliferation, cell motility, cell survival, protein synthesis, autophagy, and transcription.

Hypothesis: Based upon our preliminary results, we hypothesize that activation of the mTOR pathway contributes to obesity-induced chemotherapy resistance in TNBC, and that inhibition of this pathway by rapamycin will enhance response and improve disease-free and overall survival in the obese breast cancer patient.

Approach: We will use our novel *in vitro* model system to identify the upstream components of the mTOR pathway that are activated by the obese state. Western blot analyses will be used to elucidate the specific kinase pathways that lead to mTOR activation and chemotherapy resistance, with the goal to better understand how mTOR modulates obesity-induced progression.

ABSTRACT #34

Targeting Metabolic Dysfunction across Cancer Cells by High Throughput Screening of Natural Products and Mitochondrial Inhibitors

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Background: Leukemia is the most common pediatric cancer. The side effects of chemotherapy take a tremendous toll on patients, especially the very young ones. Because current chemotherapeutics are toxic to cancer cells and normal cells alike, relapse and secondary cancers are common in pediatric survivors. Less toxic alternatives and adjuvant therapies that can be used to decrease chemotherapeutic doses is an unmet need. Evaluating a diverse drug library of natural products permits the isolation of treatments that decrease the viability of leukemic cells, but exhibit negligible effects on normal cells. This approach provides an opportunity to further explore cancer metabolism and develop novel treatments that target malignant cells.

Methods: High-throughput screening techniques were used to treat 23 different human cell lines with a drug library consisting of 136 structurally diverse natural products and 16 mitochondrial inhibitors. Twenty leukemia cell lines, spanning different lineages were screened for comprehensive disease coverage. Normal cells screened included two bone marrow stromal cell lines and bone marrow-derived mesenchymal stem cells. Cells were seeded in 384-well plates at a density of either 2,500 or 5,000 cells/well. The final concentration of treatment was 0.01 mM and 2 μ M for the natural products and mitochondrial inhibitors, respectively. Cell viability was assessed at 12, 24, and 48 hours following treatment by quantifying the amount of ATP present using the CellTiter-Glo Luminescent Cell Viability Assay kit (Promega). Viability trends of the leukemia cell lines and the normal cell lines were compared.

Results/Conclusions: Of the 152 treatments examined, 13 were toxic to leukemia cells with negligible effects on normal cells. Treatments of interest were selected through interpretation of viability heat maps and narrowed by observing trends across individual cell lines. Treatments were selected if normal cells maintained viability close to 100% for a duration of 48 hours and leukemia cell viability decreased to 50-20% within 24 to 48 hours. The metabolic consequences of these treatments will be further investigated through metabolomics analysis utilizing nuclear magnetic resonance spectroscopy and mass spectrometry. Though further research is still needed, this research could lead to the development of new treatments to decrease the dose and duration of chemotherapy.

ABSTRACT #35

Tumor-Associated Macrophage Concentration as a Potential Biomarker to Distinguish Indolent from Aggressive Prostate Cancer

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Background: While prostate cancer remains a leading cause of cancer-related deaths among men in the US, most prostate cancers are indolent, and do not require aggressive intervention to improve overall survival. However, unlike several cancer types, there are no reliable biomarkers for distinguishing indolent from aggressive disease, resulting in significant overtreatment, decreased quality of life, and increased medical care costs.

Hypothesis: Based on preliminary findings, tumor associated macrophages (TAMs) are a potentially important driving factor in prostate cancer progression; thus, TAM concentration may serve as a potential biomarker to distinguish indolent from aggressive prostate cancer.

Approach: We will examine TAM concentrations in both a mouse model of prostate cancer previously generated in our laboratory as well as human tumor specimens from the UTHSCSA Prostate Tumor Repository. In order to investigate if a difference in TAM concentrations between different mouse samples can foretell the occurrence of indolent and aggressive prostate cancer, we employed H&E staining to assess the tumor sample's composition, and then utilized Immunohistochemistry to stain for TAMs. The F4/80 antigen was used to identify macrophages in general, and the CD206 antigen used to identify M2/TAM specific macrophages.

Results: It is predicted that if a mouse tissue sample in this pilot study is found to have higher concentrations of tumor associated macrophages, then this mouse will go on to experience more aggressive prostate cancer. Early findings in this study provided some validation to this hypothesis. In a high versus low-grade comparison of mouse tumor tissues, we found that the high-grade prostate cancer expressed a higher concentration of TAMs on average than the low-grade prostate cancer, serving as proof of the aforementioned claims.

Conclusions: Linking TAMs and prostate cancer progression may suggest that TAMs could be a reliable biomarker, allowing for further studies investigating the utilization of TAMs as a diagnostic tool.

ABSTRACT #36

Investigating the Role of Obesity-Induced EMT in Promoting Metastasis in MCF-7 Breast Cancer Cells

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Background: Half a million cancer deaths happen per year in the United States, and virtually all of them are a result of therapy failure. 90% of cancer related deaths are due to progression of primary tumors to metastatic disease, which is often accompanied by an increased resistance to all forms of therapy, attributing to it a more aggressive phenotype. Moreover, obesity is associated with a worse prognosis in breast cancer, specifically, metastasis and chemotherapy resistance.

Objective/Hypothesis: A “reprogramming” occurs, transforming stationary, epithelial cells to motile, malignant cells that exhibit a more aggressive phenotype than their stromal counterparts. This progression to a more stem-like phenotype is associated with drug resistance and greater metastatic potential. Obese breast cancer patients have a higher risk of a more aggressive disease compared to lean patients, which is associated with treatment resistance and metastasis. The mechanisms causing obesity driven metastasis are not understood, but several studies have indicated that obesity is associated with a “stem-like” phenotype. We will use the following specific aims to test if obesity induces stem like reprogramming *in vitro*, and if the tumor in the obese patient is more stem like than that in the lean patient in a cohort of breast cancer patients. Obesity is associated with a worse prognosis in breast cancer, but the mechanisms by which it promotes disease progression are unclear, making treatment difficult.

Experimental Approach: We will use our well validated *in vitro* model to identify the molecular and epigenetic changes induced by the obese state and confirm these changes in human biological specimens currently being collected as part of an on-going clinical trial. Western blot and qPCR will be used to analyze protein and mRNA expression level changes in MCF-7 breast cancer cells exposed to lean and obese sera. Experiments will be tested in triplicates with respective positive and negative control groups.

Results: Figure 1 displays average relative mRNAs for triplicates of control and obese treatments standardized to actin, relative to the control sera treatment. According to this data, a constituent of the obese sera is causing upregulation of the SNAIL 1 TF, indicating increased EMT activation, in comparison to the control, lean sera.

Conclusions: Our preliminary data suggest that *in vitro* exposure of breast cancer cells to obese conditions may induce an epithelial to mesenchymal transition (EMT), which is characterized by a more stem-like phenotype, resistance to treatment (chemo, hormone and radiation), as well as greater metastatic potential. Based upon our preliminary findings, as well as what has been reported in the literature from both clinical as well as pre-clinical studies, we hypothesize that one key mechanism by which obesity promotes a more aggressive disease is through inducing epigenetic reprogramming that results in EMT.