



The University of Texas at Austin

Department of Nutritional Sciences

College of Natural Sciences | School of Human Ecology

2017

Nutritional Sciences Research Retreat

Abstract Booklet



NUTRITIONAL SCIENCES 2017 (JANUARY) RESEARCH RETREAT

| | |
|--------------------------|---|
| 08:30 am-09:00 am | Continental Breakfast |
| 09:00 am-09:30 pm | Welcome Session* Dr. Molly Bray- Department Chair |
| 9:30 am-10:20 am | Faculty Presentations- Session 1 |
| 9:35 | Dr. Molly Bray |
| 9:40 | Dr. Ladia Hernandez |
| 9:45 | Dr. Jeanne Freeland-Graves |
| 9:50 | Dr. Alessia Lodi |
| 9:55 | Drew Hayes |
| 10:00 | Natalie Poulos |
| 10:05 | Dr. Monica Meadows |
| 10:10 | Dr. Sara Sweitzer |
| 10:15 | Dr. Elizabeth Widen |
| 10:25 am-10:30 am | Break |
| 10:30 am-11:25pm | Faculty Presentations- Session 2* |
| 10:30 | Dr. Christopher Jolly |
| 10:35 | Monica Milonovich |
| 10:40 | Dr. Jaimie Davis |
| 10:45 | Dr. Ryan S Gray |
| 10:50 | Dr. Charlotte Herzele |
| 10:55 | Dr. Laura Lashinger |
| 11:00 | Dr. Stefano Tiziani |
| 11:05 | Diane Papillion |
| 11:10 | Dr. Austin Cooney |
| 11:15 | Dr. Kumar Kothapalli |
| 11:25 pm-12:15 pm | Lunch ** |
| 12:15 pm-1:15 pm | Poster Presentations to Judges |
| 1:15 pm-2:05 pm | Nutrition Program Presentations* |
| 1:15 pm-1:25 pm | Study Abroad – Dr. Jeanne Freeland-Graves |
| 1:25 pm-1:35 pm | Experiential learning and community outreach – Drew Hays |
| 1:35 pm-1:45 pm | UTNI – Dr. Monica Meadows |
| 1:45 pm-1:55 pm | On Line Masters – Dr. Sara Sweitzer |
| 1:55 pm-2:05 pm | HANs program – Dr. Ladia Hernandez |
| 2:05-2:15 | Break |
| 2:15-2:30 | Award Presentation |
| 2:30-3:30 pm | Curriculum Discussion/Teaching |
| 3:30-5:00 pm | NTR Happy Hour |

* GEA 105

** GEA 125

List of Student Abstracts

Dr. Jaimie Davis

Erfan Khazaee (2)
Sarvenaz Vandyousefi (3)
Reem Ghaddar (4)
Matthew Landry (5)
Jessica Boisseau (15)

Dr. Jeanne Freeland-Graves

Sangyoung Kim (6)
Prageet Kaang (7)
Mahsa Babaei (8)
Jeanette Sands (9)

Dr. Margaret Briley

Amy Kweller (11)

Dr. Molly Bray

Diana Gutierrez Lopez (12)
Jaehyun Joo (13)
Vasavi Shabrish (14)

Dr. Linda deGraffenried

Brittany Harlow (16)

Dr. Stefano Tiziani

Paul Gries (17)

Dr. Christopher Jolly

Genevieve James (18)

Undergraduate, HANS and Special Departmental Honors Students

Minji Chae (19)
David Rihn (20)
Caroline McFarland (21)
Madeline Borel (22)
Christopher Hsu, Elizabeth Eichman (23)
Ali Oberman, Irene Kim (24)
Alejandro Casco (25)
Christian Johnson (26)
Laura Winikka (27)

| Judges | | | | |
|-----------------------------------|----|----|----|----|
| Poster Assignments | | | | |
| Dr. Jaimie Davis | 13 | 14 | 17 | |
| Dr. Jeanne Freeland-Graves | 11 | 4 | 5 | |
| Dr. Molly Bray | 17 | 7 | 18 | |
| Dr. Stefano Tiziani | 16 | 12 | 14 | |
| Dr. Christopher Jolly | 15 | 9 | 23 | |
| Dr. Ladia Hernandez | 2 | 3 | 6 | |
| Dr. Monica Meadows | 7 | 21 | 4 | |
| Drew Hays | 4 | 2 | 19 | 20 |
| Monica Milonovich | 8 | 5 | 11 | |
| Diane Papillion | 3 | 8 | 21 | |
| Dr. Natalie Poulos | 8 | 7 | 13 | 22 |
| Dr. Sara Sweitzer | 5 | 6 | 15 | |
| Dr. Elizabeth Widen | 6 | 18 | 3 | |
| Dr. Alessia Lodi | 16 | 22 | 26 | 23 |
| Dr. Laura Lashinger | 15 | 9 | 18 | 24 |
| Dr. Ryan Gray | 9 | 14 | 12 | |
| Dr. Kumar Kothapalli | 12 | 17 | 25 | |
| Dr. Austin Cooney | 12 | 16 | 24 | |
| Shannon Sweeney | 25 | 26 | 27 | 20 |
| Dr. Charlotte Herzele | 19 | 11 | 2 | 27 |

ABSTRACT #2

The Relationship between Breakfast Consumption and Composition with Adiposity and Metabolic Disease Risk in Hispanic Youth

Erfan Khazae, Dr. Jaimie N Davis

Background: Consumption of breakfast has been inversely linked to adiposity and body weight, making it a potential intervention strategy to address the obesity epidemic among youth. Most studies examining this relationship have only examined weight and body mass index and few studies have analyzed more specific adiposity measurements such as body fat percentage. Moreover, limited studies have examined how the type of breakfast impacts adiposity and metabolic parameters, particularly in high-risk Hispanic populations.

Objective/Hypothesis: To examine the cross-sectional relationship between breakfast consumption and composition with adiposity and metabolic parameters in Hispanic children.

Experimental Approach: This analysis uses baseline data from 450 Hispanic children (7-10 years of age) participating in the TX Sprouts study: dietary intake via multiple 24-hour diet recalls, BMI via measured height and weight, waist circumference, body fat via Tanita scale, metabolic parameters (lipids, glucose, insulin) via fasting blood draws (only a subsample of 230 children will have both dietary and blood data). Breakfast will be defined as foods that constitute $\geq 15\%$ of total daily energy consumed within three hours of waking between 0500 and 1000 hours. Participants will be categorized in one of three breakfast consumption categories: always breakfast eater: those who met the breakfast definition for both dietary recalls; intermittent breakfast eater: those who met the breakfast definition for one out of the two dietary recalls; and never breakfast eater: those who did not meet the breakfast definition for both dietary recalls. Multivariate analysis of covariance (MANCOVA) will be used to analyze the relationship between breakfast consumption and composition to adiposity and metabolic parameters. Of note, a series of independent regressions can be performed in lieu of MANCOVA if the dependent outcome variables are not collinear. The following *a priori* covariates will be included in the model: age, sex, energy intake (kcal/day), and race/ethnicity.

ABSTRACT # 3

The Impact of Early Life Infant Feeding on Obesity Prevalence and Metabolic Changes among Offspring of Hispanic Mothers with Gestational Diabetes Mellitus

Vandyousefi S, Khazaee E, Landry MJ, Markowitz AK, Ghaddar R, Asigbee FM, Davis JN

Background: Offspring born to mothers with gestational diabetes (GDM) are more likely to develop obesity and metabolic diseases later in life. Many studies have shown that increased breastfeeding (BF) duration is linked to a lower prevalence of childhood overweight and obesity.

Objective: This study aims to assess the effects of BF duration on longitudinal changes in adiposity and glucose/insulin action in Hispanic children (8-19 years) from mothers with and without GDM. We hypothesized that lower BF duration will be linked to increased adiposity and metabolic disease risk in offspring of mothers with and without GDM.

Methods: Data is from the SOLAR dataset, which was a 12-year retrospective trial of over 300 Hispanic children (8-19 years of age) who were overweight or obese between 2000-2012. The following measures were collected at each annual visit: dietary intake via two 24-hour diet recalls, body composition via DXA, fat depots via MRI, and glucose and insulin action via 2-hour oral glucose tolerance test and a frequently sampled intravenous test. BF duration was collected retrospectively via a parent questionnaire. Linear mixed-effects modeling will be used to evaluate the effects of BF on baseline and changes in adiposity variables, glucose and insulin dynamics over time. Age, sex, tanner stage, birth weight, total body fat and lean tissue mass, changes in body fat and lean tissue mass will be entered in the model as covariates. All analyses will be performed with SAS version 9.4.

Future Implications: This will be one of the few studies to assess the impact of BF duration on longitudinal changes in adiposity, and glucose/insulin action in offspring exposed to GDM *in utero*. These data will help inform potential future interventions targeting offspring of Hispanic mothers with GDM and help researchers predict obesity prevalence and metabolic disease risk factors in high risk minority populations.

ABSTRACT #4

Testing and Predicting Prediabetes in Predominantly Hispanic Children

Authors: Reem Ghaddar; Jaimie Davis, PhD

Background: Childhood obesity has been consistently rising in the United States over the past few decades, with 17.5% of children (6-11 y) classified as obese. Hispanic children of the same age group were more likely to become overweight or obese (46.2%) compared to their Non-Hispanic White (NHW) peers (29.4%). Children who are overweight or obese have higher prediabetic rates than children of normal weight and are more likely to develop type 2 diabetes mellitus (T2DM) later in life. Hispanics are at a higher risk of developing prediabetes or T2DM and tend to have lower socioeconomic status (SES) than NHW. Despite the high prevalence of obesity and other health issues in this population, no current guidelines exist for the diagnosis of prediabetes under age 10.

Objective: To assess the baseline relationship between fasting plasma glucose (FPG) and Hemoglobin A1c (HbA1c) values, and between sociodemographic variables, child BMI, and prediabetes rates.

Hypothesis: FPG and HbA1c values will be positively correlated, and children who are overweight or obese, Hispanic, or have lower SES will have higher prediabetic rates than children who are normal weight, NHW, or are of higher SES.

Experimental Approach: This analysis will use baseline data from waves 1 and 2 of a cluster-randomized gardening, cooking, and nutrition intervention called TX Sprouts. The following measures were collected pre-intervention on 838 3rd-5th grade students: anthropometrics (height, weight, BMI parameters, body fat percentage via Tanita scale), and FPG and HbA1c via optional fasting blood draw. Parent measures included survey questions about ethnicity/race, free/reduced lunch status, participation in government aid programs, and education level. Prediabetes was defined as FPG of 100-125 mg/dL or HbA1c of 5.7-6.4%. Partial correlations will be used to assess the relationships between FPG and HbA1c values and between sociodemographic variables/child BMI and prediabetes status.

Implications: These results will provide valuable data to inform prediabetes ranges and prevalence rates in young children, which will help inform future screening and interventions.

ABSTRACT #5

Validity and Reliability of a Fruit and Vegetable Screener in Hispanic Fifth-grade Students

Landry MJ¹, Khazaee E¹, Markowitz AK¹, Vandyousefi S¹, Ghaddar R¹, Pilles K¹, Asigbee FM¹, Davis JN¹

¹Department of Nutritional Sciences, The University of Texas at Austin, Austin, TX

Background: Lack of valid and reliable tools for measurement of fruit and vegetable (F/V) intake in Hispanic youth contributes to difficulties in assessment of nutrition-related intervention efficacy and epidemiological surveillance efforts.

Objective: This study assessed the validity and reproducibility of a F/V screener in Hispanic fifth-grade students.

Experimental Approach: A 14-item dietary intake screener focusing on F/V intake was developed based on the School Physical Activity and Nutrition questionnaire and administered to 56, fifth-grade students from six primarily Hispanic elementary schools. Validity of the in-person F/V screener was assessed with two, 24-hour dietary recalls (24hDRs) collected via phone by trained staff using Nutrition Data System for Research (NDS-R). Responses from the screener were recoded based on NDS-R serving count subgroup specifications. Test-retest reliability was assessed one week later with a separate cohort of 81 students. Phi correlation, weighted kappa statistics (WKS), and percent agreement were used to assess validity. Spearman correlations, intraclass correlation coefficients (ICCs), and WKS were used to assess reproducibility of the screener between time 1 and time 2.

Results: Compared to 24hDRs, the screener showed poor agreement on validity assessments for all items. Test-retest assessment yielded mean Spearman, ICCs, and WKS indicative of moderate agreement (0.38, 0.64, and 0.32, respectively). Highest reproducibility was found for leafy vegetables, starchy vegetables, carrots, tomatoes and peppers, fruit juice, and soft drinks. Cruciferous vegetables, fruit, whole grain, and unsweetened beverage screener questions showed the lowest test-retest agreement.

Conclusions: The F/V screener exhibited poor validity compared to 24hDRs; however, results were similar to those found in other studies. Screener appeared reliable for most vegetables, fruit juice, and soft drinks. Findings suggest the screener can serve as a valuable tool in measuring vegetable intake of Hispanic 10-11 year old children in epidemiological surveillance or assessment in nutrition-related interventions.

ABSTRACT #6

Quantifying the Association between Acute Leukemia and Serum Zinc, Copper, and Selenium: A Meta-analysis

Sangyoung Kim, Mahsa Babaei, Prageet K. Sachdev, Natasha Beretvas, and Jeanne H. Freeland-Graves

Optimal levels of zinc (Zn), copper (Cu), and selenium (Se) are essential to perform a number of metabolic and physiological processes in humans. Levels of these minerals have been suggested to be altered in acute leukemia; but the results have inconsistent. The main objective of this research is to examine the relationship between the amount of the three trace elements, Zn, Cu, and Se, in the serum of patients with and without acute leukemia. For this purpose, a meta-analysis was conducted to measure the concentration of these trace elements in patients with acute leukemia, as compared with healthy controls. Research papers published on this topic between 1977 and 2016 that met the criteria were included. Results showed a significantly positive correlation ($p < .01$) between serum Cu levels (effect size = 1.72; 95% CI, 0.923-2.5193) with acute leukemia and a significant negative correlation ($p < .05$) for serum Zn levels (effect size = -1.38; 95% CI, -2.477-- .2799). Results for serum Se (effect size = -1.39; 95% CI, -2.826-.0556) and acute leukemia were not statistically significant ($p < .10$). In conclusion, the meta-analysis method suggests that patients with acute leukemia have elevated levels of serum Cu and lower concentrations of serum Zn. A greater sample size may be necessary to determine if serum Se is associated with acute leukemia.

ABSTRACT #7

Zinc, Copper and Iron in Oral Submucous Fibrosis: A Meta-analysis for measurement of trace elements status.

Prageet K. Sachdev, Jeanne H. Freeland-Graves, Natasha Beretvas, Namrata Sanjeevi

Oral Submucous Fibrosis (OSMF) is a precancerous condition of the oral cavity, characterized by inflammation and progressive fibrosis of the submucosal tissues. This chronic condition is more prevalent among South Asian population with a prevalence rate of 0.2 to 0.5%. Studies have reported altered zinc (Zn), copper (Cu) and iron (Fe) levels in the body fluids of OSMF subjects; but findings are inconsistent. Therefore, estimation of Zn, Cu and Fe status may serve as an auxiliary test in the diagnosis and prognosis of oral precancer and cancer.

Objective: To evaluate whether there is a significant difference in the levels of trace elements of Zn, Cu and Fe between the OSMF and healthy groups

Approach: A literature search of Embase, PubMed, Cochrane library and Web of Science databases was conducted for studies investigating the trace element concentrations in OSMF subjects up to June 2017. A total of 31 reports met the inclusion criteria.

Standardized mean difference was utilized as the effect size for the meta-analysis. Statistics reported include 95% CI's and one-sided Z-statistic. Effects of the biomarker used and proportion of males were evaluated by the mixed-effects model.

Results: Suggested a significant increase in the levels of Cu (effect size= 1.42, p-value <0.05, 95% Confidence Interval (CI): 0.212— 2.637) and a significant decrease in levels of Zn (effect size= -2.07, p-value <0.01, 95% (CI): -3.719— -0.416) and Fe (effect size= -2.96, p-value <0.05, 95% (CI): -4.514— -1.410) in OSMF patients as compared to controls. The moderators had no significant influence on the effect size (p>0.05).

Conclusions: This is the first comprehensive meta-analysis that collectively analyzed the levels of trace elements in OSMF versus healthy subjects.

ABSTRACT #8

Comparison of Body Mass Index (BMI), diet quality and food insecurity between recipients of Women, Infants, and Children (WIC) plus Supplemental Nutrition Assistance Program (SNAP) versus single program

Mahsa Babaei, M.S. and Jean Freeland-Graves, Ph.D.

Background:

The prevalence of adult obesity in the United States has been increasing, with more than two-thirds of adults overweight or obese. Obesity has become a major public health concern because excess body fat is associated with type-2 diabetes and heart disease. Food insecure individuals will be the focus of this research, as they are more prone to be overweight or obese as compared to those with sufficient household food resources. This study will compare diet quality and Body Mass Index (BMI), and overall food insecurity of women participants (18-45 yr) of WIC plus SNAP versus those who participate in only WIC or SNAP food assistance programs.

Objective:

It is hypothesized that low income women (18-45 yr) who participate in WIC plus SNAP government programs will have better BMI, diet quality, and food security than those who enrolled in only one program.

Method:

This cross-sectional study will assess BMI, diet quality, and food insecurity of 300 women (18-45 yr) who participate in WIC plus SNAP vs those who enrolled in only one program in Austin, TX. A Demographic Questionnaire and a Food Frequency Questionnaire will collect demographics and the nutrient data, respectively. Diet quality will be determined via the Healthy Eating Index 2017. Weight and height will be measured to assess BMI. Food insecurity will be evaluated by a Core Food Security Module. Logistic regression will be used to examine food insecurity, obesity, and diet quality among WIC plus SNAP and each single program participants.

Future Implications:

To date, research has not been conducted to compare how a combination of WIC and SNAP vs. WIC or SNAP single food assistant programs affect diet quality and BMI of their women recipients. These data will help provide information on potential policy changes in the United States concerning implementation of food assistance programs.

ABSTRACT #9

Should Supplemental Nutrition Assistance Program (SNAP) benefits have similar purchase restrictions as the Supplemental Nutrition Program for Women, Infants, and Children (WIC)?

Jeanette Sands and Jeanne Freeland-Graves, PhD

Background:

Participant use of government food benefits of the Supplemental Nutrition Assistance Program (SNAP) is of concern in terms of optimizing health with limited funds. The SNAP program uses the United State Department of Agriculture's (USDA's) Thrifty Food Plan (TFP) to estimate appropriate fund disbursement. However, at present SNAP does not have any restrictions beyond prohibition of purchase of tobacco and alcohol and hot prepared foods to guide participants to make optimal grocery shopping choices. In contrast, Supplemental Nutrition Program for Women, Infants, and Children (WIC) restricts participants to certain predetermined "healthy foods." Restriction of SNAP benefits is controversial as these benefits are designed to be supplemental. Opponents to limiting purchase options on SNAP benefits believe that participants would simply shift their purchase of unhealthy foods to their personal funds and use their benefits to purchase the healthier foods. Thus, limits to control purchases would be futile, with no net benefit to participant health.

Objective/Hypothesis:

This study will investigate conformity to TFP recommendations in low-income women receiving SNAP only or SNAP and WIC benefits in order to determine if the guidelines in place for WIC users improve participant grocery purchasing habits, leading to better health.

Experimental Approach:

At present recruitment of a sample of 100 SNAP only subjects and a sample of 100 subjects with both SNAP and WIC is being conducted. Women (18-50 years of age) are recruited from Austin area locations serving low income populations. In order to quantify participant purchasing patterns, participants are asked to collect grocery receipts for one month to measure conformity to Thrifty Food Plan recommendations.

Expected outcomes/recommendations:

Initial results indicate that the restrictions placed on WIC participants do improve conformity to Thrifty Food Plan recommendations, this suggests that SNAP benefits should have similar restrictions as those for the WIC program.

ABSTRACT #11

Maternal prepregnancy obesity associated with lower psychomotor development in boys at age 3

Amy Kweller¹, Beverly Insel², Andrew Rundle², Lori Hoepner^{2,3}, Pam Factor-Litvak², Virginia Rauh², Frederica Perera², Elizabeth Widen^{1,2}

¹University of Texas at Austin; ²Columbia University Center for Children's Environmental Health, New York, NY; ³SUNY Downstate Medical Center, Brooklyn, NY.

Background: Maternal obesity and environmental toxicant exposures disproportionately affect inner-city children and may detrimentally impact intellectual development. Whether maternal obesity and prenatal environmental exposures have interactive and confounding effects on child neural development remains unknown.

Methods: A cohort of African American and Dominican dyads (n=437) from Northern Manhattan and South Bronx were followed. Prenatal maternal measures included weight, plasma chlorpyrifos (CPF) and polycyclic aromatic hydrocarbons (PAH) assessed with a 48-hour backpack air-monitor. At 36 months, the Psychomotor Development Index (PDI) and Mental Development Index (MDI) of the Bayley Scales of Infant Intelligence (BSID-II), and the Home Observation for Measurement of the Environment (HOME) Inventory were completed. Sex-stratified linear regression models assessed PDI and MDI outcomes associated with maternal prepregnancy BMI, while controlling for pregnancy weight gain, HOME environment, and covariates. In a subsample with toxicant data, we evaluated for interactive or confounding effects of CPF (n=299) and PAH (n=386) with child outcomes.

Results: Of 437 women, 49.0% were normal weight before pregnancy, 24.5% overweight, 22.4% obese, and 4.1% underweight. At 36 months, mean scores on the PDI and MDI were higher in girls compared to boys [PDI: 101.5 vs. 96.8, $p < 0.001$; MDI: 92.4 vs. 88.5, $p < 0.001$]. In covariate adjusted models, maternal obesity was associated with lower PDI scores in boys [$\beta = -6.8$, 95% CI: (-11.7, -1.9), $p = 0.007$], but not girls. Maternal BMI was not associated with MDI in boys or girls (all- $p > 0.05$). In those with toxicant data, we observed that maternal PAH or CPF exposure did not impact associations (β change $< 10\%$ or interaction p -value > 0.05).

Conclusion: Prepregnancy obesity was associated with lower PDI scores at 36 months in boys, but not girls. Prenatal toxicant exposure did not influence associations. The mechanisms underlying this sex-specific association remain unclear, but due to elevated obesity exposure in urban populations, further investigation is warranted.

ABSTRACT #12

Effects of time-of-day dependent macronutrient intake on gut microbiota diurnal oscillations.

Diana E. Gutierrez, Laura M. Lashinger, and Molly S. Bray
Department of Nutritional Sciences, The University of Texas at Austin, Austin TX

Background:

Time-restricted feeding has been associated with fluctuations in gut microbiota that may influence host metabolism and energy balance, but the mechanisms by which this occurs remain largely unknown. The purpose of this study was to examine the effects of time-restricted macronutrient intake on the circadian oscillations of the gut microbiota.

Methods:

Male and female FVB/N mice were randomly assigned to one of four feeding groups (n=8/group). Two control groups received access to either high fat (HF; 45% fat) or low fat (LF; 10% fat) chow during the active (dark) phase of the light/dark cycle (zt12- zt24). Two timed-feeding groups received two simulated "meals" given during the first four (zt12- zt16) and last four (zt20-zt24) hours of the dark cycle, separated by a 4-h period with no food access. The Early High Fat (EHF) group was given access to HF food from zt12-zt16 and access to LF food from zt20-zt24, while the Early Low Fat (ELF) group was given the opposite meal pattern. After 13 weeks of diet, fecal samples were collected every 4 h for 24 h, and 16S sequencing was used to quantify bacterial taxa present in samples. Microbial abundance was normalized to zt0, and Cosinor analysis was used to examine rhythmicity of the microbiota at the phylum and family levels.

Results:

Significant ($p < 0.05$) rhythmicity was detected in the phyla Bacteroidetes and Firmicutes only in the EHF feeding condition, with peak abundance of each phylum phase-shifted by approximately 12 h, consistent with the presentation of high fat or high carbohydrate to the colon. At the family level, Rikenellaceae, Streptococcaceae, Mogibacteriaceae, and Erysipelotrichaceae displayed diurnal rhythmic oscillations in the EHF group only.

Conclusions:

Early high fat feeding is associated with diurnal oscillations of the gut microbiota in response to nutrient entrainment. These oscillations may optimally sync microbial and host metabolism in a manner that facilitates regulation of energy balance and fuel utilization.

ABSTRACT #13

The Effect of 15-week Exercise Training on Dietary Preferences among Sedentary Young Adults

Jaehyun Joo, Molly S. Bray

Background: While exercise has been shown to influence total energy intake, its effect on dietary preferences remains understudied. The purpose of this study was to explore dietary preferences among sedentary young adults undergoing aerobic exercise training and identify the role of physical exercise on change in dietary preferences.

Methods: The Training Intervention and Genetics of Exercise Response (TIGER) Study is a prospective cohort study with the goal of identifying genetic factors that influence physiological responses to a 15-week, 3 d/wk aerobic exercise training protocol. The Block food frequency questionnaire with 102 food items was used to collect dietary data before and after exercise training. Dietary pattern analysis was performed at baseline to capture habitual dietary preference in sedentary young adults (n = 2,730) using a Bayesian sparse factor model, accounting for the effects of gender and race/ethnicity. Dietary patterns were defined by including food items that met or exceeded a probability threshold > 0.95.

Transitions of dietary patterns were evaluated after the 15-week exercise training in terms of changes in dietary pattern scores.

Results: Seven dietary patterns were identified and denoted as: Prudent, Western, Snack and Sweets, Hispanic, Meat and Dairy Alternatives, Alcohol, and Cereal with Milk.

Differences in habitual dietary choices were observed by gender and by race/ethnicity. After the 15-week exercise training protocol, participants reduced overall food intakes in accordance with a significant reduction in daily energy intake (-255.85 ± 35.81 kcal/day). Exercise characteristics were most significantly related to Snack and Sweets preference, and also associated with Prudent and Western dietary choices in which their effects were dependent on race/ethnicity.

Conclusion: The process of becoming physically active may influence other health behaviors, including dietary intake. Our data show that compliance with the prescribed exercise regimen was associated with reductions in intake of sweets and snacks and maintenance of intake of healthy food items.

ABSTRACT #14

Food and exercise entrainment of circadian rhythms in a rotating shift work paradigm

Vasavi Shabrish, Dr. Laura M. Lashinger and Molly S. Bray

Abstract.

Many of our body's biological processes follow approximately 24-hour rhythms that regulate and maintain physiological functions in mammals. Endogenous timekeeping is achieved by the molecular circadian clock system, with the central circadian oscillator in the suprachiasmatic nuclei (SCN) within the brain and cellular self-sustaining oscillators in virtually all peripheral tissues. These molecular circadian clocks synchronize internal clock timing with external cues or zeitgebers ("timekeepers;" e.g., light, food) (1-3). The rise in obesity and metabolic disorders in the past century parallels advances in industrialization, travel, urbanization, and economic globalization that have created a "24-hour society", which is associated with a shift in the timing of daily activities (i.e., eating, activity, sleep) from the natural light-dark cycle in which we evolved (4). Shift work is characterized by out-of-phase performance of feeding, activity, and sleeping patterns, inducing a multitude of changes in the physiological state of an individual. These changes can dramatically alter the temporal organization of biological rhythms in humans, increasing the risk for development of obesity, metabolic dysfunction, cancer, sleep disturbances, and cognitive impairments (5-11). Nearly 27 million workers in the United States are working in shifts and flexible schedules, according to a 2004 report by Bureau of Labor Statistics (12).

Endogenous circadian rhythms are entrained to the environment via exposure to zeitgebers. Light is the dominant central zeitgeber, which resets the endogenous physiological and behavioral rhythms to match the 24-hour day (13, 14). Non-photic zeitgebers, including food intake (15, 16) and exercise (17, 18), are equally powerful entrainers of the peripheral cellular circadian clocks. Achieving stable coordination of entrainment of circadian rhythms between central and peripheral clocks in a rotating shift work paradigm is challenging due to the repeated shifts in exposure to light/dark, food, and physical activity every 3 to 4 days. In view of these challenges, we will investigate two interventions designed to accelerate metabolic re-synchrony: 1) restricting feeding only to active phase whether on-shift or off-shift and 2) scheduling physical activity via running wheels for 1-hour every 24 hours, independent of shifts in light/dark cycle. ***Thus the objective of this study is to determine if time-restricted feeding and/or regularly repeated timed daily 1-hr bouts of exercise in a murine rotating shift work model can ameliorate metabolic perturbations of circadian misalignment.***

The results of this study will help to better understand the links of altered circadian behavior and metabolic disturbances, while informing effective strategies to improve lifestyle, prevent chronic diseases, and promote overall health of shift workers.

ABSTRACT #15

Socioeconomic Status, Home Vegetable Availability, and Child Dietary Intake: A Secondary, Cross-Sectional Analysis of TX Sprouts: Abstract

Jessica Boisseau, Jaimie N. Davis

Purpose: Obesity prevalence in American children has more than tripled in the last forty years. Childhood obesity is linked to type II diabetes, and risk factors for heart disease. Both obesity and type II diabetes disproportionately affect low-income children. Consumption of fruits and vegetables (FV) is a dietary factor that has been targeted to promote healthier body weight due to its association with reduced risk of obesity. Socioeconomic factors and home availability of FV in the home have shown an association with consumption of FV. Thus, the aim of the present study is to examine the extent to which household income and availability of different types of vegetables in the home predict child vegetable intake.

Methods: The present study is a secondary cross-sectional analysis of TX Sprouts. Participants are 3rd-5th graders in the Austin, TX area. Household income data was collected via parent/guardian-reported data on child participation in the free/reduced lunch (FRL) program at school, as household income must not exceed 185% of the federal poverty line for children to qualify. Parents/guardians were asked to assess vegetable availability in the home, and child dietary intake data was collected via a questionnaire. Chi-square analyses were run to assess differences in vegetable availability by FRL participation. Non-parametric Kruskal-Wallis analyses of variance were used to analyze differences in mean vegetable intake by FRL participation and home vegetable availability. Friedman's nonparametric two-way analysis of variance was used to assess vegetable intake by FRL participation and home vegetable availability.

Findings: FRL participants had all types of vegetables available in the home "all of the time" significantly less frequently than expected ($p=0.000$). FRL participants consumed significantly more vegetables than their classmates not participating in the FRL program ($p=0.0001$). For fresh and cut-up vegetables and salad, mean vegetable intake was significantly greater among study participants who reportedly had them in the home "all of the time" compared to those who "never" had them in the home ($p<0.05$). Thus, FRL participants consumed more vegetables despite having fewer vegetables available in the home, although home vegetable availability was a strong determinant of vegetable intake. No significant interaction existed between FRL participation and home vegetable availability to affect mean vegetable intake.

Conclusions: While vegetable consumption among low-income children may be mediated by availability of vegetables at the school, increasing availability of vegetables in the home may be a policy target to promote vegetable intake for children of all SES backgrounds.

ABSTRACT #16

Obesity Induces a Senescent-Like Phenotype in Breast Stromal Fibroblasts

Brittany Harlow,¹ Albert Davalos,² Andrew Brenner,³ Steve Hursting,⁴ Linda deGraffenried¹

¹The University of Texas at Austin

²Buck Institute for Research on Aging

³UT Health Science Center at San Antonio

⁴The University of North Carolina

Background: Nearly 40% of American women present a BMI ≥ 30 , which is particularly alarming since obesity confers a worse prognosis for both pre- and postmenopausal breast cancer patients. Although the molecular mechanisms behind this remain unclear, obese conditions have been shown to upregulate certain components of the senescence associated secretory phenotype (SASP), which directly correlates with tumorigenesis. However, studies have yet to determine whether obesity induces a cohesive SASP from any one cell type in the breast tumor microenvironment. Because cancer-associated fibroblasts (CAF) represent the most common breast tumor cell type, it is of particular importance to investigate obesity-induced changes in this cellular compartment.

Hypothesis: We hypothesize that obesity induces a senescent-like phenotype in stromal fibroblasts by reprogramming the epigenome and modulating paracrine signaling events from breast tumor microenvironment.

Experimental Approach: *In vitro* obesity models will be used to assess the direct and indirect influence of obesity. To evaluate direct effects of obesity on fibroblast phenotype, we will expose IMR-90 and HCA2 human fibroblasts to media supplemented with 2% sera from obese women and evaluate changes in gene expression of senescent markers. We will also assess the influence of obesity as mediated by other components of the breast tumor microenvironment. Specifically, we will expose these cells to obese sera, collect the conditioned media, and apply it to fibroblasts, after which the fibroblasts will be assessed for senescent markers. The gene expression analyses will effectively indicate secretory phenotype, as the mRNA transcript analyses of senescent cells correlate positively with secreted protein-antibody arrays.

Results and Conclusions: In revealing the association between obesity and senescence, our studies will help elucidate the mechanisms by which obese conditions impact the carcinogenic process. In addition, the data will contribute to our understanding of effects mediated by the tumor microenvironment and thereby emphasize the importance of maintaining a stroma-inclusive focus in cancer research.

ABSTRACT #17

Fully Automated Derivatization for Fatty Acids Analysis by Gas Chromatography-Mass Spectrometry

Paul Gries, Jennifer Chiou, Nathalie Munoz and Stefano Tiziani

Department of Nutritional Sciences & Dell Pediatric Research Institute, University of Texas at Austin, 1400 Barbara Jordan Blvd., Austin, TX

Gas chromatography-mass spectrometry (GC-MS) provides an adaptable and rugged platform for the detection and analysis of fatty acids. Analysis of fatty acids by GC-MS generally requires derivatization of fatty acids by chemically transforming them to fatty acid methyl esters (FAMES) which reduces their polar nature and the subsequent adsorption within the GC column and improves the peak separation in the resulting chromatogram. Numerous derivatization techniques with various reagents are currently employed and are performed manually. However, the resulting FAMES are commonly time-sensitive and may degrade if not sampled within an appropriate time frame. The adaptation of a robotic autosampler to a preexisting GC-MS platform allows for the creation and optimization of an automatic derivatization and injection protocol that can standardized sampling time and improve reproducibility compared to manually derivatized and injected samples. Optimized automated protocols provide highly reproducible spectrometric analysis and reduces the total hands-on time required for sample preparation. Here we present our current efforts towards generating an automated derivatization and direct injection protocol for the detection and analysis of fatty acids in biological samples. Fatty acids were extracted from human and fetal bovine serum using a modified Folch extraction method with a 2:1 ratio of isooctane to 2:1 methanol: saline. The extracted fatty acids were derivatized manually or in automation by the Thermo-Scientific Triplus RSH robotic autosampler with trimethylsulfoniim hydroxide solution (TMSH). Spectrograms and mass spectrometry data resulting from these experiments was analyzed with Thermo Xcalibur Quantitative Browser. Automatic derivatization resulted in spectrograms containing more stable baselines and higher signal-to-noise ratios when compared to manually derived samples. Automatic derivatization can be effectively applied to existing GC-MS platforms and reduce time needed to prepare biological samples while simultaneously increasing experimental reproducibility data quality.

ABSTRACT #18

Professional Development Needs in Nutrition & Dietetics

Genevieve James

Background: Nutrition is a broad, multidisciplinary field where it is difficult to identify current knowledge gaps in the field. With nutrition research constantly changing and evolving, it is imperative that nutrition professionals continue to learn and update their knowledge to remain effective translators of nutrition to the public. This is often a tough task due to the wide range of medical nutrition therapy information a healthcare professional needs to know. Nutrition professionals have a working knowledge of what is relevant in the field, as well as what is lacking in professional development resources. The purpose of this study is to identify and examine knowledge gaps in-depth by surveying nutrition and dietetics professionals. The outcome of this study will provide an extensive analysis of these topics/areas, and a clearer picture of the current state of nutrition research and professional development resources, leading to possible paths forward to advance the field.

Objective/Hypothesis:

Aim I. Identify knowledge gaps and needs of nutrition dietitians and nutrition professionals.

Aim II. Translate knowledge gaps to recommendations needed for nutrition education and research.

Experimental Approach: Participants will be professionals who are members of Dietetic Practice Groups (DPGs) in the Academy of Nutrition and Dietetics, and they will be sent a series of cross-sectional surveys. The first survey will identify areas that have significant knowledge gaps in the nutrition field. From this survey, the top ten most commonly selected areas will be chosen for further investigation. A minimum of two surveys will be designed, focusing on five areas each to keep the surveys from becoming too long. These follow-up surveys will explore the depth of knowledge necessary for professional development in the selected areas.

ABSTRACT #19

The Relationship Between Parental Perception of Child Weight Status and Actual Child Weight Status

Minji Chae

Background: Childhood obesity has become a national epidemic in the United States. Being overweight or obese as a child is a strong predictor of adult obesity. Parents may not be aware or recognize that their child is overweight or obese. An accurate perception of weight status is essential in obesity treatment and prevention. Parents, regardless of culture and age, tend to underestimate the weight of their child. There is limited research that examines the parental perception of child weight status in Hispanic populations.

Objectives: The goal of this study is to examine the relationship between parental perception of child weight status and actual weight status of children participating in TX Sprouts. The hypothesis is that parents will significantly underestimate overweight/obese status of their child.

Methods: Baseline data will be collected from wave 1 and wave 2 of TX Sprouts, which is a large randomized gardening, nutrition, and cooking controlled trial for 3rd, 4th, and 5th grade students from 16 low-income, predominately Hispanic elementary schools. The following measures will be obtained at baseline on approximately 2,000 3rd-5th grade students (8-10 years of age): demographics (age, ethnicity), height via stadiometer, weight and body fat via Tanita scale, and parental report of child's height and weight via survey. Data will be analyzed using SPSS (version 22, $p < 0.05$). T-tests will be performed to assess the relationship between parental assessment of weight status category and actual weight status category.

Implications: These findings will shed light on how a parent's assessment of child weight status relates to actual child weight status. This information can be used to improve future interventions aimed to prevent childhood obesity through parental involvement and influence.

ABSTRACT #20

Home Environment Factors That Influence Pre-Diabetes Rates In Low-Income Hispanic Children

David Rihn, supervised by Dr. Jaimie Davis & Fiona Asigbee

Background: Non-white racial and ethnic groups are disproportionately affected by Type 2 diabetes (T2D). It is estimated that by 2050 one out of three people within this population will have T2D. Few studies have examined how the home environment contributes to the child's risk for pre-diabetes and T2D. Additionally, most pre-diabetes related studies focus on adult subjects, leaving pre-diabetes rates in children an undiscovered area of research.

Objectives/Hypothesis: The purpose of this study is to characterize the home environment and family-based social interactions of school-aged children to determine if these factors are associated with pre-diabetes. Approximately 40% of wave 1 participants were pre-diabetic. It is expected that nearly 800 children in wave 2 will have pre-diabetes; therefore, it is hypothesized that economically disadvantaged children of single parents will have higher pre-diabetes and diabetes rates.

Experimental Approach/Results: Baseline data from wave 1 and wave 2 of TX Sprouts, which is a cluster-randomized gardening, nutrition, and cooking trial delivered to low-income, primarily Hispanic 3rd-5th grade students, will be used. Parental demographics via parent survey, child anthropometrics (body mass index, waist circumference, body fat percentage), and diabetes prevalence via fasting blood draw will be used for analyses. Children will be characterized as normal or pre-diabetic using American Diabetes Association cut points for fasting blood glucose (FBG) and/or HbA1c values: FBG values > 100-126 mg/dL and HbA1c between 5.7-6.4%. Data will be analyzed using SPSS and cleaned for normality. Descriptive statistics and correlations will be performed to determine if there is a relationship between the parental demographics and pre-diabetes rates of children.

Conclusions: Results from this study can be used to determine which parental demographics are linked to pre-diabetes in children (7-10 years of age), which will inform future intervention work to target specific at risk populations.

ABSTRACT #21

Determining how Obesity Prevalence Impacts Prediabetes Rates in Young Children

Caroline McFarland

Background: Prediabetes is characterized by elevated blood glucose levels between >100-126 mg/dL. Individuals with prediabetes are at a higher risk for developing type 2 diabetes (T2D) and cardiovascular disease, and obesity is often associated with increased risk of prediabetes. Over 30% of overweight/obese Hispanic adolescents have been shown to have prediabetes; however, few studies have examined prediabetes rates in younger children.

Objectives: The purpose of this study is to assess the impact of obesity prevalence on prediabetes rates using fasting blood glucose levels in young children (7-10 years of age). It is hypothesized that there will be a positive correlation between overweight/obesity prevalence rates and prediabetes rates.

Methods: Data from baseline TX Sprouts waves 1 and 2 will be used for this analysis, which includes approximately 2,000 3rd-5th grade students from 12 schools participating in a large-school based gardening, nutrition, and cooking randomized controlled trial. An estimated 50% of enrolled children are expected to participate in the blood draws. All ethnicities/races will be included; however, the selected schools are >50% Hispanic. The following baseline measures will be collected: height via stadiometer, weight and body fat via Tanita scale, and fasting glucose via blood draw. BMI parameters will be calculated. Data will be analyzed using SPSS, $P < 0.05$. Chi-square analyses will be performed to assess differences in overweight/obesity prevalence rates and prediabetes rates.

Implications: Understanding the impact of overweight/obesity prevalence rates on prediabetes rates in young children will provide valuable information to aid in clinical screening practices for children and in developing future interventions targeting prediabetes.

ABSTRACT #22

The Relationship Between Fasting Blood Glucose and HbA1c Values in Assessing Prediabetes in Elementary School Children

Madeline M. Borel

Background: An increasing number of adolescents and adults are being diagnosed as prediabetic or with type 2 diabetes (T2D). There is limited research regarding the onset of T2D in children and it is unclear which methods of diagnosis are most accurate.

Objectives: The purpose of this study is to assess and compare fasting blood glucose (FBG) values and Hemoglobin A1c (HbA1c) values in order to ascertain prediabetes rates of participants. Initial FBG values from wave 1 on 412 subjects revealed that 46% were prediabetic and we hypothesized that prediabetes rates will be slightly lower using HbA1c cut points.

Methods: Data will be collected from TX Sprouts baseline wave 2 data, a large school based gardening, nutrition, and cooking randomized controlled trial of low-income, primarily Hispanic 3rd - 5th grade students (8-10 years of age). Anthropometrics (height, weight, BMI parameters) will be measured and an optimal fasting blood draw will be performed immediately in the morning to assess HbA1c and FBG on an expected group of 500 children. Participants will be characterized as prediabetic according to the American Diabetes Association definitions: FBG values >100-126 mg/dL and HbA1c 5.7-6.4%. Data will first be examined for normality and log transformations will be made if data is not normal. Subsequently, t-tests will be run to examine differences between FBG and HbA1c values (SPSS version 22). Chi-square tests will be run to examine differences in prediabetes prevalence rates using both cut-points.

Implications: Findings will help validate prediabetic rates in participants from wave 1. Comparing these blood measurements will help determine if FBG and HbA1c values are useful variables to diagnose prediabetic children.

ABSTRACT #23

Obesity-Induced Enrichment of Stem-like Cells in the Breast Tumor Microenvironment

Christopher Hsu,¹ Anna Hayden,¹ Elizabeth Eichman,¹ Duan Quach,¹ Brittany Harlow,¹ Gloria Galván,¹ Andrew Brenner,² Chris Jolly,¹ Linda deGraffenried¹

1 The University of Texas at Austin

2 UT Health Science Center at San Antonio

Background:

Breast cancer represents the second leading cause of cancer-related mortality among women in the United States, and most deaths are the result of metastasis and therapeutic failure. Obese breast cancer patients have a higher risk of a more aggressive disease compared to lean patients, although the mechanisms causing obesity-driven progression are not well understood. However, several studies suggest that obesity plays a role in inducing a “stem-like” phenotype, and our preliminary data suggest a “reprogramming” occurs, transforming well differentiated cells to a more stem-like phenotype. In addition, earlier studies have shown that exposure to obese sera in both MCF-7 and T47D cells increases expression of TWIST and SNAIL, both known EMT transcription factors with a potential role in stem-cell reprogramming.

Hypothesis:

Obesity induces disease progression through *epigenetic reprogramming of breast epithelial cells towards a more stem-like phenotype*.

Experimental Approach: Flow cytometry will be used to determine if exposure to obese sera enriches for a CD44+/CD24-/low and ALDH1+ population in these well differentiated luminal A cells. Additionally, qPCR will be used to measure the expression levels of factors associated with stem-cell and EMT programming, including KLF4, OCT4, SOX2, and NANOG, and the miRNAs miR-221/222, miR-760, and the Let-7 family.

Conclusions: Results from the current studies will lay an important foundation for understanding how obesity modulates breast cancer disease progression, and understanding of the factors and mechanisms by which obesity confers a more stem-like phenotype will result in the acquisition of therapeutic targets, resulting in treatments that improve response and survival in the obese patient.

ABSTRACT #24

Modulation of FASN Under Obese Conditions

Ali Oberman¹ and Irene (Kyurim) Kim¹, Tommy Pham², Christopher Jolly¹, David Cavazos², Andrew Brenner², Alejandra De Angulo¹, Linda deGraffenried¹

¹ The University of Texas at Austin ² The UT Health Science Center at San Antonio

Introduction: Obesity is associated with a worse breast cancer prognosis, in part through altering metabolism in cells of the breast tumor microenvironment. In particular, changes in metabolism associated with fatty acid utilization have been noted in several types of cancer. Changes in expression and activity of the Fatty Acid Synthase enzyme (FASN), can modulate tumor behavior. FASN regulates tumor behavior by modulating beta-oxidation energy utilization and plasma membrane signaling. Previous studies in our lab have demonstrated that exposure to obese conditions induces significant changes in breast cancer cell proliferation. Additionally, obesity modulates activity of other cells within the breast tumor microenvironment, including adipocytes. . *We hypothesize that obesity induces breast cancer proliferation through regulation of FASN. FASN may be a viable target to limit obesity-induced breast cancer progression.*

Methods: FASN has been shown to promote cancer cell proliferation through generating fatty acid precursors required for cell proliferation, altering membrane fluidity, and activating oncogenic signaling pathways. To determine if modulation of FASN is an important mechanism by which obesity promotes disease progression, MCF-7 breast cancer cells and human pre-adipocyte cells (ASC) were exposed to 2% sera from obese postmenopausal women and 2% sera from non-obese (control) women.

Results : Exposure to the obese sera resulted in increased expression of FASN in MCF-7 breast cancer cell lines, Preliminary results also demonstrated that FASN inhibitor inhibits obesity-induced breast cancer cell growth.

Conclusions : Our findings indicate that obesity promotes upregulation of FASN in MCF-7 breast cancer cells . We also found that using a FASN inhibitor is effective in limiting cancer cell proliferation. The goal of our study is to demonstrate if FASN is an important mechanism by which obesity promotes disease progression, The results of these studies will provide a better understanding of how obesity alters the production of FASN, thus making breast cancer more aggressive. FASN inhibitors may be a novel target for treating and preventing breast cancer in obese subjects.

ABSTRACT #25

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

Alejandro Casco, Gloria Galvan, Duan Khahn Quach, Dr. Linda deGraffenried

Background: Androgen deprivation therapy (ADT) is the first line therapy for recurrent prostate cancer (PC) and is highly effective at early stages. Unfortunately, androgen receptor (AR) activity begins to increase over time, and eventually progresses in an androgen-independent manner. Studies indicate that compared to non-obese men, obese men show greater rates of recurrence and increased rates to CRPC after ADT. In this study, we attempt to elucidate the mechanisms behind these increased rates for obese men.

Hypothesis: Epigenetic changes facilitate AR binding to target gene promoters

Experimental Approach: We will determine whether obesity upregulates FoxA1 activity, LNCaP cells will be treated with various treatments including obese sera, non-obese sera, and insulin-like growth factor 1 (IGF-1). We will then investigate if there is an increased interaction between the pioneer factor forkhead box protein A1 (FoxA1) and the AR by co-immunoprecipitation (Co-IP) in the prostate cancer LNCaP cell line. We will also determine whether cAMP responsive element binding protein 1 (CREB1) – which facilitates FoxA1 binding to DNA – contributes significantly to increased AR activity under these obese conditions. The AR/DNA binding will be analyzed by chromatin-immunoprecipitation followed by quantitative polymerase chain reaction (qPCR) analysis. We suspect IGF-1 to be the compound driving increased AR activity in obese individuals as it is known to be upregulated in obese individuals and plays an important role for AR activation and FoxA1/DNA binding stability. qPCR analysis of ubiquitin conjugating enzyme E2 (UBE2C) levels – a known target gene for FoxA1 and AR – will be used to confirm increased AR activity under obese conditions due to epigenetic changes.

Results: 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. The proposed mechanism could provide insight of a novel mechanism by which the obese state promotes the rate of PC recurrence.

ABSTRACT #26

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

Presenter(s): Christian Johnson

Collaborator(s): Christian Johnson, Gloria C. Galván, Linda A. deGraffenried

Department(s): Department of Nutritional Sciences, Dell Pediatric Research Institute

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.

ABSTRACT #27

The Ratio of Omega-3 to Omega-6 PUFAs Impact Cancer Cell Phenotype in the Tumor Microenvironment

Laura Winikka, Duan Quach, Brittany Harlow, Andrew Brenner, Nathalie Munoz, Stefano Tiziani, Linda deGraffenried

Background: Studies have shown that obesity is associated with a worse breast cancer prognosis. Besides the effect of different stages of diagnosis and co-morbidities, recent data from our published *in vitro* and retrospective studies suggests that this phenomenon may occur because the obese state promotes a more aggressive cancer phenotype through the cyclooxygenase (COX-2) pathway and its production of prostaglandin E2 (PGE2). The metabolization of omega-3 fatty acids decreases the production of PGE2, and has been shown to have potential benefit to cancer patients by decreasing inflammation-related signaling.

Objective/Hypothesis: Our previous clinical trial showed mixed results in the effect of omega-3 PUFA supplements on PGE2 production in post-menopausal obese women. This led us to the hypothesis that *the ratio of omega-3 to omega-6 PUFAs have differential effects on cell types within the tumor microenvironment, impacting cancer cell phenotype.*

Experimental Approach: *In vitro* experiments, including wound-healing assays to determine motility, and clonogenic assays to determine overall survival, were performed to determine if exposure to higher ratios of omega-6 to omega-3 fatty acids lead to a more aggressive cancer phenotype. MCF-7 breast cancer cells were treated with the following fatty acid ratios of omega-6 (*arachidonic acid (AA)*) to omega-3 (*eicosapentaenoic acid (EPA)* and *docosahexaenoic acid (DHA)*): 46:1, 20:1, 10:1, and 1.3:1.

Results: The wound-healing assays showed greater motility with higher ratios of omega-6 to omega-3 fatty acids conditions and the clonogenic assays showed greater survival with the higher ratios.

Conclusions: These data indicate that lowering ratios of omega-6 to omega-3 fatty acids may lessen the aggressiveness of breast cancer cells and be beneficial to some patients. Studies are on-going to investigate indirect effects from modulation of the other cells within the tumor microenvironment, including the macrophages and adipocytes, as these cells have been shown to produce more PGE2. Through intercellular communication, these cells may further induce a more aggressive phenotype in breast cancer cells when exposed to higher ratios of omega-6 to omega-3 fatty acids.